FINAL
ENVIRONMENTAL IMPACT REPORT &
ENVIRONMENTAL IMPACT STATEMENT
Volume 1 of 3

LOWER OWENS RIVER PROJECT

June 23, 2004

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Bishop, California 93514

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CEQA Responsible Agency:

Inyo County Water Department
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FINAL
ENVIRONMENTAL IMPACT REPORT AND ENVIRONMENTAL IMPACT STATEMENT

Lower Owens River Project
Inyo County, California

Issued June 23, 2004

Project Summary: Los Angeles Department of Water and Power (LADWP) and Inyo County propose to implement a large-scale habitat restoration project in the Owens Valley. The Lower Owens River Project (LORP) was originally identified in a 1991 agreement between Inyo County and LADWP. The project was identified in a 1991 EIR as mitigation for impacts related to groundwater pumping by LADWP from 1970 to 1990. The project was augmented in a Memorandum of Understanding signed by LADWP, Inyo County, and other parties. The LORP will be implemented through a joint effort by LADWP and Inyo County. The US Environmental Protection Agency will contribute funding for a portion of the project. The LORP involves four primary restoration efforts: (1) releasing water to the Lower Owens River to enhance native and game fisheries and riparian habitats along 62 miles of the river; (2) providing water to the Owens River Delta to maintain and enhance various wetland and aquatic habitats; (3) enhancing a 1,500-acre off-river area with seasonal flooding and land management to benefit wetlands and waterfowl; and (4) maintaining several off-river lakes and ponds. The project also includes construction of a pump station to capture and recover some of the water released to the river. In addition, the project includes range improvements and modified grazing practices on leases in the LORP project area

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EXECUTIVE SUMMARY

1. BACKGROUND

In 1991, Los Angeles Department of Water and Power (LADWP) and Inyo County approved the Inyo County/Los Angeles Long Term Water Agreement (Agreement) that provides environmental protection of the Owens Valley from the effects of groundwater pumping and water exports while maintaining a reliable water supply for the City of Los Angeles. The Agreement and a Final Environmental Impact Report (1991 EIR) were then submitted to the Court with a joint request to end ongoing litigation. Shortly thereafter, concerns about the legal adequacy of the 1991 EIR were raised by state agencies and environmental groups.

In 1994, the Court ordered the County and LADWP to respond to certain of these issues. After several years of settlement discussions among all parties, a Memorandum of Understanding (MOU) was executed that provides resolution over the concerns about the 1991 EIR, particularly related to the adequacy of mitigation described in the EIR for impacts due to historic pumping and diversion activities in the Owens Valley. The MOU was lodged with the court which in June 1997, discharged its writ ending the litigation between Inyo and LADWP and freeing the parties to implement the Agreement and the 1991 EIR mitigation measures. Parties to the MOU include LADWP, Inyo County, California Department of Fish and Game, State Lands Commission, Sierra Club, and Owens Valley Committee and Carla Scheidlinger.

2. ORIGINS AND OBJECTIVES OF THE LORP

The Lower Owens River Project (LORP) was identified in the 1991 EIR as mitigation for impacts related to groundwater pumping by LADWP from 1970 to 1990. The MOU specifies the goal of the LORP, timeframe for development and implementation, and specific actions. It also provides certain minimum requirements for the LORP related to flows, locations of facilities, and habitat and species to be addressed. Finally, the MOU specifies that LADWP and Inyo County prepare an EIR for the LORP and issue a draft EIR within 36 months of execution of the MOU (i.e., June 2000), and that flows in the river begin within 72 months of the MOU execution (i.e., June 2003). Under the LORP, natural habitats will be created and enhanced consistent with the needs of certain habitat indicator species through the application of appropriate flow and land management practices.

The LORP will be implemented through a joint effort by LADWP and Inyo County. The U.S. Environmental Protection Agency (EPA) will provide funding for the project, but will not be actively involved the implementation of the project. Regulatory agencies, including the California Department of Fish and Game, Lahontan Regional Water Quality Control Board, and U.S. Army Corps of Engineers, will influence the LORP through various permits and approvals.

As provided in the MOU, the LORP will be adaptively managed. This means that, subject to funding limitations and consistency with the MOU, project management will be modified if ongoing monitoring and analysis reveal that such modification is necessary to ensure the successful implementation of the project and the attainment of the project goals. The LORP includes a long-term monitoring plan for collecting and analyzing data on the progress toward meeting the LORP goals.

3. LORP PLAN ENVIRONMENTAL REVIEW

The MOU specifies that LADWP and the County will direct and assist Ecosystems Sciences (MOU LORP consultant) in the preparation and implementation of the LORP ecosystem management plan. A draft LORP Plan was issued for review by parties to the MOU in May 1999, and a revised plan was issued in August 2002.

The MOU also specifies that LADWP, as the CEQA Lead Agency, and Inyo County as a CEQA Responsible Agency, will jointly prepare the EIR on the project. LADWP is the CEQA Lead Agency because it has the primary responsibility for the project through discretionary actions to fund and physically implement the LORP. A portion of the funding for the LORP will be derived from federal grant funds provided by EPA. The allocation of such funds from EPA to Inyo County and LADWP is a federal action by EPA subject to the environmental review requirements of the National Environmental Policy Act (NEPA). Hence, a federal Environmental Impact Statement was prepared for the LORP, and incorporated into a joint EIR/EIS document.

The Draft EIR/EIS on the LORP was issued on November 1, 2002. The public review and comment period began on November 1, 2002 and ended on January 14, 2003. A total of 241 written comment letters were received on the Draft EIR/EIS. In addition, public meetings were held in Lone Pine on December 4, 2002 and in Bishop on December 5, 2002 to receive oral comments on the Draft EIR/EIS. A total of 19 people provided oral comments at the two meetings.

After the publication of the Draft EIR/EIS, the MOU parties continued to hold additional negotiations to resolve the dispute over the two alternatives for the pump station capacity presented in the Draft EIR/EIS and other issues related to the MOU. In February 2004, the MOU parties reached an agreement, and a Stipulation and Order was entered in Inyo County Superior Court (Case Number S1CVCV01-29768, Sierra Club and Owens Valley Committee v. City of Los Angeles et al., February 13, 2004). This February 2004 Stipulation and Order specifies the following with respect to the LORP project description:

- The maximum flow to be diverted by the pump station from the river will be 50 cfs. (See Section 2.4.)
- LADWP will provide matching funds for LORP saltcedar control equal to the amount obtained by the County up to a total of $1.5 million (not to exceed $500,000 in any given year). Matching funds will be in addition to the funds provided by LADWP for saltcedar control under the Inyo County/Los Angeles Long Term Water Agreement. LADWP will commence providing funding by matching the $560,000 Wildlife Conservation Board (WCB) grant that was awarded to the County in February 2004. (See Section 2.2.2 and Section 10.4.4.)

The LORP project description presented in Section 2.0 of this Final EIR/EIS reflects these requirements specified in the Stipulation and Order. In addition, the Stipulation and Order specifies an implementation schedule for the LORP, and requires that the baseflow of 40 cfs be achieved in the river no later than April 1, 2006 (see also Section 2.2.3 "Schedule and Phasing").

Appendix J (Volume 2) of this Final EIR/EIS presents the written comment letters on the Draft EIR/EIS and the written transcripts of the two public meetings, and Appendix K (Volume 3) presents responses to these comments. Please note that URS Corporation, consultant to Inyo County for the Draft EIR/EIS, assigned numbers to the comment letters; specific number series (61 through 69 and 71 through 79) were not used.

Throughout 2003 and until early May 2004, LADWP, EPA, and Inyo County coordinated closely to prepare the Final EIR/EIS, with the objective of reaching consensus on all issues among the three agencies. However, in order to meet the court-established deadline to release the Final EIR/EIS by June 23, 2004, LADWP informed Inyo County Superior Court on May 10, 2004 that LADWP would complete the document on its own, without further consultation with EPA and Inyo County. On May 11, 2004, LADWP informed EPA and Inyo County that LADWP would strive to incorporate the comments that had been received from the two agencies thus far, and also invited the two agencies to submit any additional comments by May 14 for LADWP's consideration and incorporation to the extent possible within the remaining time available. Therefore, this Final EIR/EIS reflects the consensus reached on the issues discussed by the three agencies as of May 2004.

4. ELEMENTS OF THE LORP

The MOU provides that natural habitats will be created and maintained consistent with the needs of certain "habitat indicator" species through flow and land management in the project area. The MOU identifies the four physical features of the LORP, which are described below.

Lower Owens River Riverine-Riparian Ecosystem

The goal for the Lower Owens River Riverine-Riparian System is to create and sustain healthy and diverse riparian and aquatic habitats and a healthy warmwater recreational fishery with habitat for native fish species. The MOU specifies that a baseflow of 40 cubic feet per second (cfs) will be established from the River Intake to the pump station near the Owens River Delta. This reach is approximately 62 river miles long. The MOU also specifies an annual seasonal habitat flow of up to 200 cfs. The annual amount of the seasonal habitat flow will depend on the runoff amount in Owens Valley each year.

Owens River Delta Habitat Area

The goal for the Delta Habitat Area under the MOU is to enhance and maintain approximately 325 acres of existing wetland habitat within the Delta. The management action for creating and enhancing habitats in the Delta is to establish baseflows to the Delta with an average annual flow of 6 to 9 cfs, as specified in the MOU. Within the 6 to 9 cfs annual average flow, four pulse flows of 20 to 30 cfs will be released to the Delta for short periods of time. The daily baseflow would be the amount necessary to maintain Delta conditions and to conserve water for use in the Delta during other times of the year (within the 6-9 cfs annual average and a minimum of 3 cfs) and for delivery to Los Angeles. In addition, higher flows may pass through the pump station to the Delta during the annual seasonal habitat flows in the Lower Owens River of up to 200 cfs.

The MOU includes a pump station to be located between Keeler Bridge and the Lower Owens River Delta. The facility is designed to capture flows in the river and divert the water to the Owens Lake dust control project, or to the Aqueduct for use by LADWP. Water that is not captured will be by-passed to the Delta. The pump station will include a rock/earthen/concrete diversion structure placed across the river, a facility pad with an enclosed pump building, and ancillary facilities including service roads, in-channel sediment basins, a power line, and pipelines.

Blackrock Waterfowl Habitat Area

The MOU specifies that a 1,500-acre off-river area with a mixture of pasture and wetlands be enhanced through flow and land management to benefit wetlands and waterfowl. Approximately 500 acres of the habitat area are to be flooded at any given time when runoff is forecasted to be average or above average with reductions in water supplies in less than average runoff years. The proposed flooding will increase wetland productivity and diversity, which is consistent with the approach described in the LORP Plan. The management units would be subject to periodic cycles of wetting and drying so that one to three management units would be wholly or partially flooded at any given time. Various physical improvements to existing ditches, berms, and spillgates will be necessary to manage water conveyance and flooding in the management units

Off-River Lakes and Ponds

The MOU specifies that existing off-river lakes and ponds near the Blackrock Waterfowl Habitat Area be maintained for fisheries, waterfowl, shorebirds, and other animals through flow and land management. The off-river lakes and ponds identified in the MOU are: Billy Lake, Goose Lake, Thibaut Ponds, and Upper and Lower Twin Lakes. The MOU includes goals for "habitat indicator species" related to the actions at the off-river lakes and ponds.

Other LORP Management Actions

The LORP also includes a land management plan for LADWP leases within the LORP project area. It focuses on enhancing native habitat diversity while allowing for sustainable grazing. New riparian pastures and riparian and upland utilization rates would be established. Other actions include protection of rare plant populations, establishment of off-river watering sources to reduce use of the river and off-river ponds for cattle watering, and monitoring of grazing utilization throughout the lease areas to ensure that grazing rates maintain the long-term productivity of the rangelands.

Threatened and endangered species are considered in the LORP Plan. The LORP actions would protect and enhance habitat for these species; however, the LORP does not include any actions to create sanctuaries for these species, nor does the project include any deliberate actions to introduce, manage, or enhance populations of these species. Although the MOU specifies that a Habitat Conservation Plan will be prepared as one part of the LORP Plan, LADWP has concluded, after conferring with MOU parties, to delay initiating the development of an HCP until the LORP has been approved or implemented.

5. SUMMARY OF ENVIRONMENTAL IMPACTS

The LORP is designed to improve environmental conditions, but may cause incidental and unintended adverse environmental impacts, many of them temporary. The objective of the EIR/EIS is to evaluate the impacts of the proposed LORP in order to allow LADWP, the County, and EPA to make informed decisions on how to minimize impacts of the project. The significance of individual impacts was classified as shown below.

- Class I Impacts - Unavoidable Significant Impacts. The impacts cannot be avoided if the project is implemented, and cannot be mitigated to a level of insignificance. For these impacts, LADWP (as the CEQA Lead Agency) must issue a "Statement of Overriding Considerations" under CEQA if the project is approved. This statement is a finding that the project should be implemented even though it will cause significant impacts to the environment. Inyo County must issue the same finding when it takes action on the project as the CEQA Responsible Agency. EPA must explain in their Record of Decision why these impacts are acceptable in light of the project benefits.

- Class II Impacts - Significant Environmental Impacts that can be Mitigated to a Less than Significant Level. For these impacts, the EIR/EIS identifies mitigation measures that will avoid significant impacts. LADWP and Inyo County must adopt those mitigation measures if the project is approved.

- Class III Impacts - Other Environmental Impacts that are Considered Adverse but not Significant. Mitigation measures are recommended to minimize these adverse impacts, but the lead agencies are not required to adopt them.

- Class IV Impacts - Beneficial Impacts.

CEQA requires that the lead agency identify feasible measures for all significant impacts (Class I and Class II), if available, that would mitigate those impacts to a less than significant level. These measures must be adopted by the lead agency if they are considered feasible. Mitigation measures for less than significant impacts are voluntary under CEQA. Under NEPA, feasible mitigation measures for all impacts must be identified whether they are significant or not. The federal lead agency need not adopt the mitigation measures identified in an EIS, but should identify all relevant, reasonable mitigation measures that could alleviate the environmental effects of a proposed action. Accordingly, in the Draft EIR/EIS, mitigation measures were identified as CEQA mitigation or NEPA mitigation. During the preparation of the Final EIR/EIS, LADWP determined that, with the exception of Mitigation Measure P-2 (as numbered in the Draft EIR/EIS), all mitigation measures that were identified in the Draft EIR/EIS to further reduce Class III impacts (i.e., voluntary mitigation) will be adopted by LADWP. It should also be noted that Mitigation Measures AQ-1 and AQ-2 were revised since the publication of the Draft EIR/EIS and will be adopted by LADWP as revised and presented in the Final EIR/EIS. Table S-1 presents all mitigation measures that will be adopted by LADWP.

The EIR/EIS includes a comprehensive analysis of the potential environmental impacts of the LORP, and an analysis of various alternatives. The environmental impacts that are evaluated in the EIR/EIS include: water quality, native and game fish, wetlands and riparian habitats, upland habitats, wildlife, threatened and endangered species, cultural resources, air quality, and public health. Based on the analyses in the EIS/EIR, the LORP is expected to cause the following significant, unmitigable impacts (Class I). These impacts are also listed in Table S-1.

1. During the first several years of the project, the baseflows and seasonal habitat flows could degrade water quality along the river, primarily downstream of Mazourka Canyon Road. The interactions of increased flows with organic sediments in the channel may reduce dissolved oxygen levels and increase hydrogen sulfide and ammonia levels. These impacts would be minimized to the extent feasible by flow management actions, but cannot be entirely avoided. There is no feasible mitigation measure to fully avoid this impact.

2. The temporary adverse water quality conditions during the initial releases to the river could adversely affect fish due to the depletion of oxygen, and possible increase in hydrogen sulfide and ammonia. The poor water quality could cause fish kills along the river downstream of Mazourka Canyon Road. Both the 40 cfs baseflow and the seasonal habitat flows of up to 200 cfs could potentially cause water quality degradation. The fishery is expected to recover once water quality conditions improve. There is no feasible mitigation measure to fully avoid this impact.

The LORP is expected to cause various other environmental impacts that could be mitigated to less than significant levels (Class II), that are minimal in nature (Class III), or beneficial (Class IV). These impacts and mitigation measures are listed in Table S-1.

6. ALTERNATIVES

Several alternatives were evaluated in the EIS/EIR that could potentially avoid or reduce the significant environmental impacts (Class I). They are listed in Table S-2. LADWP has determined that these alternatives are not preferable to the proposed project because of one or more of the following reasons: (1) they are infeasible; (2) they may cause other incidental environmental impacts; (3) they would unnecessary delay the implementation of the LORP, and/or (4) the effectiveness of the alternative in reducing the significant impact is uncertain.

TABLE S-2
SUMMARY OF ALTERNATIVES TO AVOID SIGNIFICANT IMPACTS

Significant Impact of the Proposed Project (Class I)	Alternatives to Avoid or Reduce the Impact	Feasible? (as Determined by Lead Agencies)	Does the Alternative Have Other Significant Impacts?
Water quality degradation and fish kills during initial flows (two impacts)	Release Regime 1 - Gradual Baseflows and Deferred Seasonal Habitat Flows	No. While technically feasible t, not environmentally superior to the proposed project and infeasible due to delay in establishment of 40 cfs baseflows	No. However, this alternative would further delay achievement of LORP goals.
	Release Regime 2 - Begin with Seasonal Habitat Flows to Flush the System (in July following completion of the pump station)	No. While technically feasible, not environmentally superior to the proposed project and infeasible due to potential delay in establishment of 40 cfs baseflows	Possible greater water quality impacts and fish kills during the first seasonal habitat flow release, but potentially reduced water quality impacts and fish kills during establishment of the 40-cfs baseflow
	Release Regime 3 - Delay Releases for Baseflows Until Winter	No. While technically feasible, not environmentally superior to the proposed project and infeasible due to delay in establishment of 40 cfs baseflows	Possible greater water quality impacts and fish kills during first seasonal habitat flow release and would delay establishment of 40 cfs baseflows thus delaying achievement of LORP goals

The EIR/EIS also addressed various alternatives to elements of the LORP designed to generally reduce impacts and/or potentially increase the effectiveness of the LORP in achieving the stated objectives. These alternatives are listed in Table S-3. LADWP has determined that some of these alternatives are feasible, but are not preferable to the proposed project and will not be adopted.

TABLE S-3
SUMMARY OF OTHER ALTERNATIVES

Alternative	Is it Feasible? (as Determined by Lead Agencies)	Does it *Avoid or Lessen* Significant Impacts of the Proposed Project	Does it Involve Any *New* Significant Impacts?
150 cfs Pump Station – Section 11.4.1	Yes	No	No
Delta Modifications – Section 11.4.2	No	No	Yes, significant wetland losses due to berm construction in the Delta
Alternative Releases for the Seasonal Habitat Flows – Section 11.4.3	Yes	No	Possibly, there is a higher potential for flows being diverted outside the Delta through the overflow channel. This impact could range from significant and adverse to beneficial.
Alternative Pulse Flow Regimes for the Delta – Section 11.4.4	Yes	No	No
Cowbird Trapping – Section 11.4.5	Yes	No	No
Native Fishes in Blackrock – Section 11.4.6	No	No	Yes, possible high mortality of native fishes during transition from wet to dry cycles.
Modified Flooding Regime in Blackrock – Section 11.4.7	Yes	No	No
Alternative Sediment Stockpiling Sites – Section 11.4.8	Yes	(Since publication of the Draft EIR/EIS, the sediment stockpile area has been changed to two upland locations to avoid impacts to the wetland located in the oxbow area.)	No

TABLE S-1
SUMMARY OF IMPACTS AND MITIGATION MEASURES
LOWER OWENS RIVER PROJECT

DESCRIPTION OF IMPACT BY ISSUE AREA	MITIGATION MEASURES	RESIDUAL IMPACT LEVEL
CLASS I IMPACTS: SIGNIFICANT AND UNAVOIDABLE		
Water Quality		
The proposed 40-cfs baseflow and seasonal habitat flows could degrade water quality due to the depletion of oxygen, and the possible increase in hydrogen sulfide and ammonia levels. These impacts are only expected to occur along the wetted reach of the river, from Mazourka Canyon Road to the pump station site, where the organic sediment deposits are present, affecting about 37 channel miles of the 62-mile length of the river. It is anticipated that water quality conditions will improve under the 40-cfs baseflows over time, but may be subject to periodic disturbance by the seasonal habitat flows of up to 200 cfs. The time required to stabilize water quality under the baseflows and seasonal habitat flows is unknown. (Section 4.4.3.1)	No feasible mitigation measures are available to reduce or avoid the significant, short-term water quality impacts associated with the initial release regime for the 40-cfs baseflows and seasonal habitat flows.	Significant
Game and Native Fish		
The temporary adverse water quality conditions during the initial releases to the river could adversely affect fish due to the depletion of oxygen, and possible increase in hydrogen sulfide and ammonia. The poor water quality could cause fish kills along the river downstream of Mazourka Canyon Road. Both the 40-cfs baseflow and the 200 cfs seasonal habitat flow are expected to cause water quality degradation. The fishery is expected to recover once water quality conditions improve.	**F-1.** In the event that the natural re-colonization of the game fishery does not occur within 5 years after water quality conditions have improved, or appears to be occurring at a very slow rate, LADWP shall implement and fund a one-time fish-stocking program (depending on availability of fish stock from state fish hatcheries) in coordination with CDFG, in the fifth year after water quality in the river has improved. Fish stocks from sources within the Owens Valley will be used preferentially. Fish stocks from outside the valley will be used if in-valley stocks are not available. The program will be designed to initiate re-colonization and to stimulate population growth to establish game fish populations within 10 years after water quality conditions have improved.	Significant.

TABLE S-1 (continued)

DESCRIPTION OF IMPACT BY ISSUE AREA	MITIGATION MEASURES	RESIDUAL IMPACT LEVEL
CLASS II IMPACTS: SIGNIFICANT, BUT MITIGABLE		
Hydrology		
There is a potential for localized overbank flooding that could affect public roads and lease roads that cross the river (e.g., Mazourka Canyon Road, Manzanar-Reward Road, and Keeler Road). This impact could occur if floating debris clogs the culverts and bridges at these crossings, primarily under the seasonal habitat flows. (Section 4.3.2)	**H-1.** During seasonal habitat flows, Inyo County shall monitor culverts and bridges on County roads along the river and LADWP shall monitor culverts on other roads to determine the potential for debris plugs to form at road crossings. Obstructive debris will be removed as necessary to minimize flooding the roads.	Less than significant
Wildlife, Including Special Status Species		
The mechanical removal of limited tule stands could disturb nesting birds by destroying cover and nests, altering breeding behavior, and displacing breeding pairs. At least one special status species could be affected – the least bittern. (Section 4.7.2)	**RW-1.** If necessary to remove limited cattail and bulrush obstructions, mechanical removal of cattail and bulrush stands shall only occur in the fall and winter (October 1 to March 1) to avoid conflicts with breeding birds. Work outside of this time may be conducted if field surveys determine there would be no effect to nesting birds.	Less than significant
Wetlands, Riparian Habitat, and Upland Habitats		
Prior to the initial releases, LADWP will mechanically remove sediments and marsh vegetation from 10,800 feet of the river downstream of the River Intake. A temporary 20-foot wide haul road will be established on the top of the west bank for the excavator and trucks. It will be created by driving over the existing vegetation in flat areas, and by minor grading where the terrain is uneven. Several temporary roads will be created perpendicular to the main haul road to provide access to an existing dirt road along the Aqueduct. Establishment of these roads would result in the short-term disturbance of about 8 acres of desert sink scrub. (Section 4.5.2)	**R-1.** Temporary access roads used to clear the river channel shall be seeded with native or naturalized grasses and shrubs common to the valley, as available, after completion of the desilting operation to facilitate restoration of vegetative cover and species compatible with the surrounding vegetation. The colonization by non-native aggressive or noxious weeds shall be inhibited by weed control for 3 years after construction.	Less than significant

TABLE S-1 (continued)

DESCRIPTION OF IMPACT BY ISSUE AREA	MITIGATION MEASURES	RESIDUAL IMPACT LEVEL
CLASS II IMPACTS: SIGNIFICANT, BUT MITIGABLE		
The construction of the pump station would cause general disturbance to upland vegetation from equipment staging, overland travel between work areas, and construction of the service roads. About 21.5 acres of desert greasewood scrub would be temporarily disturbed. (Section 5.1.2)	**P-1.** Upland areas disturbed during construction at the pump station site shall be regraded to create natural contours that match adjacent topography, then shall be seeded with native plant species. Restoration shall commence within one year of completion of the pump station. The goal of the restoration shall be to restore plant species and cover to pre-construction conditions over time. The species included shall be based on the species removed, availability of seeds or plant materials, and ability to cultivate each species. The colonization by non-native aggressive or noxious weeds shall be inhibited by weed control for three years after construction. Revegetation methods, plant maintenance, performance goals, and monitoring methods shall be based on: (1) the guidance in Inyo County's Revegetation Plan prepared pursuant to the Agreement; and (2) results of LADWP's ongoing experimental dryland revegetation studies in the Owens Valley. A 7-year monitoring and maintenance program shall be implemented to ensure successful establishment of the plants. The following are the mitigation goals for revegetation: (1) at least 50 percent of the native perennial species present at the site prior to construction shall be established by year 3 and persist through year 7; (2) plant cover shall achieve 50 percent of pre-construction cover values by year 5 and 65 percent by year 7; (3) newly established plants shall exhibit normal growth rates and healthy conditions for at least two years without supplemental watering and weeding; and (4) cover by non-native noxious weeds shall not exceed pre-construction conditions.	Less than significant
Construction work in the Blackrock Waterfowl Habitat Area would disturb about 20 acres for berms and 11 acres for ditches, consisting primarily of desert sink scrub. The berms would be allowed to revegetate naturally, although the tops of the berms would be used for vehicular access. Ditches would be used for conveying water, and as such, would be converted to open water or wetland habitat. The construction-related disturbance zone around the margins of berms and ditches would be allowed to revegetate naturally. The success of natural revegetation of new berms and construction related disturbances zones is uncertain. There is a potential for invasion of non-native exotics in dry areas, and saltcedar in moist areas. (Section 7.1.3)	**B-1.** Temporarily disturbed upland habitats in the Blackrock Waterfowl Habitat Area shall be seeded with native or naturalized grasses and shrubs common to the valley, as available, after construction of berms and ditches to facilitate restoration of vegetative cover and species compatible with the surrounding vegetation. The colonization by non-native weeds shall be inhibited by weed control for three years after construction.	Less than significant
The proposed flow management along the river will encourage the recruitment of native plants. However, it could also potentially increase the distribution and abundance of perennial pepperweed,	**V-1.** (This measure also applies to impacts associated with saltcedar infestations. See below.) Implement Measures to Minimize New Infestations. LADWP shall implement the following actions to minimize infestations of noxious weeds:	Less than significant

TABLE S-1 (continued)

DESCRIPTION OF IMPACT BY ISSUE AREA	MITIGATION MEASURES	RESIDUAL IMPACT LEVEL
CLASS II IMPACTS: SIGNIFICANT, BUT MITIGABLE		
Russian knapweed, and other noxious non-native weeds which could displace native vegetation. (Section 10.4.3)	1. Construction and other disturbance of substrates will be minimized. 2. When possible, good water circulation will be provided in project wetlands to minimize accumulation of salts to prevent saltcedar infestation. 3. The use of fire for vegetation management will be minimized. 4. To the extent possible, LADWP will initiate flow releases and initiate dry phases within the Blackrock area between November 1 and March 15 (i.e., when saltcedar is not producing seed) to minimize the chance of invasion by saltcedar. 5. Construction equipment will be maintained "weed free" by washing and inspecting equipment used in weed-infested areas prior to moving to another site. 6. On-site fill materials for construction will be used to the extent possible. If off-site fill materials are necessary, they will be taken from borrow pits located in areas that are free of noxious weeds. **V-2.** Provide Funding to the Inyo-Mono County Agricultural Commissioner. LADWP shall provide $50,000 per year to the Agricultural Commissioner to fund the monitoring and control of new infestations of perennial pepperweed and other noxious weeds (excluding saltcedar) in the LORP project area for the first 7 years of LORP implementation. In addition, LADWP shall provide $150,000 per year for the first 7 years to the Agricultural Commissioner to fund the control of existing perennial pepperweed and other noxious weed populations outside of the LORP area that could serve as seed sources for the LORP area. The Agricultural Commissioner will develop protocols for monitoring and controlling infestations based upon past experience and current literature. Based on the protocols, the Agricultural Commissioner will use the funds to identify and treat new infestations of noxious weeds within the LORP area in a timely manner, with priority given to the riparian areas. Existing infestations outside of the LORP area that could serve as seed sources for the LORP area will also be monitored and treated. A Memorandum of Understanding between the Agricultural Commissioner and LADWP will be entered into, and will outline the responsibilities of each agency under the protocols.	

TABLE S-1 (continued)

DESCRIPTION OF IMPACT BY ISSUE AREA	MITIGATION MEASURES	RESIDUAL IMPACT LEVEL
CLASS II IMPACTS: SIGNIFICANT, BUT MITIGABLE		
	V-4. Conduct Training Program for LADWP Personnel and Lessees. (This measure also applies to impacts associated with saltcedar and New Zealand mud snail infestations. See below.) LADWP shall conduct a training program for LADWP and Inyo County personnel, lessees, and their employees working within the LORP area on identification and reporting of noxious weeds, including saltcedar, and New Zealand mud snails. The training will be conducted at LADWP or Inyo County facilities in the Owens Valley. The Eastern Sierra Weed Management Area Noxious Weed Identification Handbook will be provided to program participants. The instruction will detail how to accurately describe their locations to aid in verification and timely response and identify the agencies to which sightings of the species should be reported. As new personnel are hired or when training is updated, a refresher course will be provided. In addition, photos of relevant deleterious species will be posted in the assembly rooms of appropriate LADWP and Inyo County facilities.	
The rewatering of the river would create new wetted channel areas, including areas that are barren. Once wetted, these areas would be susceptible to saltcedar infestation. In view of the extent of existing saltcedar populations within the LORP area that could serve as seed sources, the invasiveness and persistence of saltcedar, and the new areas that could be susceptible to saltcedar infestation as a result of LORP, the potential increase in saltcedar resulting from the project is considered significant, but mitigable. (Section 10.4.3)	**V-1.** (See above) **V-3.** Provide Funding to and Coordinate with the Inyo County Saltcedar Control Program. In addition to LADWP's contribution to the existing Inyo County Saltcedar Control Program, LADWP will provide funding to Inyo County in order for the County's Saltcedar Control Program to implement the following measures (the measures described below are in addition to the activities that will be conducted as part of the continuation of the existing Inyo County Saltcedar Control Program described in Section 10.4.1.6.): • Monitoring and Treatment of New Saltcedar Infestations Protocols for monitoring and treating new saltcedar infestations in the project area will be developed and implemented by the Inyo County Saltcedar Control Program in cooperation with LADWP. The protocols will include, but not be limited to, the following: 1. Prioritization for monitoring and treatment of areas that are to undergo a change in hydrologic status and that do not have an established cover of native plants. 2. Provisions for treating new saltcedar infestations, including protocols for treating saltcedar near rare plant populations.	Less than significant

TABLE S-1 (continued)

DESCRIPTION OF IMPACT BY ISSUE AREA	MITIGATION MEASURES	RESIDUAL IMPACT LEVEL
CLASS II IMPACTS: SIGNIFICANT, BUT MITIGABLE		
	3. Provisions for annual pedestrian monitoring of project areas potentially subject to saltcedar infestations. 4. Provisions for annual follow-up treatments of previously treated saltcedar infestations. • Treatment of Saltcedar Seed Sources If the ongoing Inyo County Saltcedar Control Program is not able to achieve the priorities for the control of existing saltcedar populations in the LORP area identified in Section 10.4.1.6, the control of existing saltcedar populations will be completed as part of this mitigation measure. • Coordination In addition to the above, the program will include: 1. LADWP will provide to the Saltcedar Control Program reports and data compiled through the LORP monitoring program concerning flows and water levels related to the river baseflow and seasonal habitat flows, releases to the Delta, and water levels at the Off-River Lakes and Ponds and in the Blackrock area. 2. LADWP will notify the Saltcedar Control Program of the timing and extent of annual seasonal habitat flows, increased flow releases to Blackrock units, pulse flows to the Delta, and other changes in land management that could cause a new infestation of saltcedar. 3. LADWP will provide to the Saltcedar Control Program work products relevant to saltcedar control that are prepared through the LORP monitoring program, such as maps, imagery, etc. • Funding LADWP will provide matching funds for LORP saltcedar control equal to the amount obtained by the County up to a total of $1.5 million as described in Section 10.4.1.6. The intent of this mitigation measure is to suppress increases in saltcedar resulting from LORP implementation. If continuation of the LORP-focused saltcedar control program is required and the matching funds described above are exhausted, funding	

TABLE S-1 (continued)

DESCRIPTION OF IMPACT BY ISSUE AREA	MITIGATION MEASURES	RESIDUAL IMPACT LEVEL
CLASS II IMPACTS: SIGNIFICANT, BUT MITIGABLE		
	for the program will be an ongoing post-implementation cost (Section 2.2.2.2). **V-4.** (See above)	
Cultural Resources		
The clearing of the channel immediately downstream of the River Intake will require establishment of access roads along about 2 miles of the western bank, and several additional roads to provide access from the river to the nearest existing service road. Establishment and use of these construction-related roads and/or use of construction equipment during the channel clearing work could potentially affect several known archeological and historic sites. (Section 4.8.4)	**CRR-1.** LADWP shall implement the following management actions to avoid impacts on cultural resources during the channel clearing work: • LADWP shall work with a qualified archaeologist to locate the temporary access road for the channel clearing work to avoid the two historic sites identified in the field survey by Far Western (2003). • Temporary construction fencing shall be installed along the perimeter of the area where these two historic sites are located to avoid construction equipment, vehicles, or personnel from accidentally entering and disturbing the site. • Temporary construction fencing shall be installed between the sediment stockpile area and the adjacent prehistoric site to avoid heavy equipment and or sediment spoil from accidentally entering and disturbing the site. • Installation of temporary fencing referenced above shall be conducted under the supervision of a qualified archaeologist. • LADWP shall notify representatives of regional Native American Tribes prior to beginning earthwork for the channel clearing work. Interested Tribal representatives shall be invited to be present (on a volunteer basis) during earthwork. • In the event that previously unknown prehistoric or historic cultural material is encountered, a qualified archaeologist will be contacted and will investigate the find and determine if it represents an intact deposit or archaeological site. LADWP shall implement the recommendations of the archaeologist concerning measures to protect or salvage the site. If prehistoric cultural material is identified, LADWP shall coordinate the investigations and actions to be taken with appropriate Native American parties.	Less than significant

TABLE S-1 (continued)

DESCRIPTION OF IMPACT BY ISSUE AREA	MITIGATION MEASURES	RESIDUAL IMPACT LEVEL
CLASS II IMPACTS: SIGNIFICANT, BUT MITIGABLE		
No known prehistoric or archeological sites are known to occur along the margins of the Lower Owens River, within the floodplain that would be affected by the baseflows and seasonal habitat flows. However, there is a remote possibility that unknown archeological sites or cultural deposits could be affected by the new flows. (Section 4.8.4)	**CRR-2.** In the event that previously unknown prehistoric or historic cultural material is observed in areas subject to LORP-related flows or earthwork, LADWP shall retain a qualified archeologist to investigate the find and determine if it represents an intact deposit or archeological site. LADWP shall implement the recommendations of the archeologist concerning measures to protect or salvage the site. If prehistoric cultural material is identified by the archaeologist, LADWP shall coordinate these investigations and actions to be taken with appropriate Native American parties. If any investigations are conducted, interested Tribal representatives would be invited to participate (on a volunteer basis).	Less than significant
There is a potential to encounter unknown archeological resources during construction at the pump station site. The probability is considered very low. (Section 5.4.1)	**CRP-1.** LADWP shall implement the following management actions to avoid impacts on cultural resources during construction of the pump station: • LADWP shall notify representatives of regional Native American Tribes prior to beginning earthwork for the pump station. Interested Tribal representatives shall be invited to participate (on a volunteer basis) in the monitoring of the earthwork. • A qualified archaeologist shall be present during earthwork for the pump station to monitor for and avoid cultural resources. In the event that prehistoric or historic cultural material is encountered, the archaeologist will investigate the find and determine if it represents an intact deposit or archaeological site. LADWP shall implement the recommendations of the archaeologist concerning measures to protect or salvage the site. If prehistoric cultural material is identified by the archaeologist, LADWP shall coordinate the monitoring, investigations, and actions with appropriate Native American parties. If any investigations are conducted, interested Tribal representatives would be invited to participate (on a volunteer basis).	Less than significant

TABLE S-1 (continued)

DESCRIPTION OF IMPACT BY ISSUE AREA	MITIGATION MEASURES	RESIDUAL IMPACT LEVEL
CLASS II IMPACTS: SIGNIFICANT, BUT MITIGABLE		
One of the proposed ditches in the Blackrock Waterfowl Habitat Area will be located in proximity to two archeological sites. Disturbance of these sites would be considered a potentially significant, but mitigable impact. (Section 7.3.1)	**B-2.** LADWP shall implement the following management actions to avoid impacts on cultural resources during construction of the proposed ditch to be located in proximity of the two known prehistoric sites in the Blackrock area: • LADWP shall notify representatives of regional Native American Tribes prior to beginning construction of the proposed ditch to be located in proximity of the two known prehistoric sites. Interested Tribal representatives shall be invited to be present (on a volunteer basis) during the construction of the ditch. • LADWP shall work with a qualified archaeologist to locate the proposed ditch to avoid the two known prehistoric sites identified in the field survey by Far Western (2001). • Temporary protective fencing shall be placed between the known prehistoric sites and proposed ditch areas if construction work will occur within 100 feet of these sites. A qualified archaeologist shall supervise the placement of temporary protective fencing. • All vehicles shall remain on the road in the vicinity of the known prehistoric sites. • If construction must occur within 25 feet of these sites, an archaeologist shall monitor construction activities.	Less than significant
Public Health and Safety		
The LORP will results in hundreds of acres of new open water and marsh habitat along the river, at Blackrock, and at the Delta. These new habitats would provide more opportunities for mosquitoes to breed, which could result in increased nuisance and public health risks to communities and residents near these areas, and to the people engaged in outdoor recreation. (Section 10.3)	**PS-1**. LADWP shall enter into an agreement with OVMAP to abate the potential increase in mosquitoes resulting from the LORP. Mitigation Measure PS-1 has three components: • Pre-project and post-implementation surveillance, monitoring, and control (to be performed by OVMAP) • Agency coordination and LORP management adjustments (to be performed by LADWP) • Public education, program administration, and reporting (to be performed by OVMAP) These components are described in greater detail in Appendix H. The agreement between LADWP and OVMAP will include the provisions in Appendix H. In addition, the agreement will describe the areas to be monitored and treated, the range of control	Less than significant

TABLE S-1 (continued)

DESCRIPTION OF IMPACT BY ISSUE AREA	MITIGATION MEASURES	RESIDUAL IMPACT LEVEL
CLASS II IMPACTS: SIGNIFICANT, BUT MITIGABLE		
	methods to be used, and reporting requirements. As the impacts from mosquito production created by the LORP are better understood and as methods for mosquito control improve, LADWP and OVMAP may agree to modify the provisions of the scope of work, as long as LORP-related mosquito populations continue to be prevented from reaching nearby communities. OVMAP estimates that the annual cost to fully implement Mitigation Measure PS-1 could be approximately $109,000, depending on the severity of the impact (L. Kirk, pers. comm., December 2003). This is considered an ongoing post-implementation cost that will continue for the life of the project. Post-implementation costs are to be shared equally by LADWP and the County as described in Section 2.2.2.2.	

TABLE S-1 (continued)

DESCRIPTION OF IMPACT BY ISSUE AREA	MITIGATION MEASURES	RESIDUAL IMPACT LEVEL
CLASS III IMPACTS: ADVERSE, BUT NOT SIGNIFICANT		
Water Quality		
LADWP will remove channel sediments in the river immediately downstream of the River Intake prior to the release of water. The physical disturbance to these sediments may cause short-term water quality impacts when the initial releases are made because there will be loose sediments and vegetative debris. However, this impact is expected to be short-term and localized. (Section 4.4.3.2)	No mitigation required.	Less than significant
On rare occasions, LADWP may remove stands of cattail and bulrush that obstruct flows in the river. Mechanical removal could cause localized water quality impacts by increasing turbidity and suspended sediments at and downstream of the work areas. In addition, it is likely that the excavated sediments associated with the root mass could increase biological oxygen demand, reduce dissolved oxygen concentrations, and increase concentrations of undesirable constituents such as ammonia and sulfur compounds. The water quality impacts are expected to be temporary and localized and are expected to improve within hours. (Section 4.4.3.2)	No mitigation required.	Less than significant
Construction of the pump station facilities and maintenance desilting of the forebay would cause downstream sedimentation. The impact is expected to be minor in magnitude, localized, and temporary. (Section 5.1.2)	**P-2.** The Storm Water Pollution Prevention Plan (SWPPP) to be prepared under the provisions of the required Construction General Storm Water NPDES Permit shall specifically include measures to: (1) prevent erosion from the construction site and from the post-construction site that could cause sedimentation into the river, with a focus on stabilizing the river banks to prevent sloughing and erosion during the initial river flows and due to water level fluctuations in the forebay; and (2) prevent discharge of construction materials, contaminants, washings, concrete, fuels, and oils into the river from construction equipment and vehicles. These measures shall include, at a minimum, physical devices to prevent sedimentation and discharges (e.g., silt fencing, hay bales), and routine monitoring of these devices and the conditions of the river downstream of the pump station site.	Less than significant

TABLE S-1 (continued)

DESCRIPTION OF IMPACT BY ISSUE AREA	MITIGATION MEASURES	RESIDUAL IMPACT LEVEL
CLASS III IMPACTS: ADVERSE, BUT NOT SIGNIFICANT		
There is potential for accidental spills of fuel, lubricating oils, paints, and concrete during construction of the pump station. Depending upon the size and location of the spill, and the time of year, contaminants could be discharged to the river and adversely affect water quality. (Section 5.1.2)	See **P-2** above	Less than significant
Wildlife, Including Special Status Species		
Active cattail and bulrush removal would only be considered in rare instances, and probably only be considered where there are significant constrictions along the river or at culverts. Extensive removal or active management of tule stands to retard the expansion of tule growth or to increase open water habitat (i.e., for habitat purposes) would not be considered unless it is determined that the benefits outweigh the environmental effects of such measures and only if funding for such work is obtained from sources other than LADWP or the County. If supplemental funding is not available, it is possible that no action would be taken to respond to, or prevent, this effect. As such, there is a potential for the amount of cattail and bulrush marsh to proliferate at the expense of open water habitat. (Section 4.7.2)	No mitigation required.	Less than significant
Mechanical removal of cattail and bulrush stands would require access routes to the wetted channel for equipment, staging areas for truck and equipment maneuvering, and a temporary dewatering site. Establishment of these temporary work areas could disturb wetland and riparian vegetation. (Section 4.7.2)	**RW-2.** Impacts to wetland and riparian habitats adjacent to the work area shall be minimized by making use of existing barren areas for staging, operations, and stockpiling; crushing vegetation in the work area rather than clearing or grading it; and mulching areas denuded during operations with vegetative debris to encourage natural revegetation and discourage noxious weeds.	Less than significant
The pump station site contains a wide variety of upland, wetland, aquatic, and riparian habitats that provide high quality forage and shelter for wildlife. Conversion of this site to a large forebay with 17 acres of mostly open water would benefit waterfowl, but to the detriment of riparian-dependent bird species. The overall habitat wildlife diversity and productivity of the site are expected to decrease as a consequence.. This impact would be partially offset by the anticipated overall increase in riparian woodland habitat due to the rewatering of the river, and the associated increase in wildlife productivity and diversity along the river. (Section 5.2.1)	No mitigation required.	Less than significant

TABLE S-1 (continued)

DESCRIPTION OF IMPACT BY ISSUE AREA	MITIGATION MEASURES	RESIDUAL IMPACT LEVEL
CLASS III IMPACTS: ADVERSE, BUT NOT SIGNIFICANT		
The new power line will employ vertical construction with conductors spaced at least 4 feet apart (vertical distance), which minimizes the risk of raptors or other large birds becoming electrocuted by touching both conductors simultaneously. The distance between the existing and new power lines (12 feet or more) will also be sufficient to prevent electrocution. In addition, the vertical construction does not include a crossbar, which minimizes the potential for large birds to perch on the pole. Since the new power line will parallel existing infrastructure, including the existing power line and Highway 395, it minimizes any fragmentation of open landscapes, which helps to minimize bird collisions. Therefore, the risk of bird collision with and/or electrocution from the new power line is expected to be low.	No mitigation required.	Less than significant
The potential for increase in predation on plovers and other shorebirds from the increase in power poles is expected to be low due to the use of vertical construction, which minimizes the area available for ravens and raptors to perch or nest. (Section 5.2.2)	**P-5.** Power poles installed for the LORP pump station that are located within 0.25 mile of Owens Lake will be equipped with anti-predator perches (aluminum combs or other appropriate devices placed on top of poles or other potential perching sites).	Less than significant
With implementation of LORP, there is potential for the New Zealand mud snail to spread to the project area due to increased recreational uses and the hydrologic connection to the Owens River upstream of the River Intake, where the snails currently exist. Implementation of LORP may allow for colonization of New Zealand mud snails, but would not be the only cause of the colonization. Hence, the potential introduction of the New Zealand mud snail into the Lower Owens River is considered an adverse, but not significant impact.	**V-4.** Conduct Training Program for LADWP Personnel and Lessees. (See above under mitigation measure for impacts associated with noxious weed infestations.) **V-5.** Coordinate with CDFG to Implement Public Outreach Program for Preventing the Spread of New Zealand Mud Snails. Upon the implementation of the LORP, LADWP, in coordination with the California Department of Fish and Game, shall expand the existing public outreach program for preventing the spread of New Zealand mud snails to cover the LORP area. LADWP will post information signs instructing the public on how to identify New Zealand mud snails and notifying recreational users to take precautionary measures to prevent the spread of New Zealand mud snails. The signs will be posted at key access points to the LORP area, such as Mazourka Canyon Road, Manzanar Reward Road, the pump station, and the Delta. The precautionary measures that will be described on the signs include: scrubbing and rinsing waders, boots, watercraft, and equipment before leaving the water (using hot water or drying will enhance this measure); disposing of fish entrails in proper trash receptacles; and reporting to the Non-indigenous Aquatic Species Toll Free Hotline if this species is observed.	Less than significant

TABLE S-1 (continued)

DESCRIPTION OF IMPACT BY ISSUE AREA	MITIGATION MEASURES	RESIDUAL IMPACT LEVEL
CLASS III IMPACTS: ADVERSE, BUT NOT SIGNIFICANT		
	V-6. Implement Measures to Prevent Spread of New Zealand Mud Snails during Project Construction and Maintenance. During project construction and maintenance, LADWP and the County will completely dry construction equipment between use in water infested with New Zealand mud snails and non-infested water. If this is not feasible, the equipment will be steam cleaned before being used in non-infested water.	
Wetlands, Riparian Habitats, and Upland Habitats		
Over time, the rewatering of the river is predicted to convert about 2,343 acres of alkali scrub/meadow (an upland vegetation) and 531 acres of alkali meadow (upland phase) to various wetland and riparian vegetation types due to inundation effects and altered hydrologic conditions along the river. (Section 4.5.2)	No mitigation required.	Less than significant
Prior to the initial releases, LADWP will mechanically remove sediments and marsh vegetation from 10,800 feet of the currently dry river channel downstream of the River Intake. This action would result in the removal of 3.7 acres of emergent freshwater marsh currently dominated by cattails. This impact is considered adverse but not significant because new emergent wetlands will be created over time along the entire lower Owens River due to in response to the rewatering, including along the margins of the wetted channel along this reach. (Section 4.5.2)	No mitigation required.	Less than significant
Construction activities in the river channel for the pump station diversion would temporarily disturb about 2.0 acres of vegetated wetlands (freshwater marsh, riparian forest, and alkali meadow). Most of these areas would recover through natural processes, only a small area would be affected relative to the extent of wetlands at the site, and there would be an overall gain in wetland and riparian habitats along the river associated with the LORP, including an expected increase in the extent and productivity of emergent wetlands along the river upstream of the pump station. (Section 5.1.2)	No mitigation required.	Less than significant

TABLE S-1 (continued)

DESCRIPTION OF IMPACT BY ISSUE AREA	MITIGATION MEASURES	RESIDUAL IMPACT LEVEL
CLASS III IMPACTS: ADVERSE, BUT NOT SIGNIFICANT		
Construction of the pump station facilities (i.e., paved yard, pump station sump and building, service roads, and sediment stockpile areas) would result in the permanent loss of 4.46 acres of greasewood scrub. Mitigation is not considered necessary due to the small area involved and compensation by the gain of acres of marsh/wet alkali meadow and alkali meadow and other habitats. (Section 5.1.2)	No mitigation required.	Less than significant
Creation and maintenance of the sediment basin at the pump station would result in the permanent conversion of 0.37 acres of freshwater marsh and 1.01 acres of riparian woodland to the open water of the forebay. The acreages involved are minimal and would be offset by the overall gain in similar wetland and riparian vegetation types that is anticipated to occur along the river due to the LORP. (Section 5.1.2)	No mitigation required.	Less than significant
Construction of the western and eastern service roads to the sediment basin would result in the permanent loss of 1.85 acres of alkali meadow and 0.05 acre of riparian woodland. The acreages involved are minimal and would be offset by the overall gain in similar wetland and riparian vegetation types that is anticipated to occur along the river due to the LORP. (Section 5.1.2)	No mitigation required.	Less than significant
The diversion structure would permanently displace about 0.15 acres of upland vegetation and about 0.30 acre of riparian woodland in the river channel. (Section 5.1.2)	No mitigation required.	Less than significant
The establishment of the forebay at the pump station would result in the permanent loss of about 4.1 acres of alkali meadow and 7.5 acres of freshwater marsh, as these vegetation types would be converted to open water. The acreages involved are minimal and would be offset by the overall gain in similar wetland and riparian vegetation types that is anticipated to occur along the river due to the LORP. (Section 5.1.2)	No mitigation required.	Less than significant
The creation of the forebay would result in the loss of 5.3 acres of Mojave riparian forest from the river channel due to the effects of permanent inundation. Riparian forest is limited along the Lower Owens River, and as such, is considered a sensitive habitat. (Section 5.1.2)	No mitigation required.	Less than significant

TABLE S-1 (continued)

DESCRIPTION OF IMPACT BY ISSUE AREA	MITIGATION MEASURES	RESIDUAL IMPACT LEVEL
CLASS III IMPACTS: ADVERSE, BUT NOT SIGNIFICANT		
Construction of the power line would disturb upland desert scrub due to limited overland travel and installation of the poles. (Section 5.1.3)	**P-3.** The area of temporary disturbance associated with construction of the power line shall be minimized to the extent feasible by using overland travel to reach pole sites, prohibiting construction of new roads, and minimizing soil disturbance such as scraping or excavation, except where necessary to ensure safe passage or to complete construction.*)*	Less than significant
Installation of the power line could result in inadvertent disturbance of a freshwater seep is present within 100 feet of the proposed route, about 2000 feet north of Highway 395 on the margins of Owens Lake. (Section 5.1.3)	**P-4.** The small freshwater seep along the power line shall be avoided during construction by marking its boundary on construction drawings and flagging them in the field prior to construction activities to indicate an environmentally sensitive area to be avoided.	Less than significant
Based on the results of the HEC-RAS model, if the proposed seasonal habitat flows overtop banks over time, there is a potential for a large fraction of the river flows to be diverted to the west and outside the Delta Habitat Area. It is likely that these habitats would be replaced through natural colonization and succession processes along the new overflow channel. However, there is a potential for a net overall reduction in the areal extent of aquatic and wetland habitats due to flows being conveyed west of the Delta through natural hydraulic processes. Upon implementation of the project, LADWP does not propose to physically increase the channel capacity by excavating the channel or raising the western banks along the river upstream of the Delta. However, with implementation of adaptive management measures (e.g., adjusting baseflows and/or pulse flows to the Delta [within the 6 to 9 cfs annual average] and/or physically increasing channel capacity), the potential diversion of flows from the center of the Delta is considered a less than significant impact. (Section 6.3.3)	No mitigation required.	Less than significant

TABLE S-1 (continued)

DESCRIPTION OF IMPACT BY ISSUE AREA	MITIGATION MEASURES	RESIDUAL IMPACT LEVEL
CLASS III IMPACTS: ADVERSE, BUT NOT SIGNIFICANT		
Based on the analysis presented in Sections 6.3.1 (Impact Assessment No. 1 prepared by Ecosystem Sciences and White Horse Associates), 6.3.3, 6.3.4, and 6.3.5, LADWP, as CEQA lead agency, has determined that impacts to existing aquatic and wetland habitats of the Delta would range from beneficial to less than significant. LADWP concurs with the model of the Delta presented in Impact Assessment No. 1 which describes the Delta as a basin that fills to capacity then overflows and, consequently, that the water needs of existing vegetation (including and evapotranspiration and freshwater in the root zone) are met if there is an outflow from the Delta. Since the proposed baseflows will be established to ensure a minimal amount of outflow from the Delta throughout the first year (thereby exceeding the water demands of the Delta wetlands that exist at that time), Per LADWP's analysis, the proposed baseflows will be sufficient to at least maintain the vegetated wetlands that exist at the time of project initiation. The release of the four pulse flows and the bypass of seasonal habitat flows would provide higher flows (thereby spreading water over a larger area than under baseflow conditions) at key times of the year to enhance vegetated wetlands and aquatic habitats.	No mitigation required.	Less than significant
The repair of existing spillgates and the installation of new spillages in the Blackrock Waterfowl Habitat Area would temporarily disturb upland and wetland habitats in man-made ditches. This impact is considered adverse, but not significant because the impacts would be very small in area (less than 3,000 square feet at any single site), and temporary. Wetlands in the affected ditches would recover quickly after construction. (Section 7.1.3)	No mitigation required.	Less than significant

TABLE S-1 (continued)

DESCRIPTION OF IMPACT BY ISSUE AREA	MITIGATION MEASURES	RESIDUAL IMPACT LEVEL
CLASS III IMPACTS: ADVERSE, BUT NOT SIGNIFICANT		
Air Quality		
Emissions from channel clearing near the River Intake prior to releases to the river, construction activities at the pump station site, sediment stockpiling, and construction activities in the Blackrock Waterfowl Habitat Area would contribute to degradation of air quality conditions in the valley, but are unlikely to cause air quality violations. The pollutant of concern is particulate matter (PM10). In addition, occasional controlled burns at Blackrock would contribute to degradation of air quality conditions in the valley, but are unlikely to cause air quality violations because they would be implemented under a permit from the Great Basin Unified Air Pollution Control District, which only allows burns to occur when meteorological conditions will ensure sufficient dispersion to avoid violations. (Sections 4.9, 5.3.2, and 7.4.2)	**AQ-1.** To minimize dust/ PM_{10} emissions during construction activity, as necessary, one or more of the following measures shall be implemented: • After clearing, grading, earth moving or excavation is complete, the disturbed area shall be treated by watering, or revegetating, or by spreading soil binders until the area is stabilized. • During construction, use water trucks or sprinkler systems to keep areas of vehicle movement, temporary soil stockpiles, and construction disturbance damp enough to prevent dust from leaving the site. This may include wetting down such areas in the late morning and after work is completed for the day. The frequency of watering or other dust control measures may be increased when wind speed exceeds 15 mph. • Minimize the amount of disturbed area and reduce on site vehicle speeds to 15 miles per hour or less. **AQ-2.** LADWP shall stabilize the sediment stockpile at the pump station site as necessary to minimize wind-blown dust from the stockpile. Methods to reduce fugitive dust emissions include revegetating the pile, armoring it with a layer of coarse materials, soil binders, or water application.	Less than significant
The initial rewatering of the river will cause short-term adverse water quality impact that could result in objectionable odors from off-gassing of the organic sediments. People that are located adjacent to the river during the initial releases could be exposed to these gases, which could be unpleasant. Individuals that are on the river banks could be exposed to high concentrations that could cause respiratory distress. The magnitude of this impact is expected to be very low because few people reside adjacent to the river, or will be present along the river during the initial rewatering. The potential exposure to objectionable gasses and odors during the initial rewatering is considered an adverse but not significant impact. (Section 4.9)	No mitigation required. *Note: If LADWP and the County become aware that hydrogen sulfide and/or methane is arising from the river, efforts to warn people who may visit the river of the situation (i.e., the posting of warning signs and/or notification of media) will be undertaken by LADWP and the County.*	Less than significant

TABLE S-1 (continued)

DESCRIPTION OF IMPACT BY ISSUE AREA	MITIGATION MEASURES	RESIDUAL IMPACT LEVEL
CLASS III IMPACTS: ADVERSE, BUT NOT SIGNIFICANT		
Cultural Resources		
The proposed modifications to the River Intake do not involve any demolition and are all reversible. JRP (2001) also assessed whether the proposed modifications could be defined as a "substantial adverse change" as defined under the CEQA Guidelines. "Substantial adverse change" includes demolition, destruction, relocation, and alteration of a historic structure such that its significance would be impaired. JRP (2001) concluded that the proposed modifications would not significantly alter the significance or integrity of the structure, and as such, would not cause a significant impact under CEQA. Therefore, project impacts on the River Intake are considered a less than significant impact. (Section 4.8.4)	No mitigation required.	Less than significant
Several structural obstacles to flow will be removed from the river channel prior to the commencement of releases for the Phase 1 baseflows. Of the 16 structures that were evaluated by JRP (2004), up to 11 may be removed or modified prior to initial flow releases. None of the 16 resources is considered significant, or eligible for inclusion on the National Register of Historic Places. Therefore, removal and modification of these structures would represent a less than significant impact. (Section 4.8.4)	No mitigation required.	Less than significant
Installation of the power line could cause inadvertent disturbance to an isolated find, four prehistoric sites, and four historic sites. It appears that all sites would be avoided. Incidental or accidental disturbance would not be significant impact because none of the resources are considered significant, nor eligible for inclusion on the National Register of Historic Places. (Section 5.4.2)	**CRP-2.** LADWP shall implement the following management actions during installation of the power line: • LADWP shall notify representatives of regional Native American Tribes prior to beginning construction of the power line. Interested Tribal representatives shall be invited to be present (on a volunteer basis) during construction.	Less than significant
Five historic architectural features occur in the Blackrock Waterfowl Habitat Area. There is a potential for disturbance to one or more of these features during the replacement of existing spillgates. This impact would not be significant because none of the resources are considered significant, nor eligible for inclusion on the National Register of Historic Places. (Section 7.3.2)	No mitigation required.	Less than significant

TABLE S-1 (continued)

DESCRIPTION OF IMPACT BY ISSUE AREA	MITIGATION MEASURES	RESIDUAL IMPACT LEVEL
CLASS III IMPACTS: ADVERSE, BUT NOT SIGNIFICANT		
Rangelands		
LADWP expects that the grazing management actions proposed under LORP, combined with the increase in forage in riparian areas from rewatering the river, will result in no change or a net reduction in livestock drift onto public lands. However, the potential for localized increase in livestock drift under LORP cannot be eliminated (e.g., from establishment of stockwater areas closer to public lands). Therefore, this impact is considered adverse, but not significant. (Section 9.3.2)	**LM-1.** If it is determined by BLM or SLC that the rangeland management actions proposed under LORP are resulting in a substantial increase in cattle drift, the grazing management plan(s) for the relevant lease(s) shall be modified to incorporate herd and grazing practices to reduce drift. These lease-specific measures shall be developed in consultation with BLM (Blackrock, Twin Lakes, Island, Lone Pine, Intake, and Thibaut Leases) or SLC (Delta Lease) and shall include specific measures to discourage unauthorized drift, such as strategic placement of watering troughs and salt blocks/supplements and coordination of grazing rotation patterns between the LADWP and BLM pastures. The effectiveness of these measures shall be evaluated in the LORP monitoring and adaptive management program.	Less than significant
Recreation		
Future increased recreational activities in the LORP project area could have adverse impacts on biological resources, grazing operations, cultural resources, existing recreational uses, and roadways. LORP includes monitoring for recreation impacts and implementation of management strategies to address these impacts. (Section 10.1.2)	**RC-1.** When LADWP and Inyo County personnel observe and/or receive complaints or concerns about negative impacts related to recreational activity, LADWP or Inyo County shall review the issue and investigate as necessary. For verified impacts or concerns for potential impacts related to recreation in the LORP area, LADWP and/or Inyo County shall implement recreation management strategies, as relevant (see Section 2.9). **RC-2.** LADWP shall conduct a training program for LADWP and Inyo County personnel working within the LORP area on identification and reporting of cultural resources or potential threats to cultural resources at LAWDP or Inyo County facilities in the Owens Valley. Personnel will be instructed on how to identify and report cultural resources encountered in the field, and will also receive an overview of the procedures that must be implemented should impacts or threats to cultural resources be documented. The training will be accomplished through either a multi-media (e.g., video) presentation or a seminar conducted by a professional archaeologist in consultation with local Tribes (as listed in Section 4.8.2) and other methods as deemed appropriate. As new personnel are hired or when training is updated, a refresher course will be provided. Visual aids such as photographs or sample artifacts, if available, will be used to familiarize LADWP and Inyo County personnel with cultural resources that may be present in the project area.	Less than significant

TABLE S-1 (continued)

DESCRIPTION OF IMPACT BY ISSUE AREA	MITIGATION MEASURES	RESIDUAL IMPACT LEVEL
CLASS III IMPACTS: ADVERSE, BUT NOT SIGNIFICANT		
Public Health and Safety		
Concerns have been raised regarding safety issues associated with a sudden increase in river flows under LORP (i.e., seasonal habitat flows). However, the seasonal habitat flows will be ramped up and down typically over 8 to 14 days and will not be a sudden release of water. Furthermore, the gradient of the river is small, and the river has a meandering channel. Therefore, flow velocity of the baseflows and seasonal habitat flows will not create hazardous conditions for recreational users along the river.	No mitigation required.	Less than significant

TABLE S-1 (continued)

DESCRIPTION OF IMPACT BY ISSUE AREA	MITIGATION MEASURES	RESIDUAL IMPACT LEVEL
CLASS IV IMPACTS: BENEFICIAL IMPACTS		
Water Quality		
Under the proposed program for off-river lakes and ponds, the amount of water provided to Coyote/Grass Lakes Complex and Goose Lake may be greater than under existing conditions due to the need to create flows in the channels downstream of Goose Lake that will connect to the river. There will be an inflow and outflow from these lakes sufficient to sustain the artificial corridor below the lake, but the lake elevations will remain unchanged from current conditions. The greater inflows and outflows at these lakes may improve water quality and increased turnover rates in the lakes. (Section 8.4)	Not applicable	Not applicable
Wetlands and Riparian Habitats		
The rewatering of the river will increase the amount of wetlands along the river by about 3,000 acres. Wetlands to be created include riparian forest, alkali meadow, and marsh/alkali wet meadow. (Section 4.5.2)	Not applicable	Not applicable
Native and Game Fish		
The re-watering will have an overall beneficial impact on the warmwater fishery by increasing its productivity (more area) and providing more diverse habitat to support less common species such as the brown trout and smallmouth bass. (Section 4.6.2)	Not applicable	Not applicable
The establishment of permanently watered fish corridors between Goose Lake and the river as part of the riverine-riparian enhancement program could increase fish production in the lakes by allowing recruitment of fish from the river, as well as providing opportunities for lake and pond fish to feed and reproduce in the ditches between the lakes and the Aqueduct, and between the lakes and the river. (Section 7.1.3)	Not applicable	Not applicable

TABLE S-1 (continued)

DESCRIPTION OF IMPACT BY ISSUE AREA	MITIGATION MEASURES	RESIDUAL IMPACT LEVEL
CLASS IV IMPACTS: BENEFICIAL IMPACTS		
Wildlife, Including Special Status Species		
The creation of new and enhanced wetlands and aquatic habitats at the Blackrock Waterfowl Habitat Area and the increased flows at the Delta Habitat Area would increase the opportunities for resident, migratory, and overwintering birds (primarily shorebirds and waterfowl). The long-term establishment of a significant acreage of new open water habitats and associated marsh habitats will be beneficial for many migratory birds along the Pacific Flyway. The development of a wooded riparian corridor along the Lower Owens River by re-watering will provide more opportunities for a variety of resident and migratory riparian breeding birds. (Section 7.2.2)	Not applicable	Not applicable
The addition of flows to the Lower Owens River is expected to increase extent, quality, and diversity of habitat for wildlife, particularly for birds. (Section 4.7.2)	Not applicable	Not applicable.
Rangelands		
The establishment of pastures with seasonal restrictions and exclosures proposed under LORP will result in a reduction of acreage available for grazing over existing conditions. Initially, this reduction in available acreage will temporarily reduce the amount of forage available for livestock grazing. However, once the river is rewatered under LORP, available forage will increase and improve in condition. In addition, the establishment of utilization rates, modification in timing and duration of grazing, and changes in livestock distribution will also improve rangeland conditions by improving plant vigor and seedling recruitment of forage species. Plant and soil conditions on the leases would improve due to these actions, resulting in a beneficial impact to rangelands. (Section 9.2.1)	Not applicable	Not applicable

TABLE S-1 (continued)

DESCRIPTION OF IMPACT BY ISSUE AREA	MITIGATION MEASURES	RESIDUAL IMPACT LEVEL
CLASS IV IMPACTS: BENEFICIAL IMPACTS		
Biological Resources (in general)		
In general, implementation of the proposed grazing management actions (i.e., creation of riparian pastures; modification of utilization rates in both riparian and upland pastures; and creation of rare plant, wetland, and waterfowl exclosures) would reduce current grazing impacts to existing biological resources. Beneficial impacts include increased plant production and cover in riparian areas, which would provide more food for small mammals and birds, and cover for ground- and understory-nesting birds. Cattle will graze riparian areas for a shorter period of time, resulting in less frequent disturbance to ground- and understory-nesting birds. The application of appropriate grazing strategies in the LORP project area would complement the habitat enhancements anticipated along the river and in the Blackrock and Delta areas where a greater diversity and abundance of aquatic and terrestrial species are anticipated. (Section 9.2.2)	Not applicable	Not applicable
Rare Plants		
The proposed grazing strategies are expected to improve the reproductive success and long-term survival of rare plant populations. Therefore, impacts to these populations from future grazing strategies are considered beneficial. (Section 9.2.2)	Not applicable	Not applicable
R*ecreation*		
The LORP would improve outdoor recreational opportunities in the Owens Valley, particularly for anglers (by improving warmwater fishery) and for hikers and birdwatchers (by habitat improvements along the river, at Blackrock and at the Delta). (Section 10.1.2)	Not applicable	Not applicable

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1.0 INTRODUCTION

1.1 ORIGIN OF THE PROJECT

1.1.1 1991 EIR and Long Term Water Agreement

In 1913, the City of Los Angeles completed the Los Angeles Aqueduct from the Owens Valley to Los Angeles. The primary source of water was surface water diverted from the Owens Valley, and after 1940, to a lesser extent, from the Mono Basin. In 1970, a second Aqueduct was completed by the City of Los Angeles that was supplied from three sources: increased surface diversions and groundwater pumping from the valley and increased surface diversions from the Mono Basin.

In 1972, the County of Inyo (County) sued the City of Los Angeles under the California Environmental Quality Act (CEQA) to require the Los Angeles Department of Water and Power (LADWP) to prepare an Environmental Impact Report (EIR) on its groundwater pumping to supply the second Aqueduct. LADWP was ordered to prepare an EIR. LADWP issued EIRs in 1976 and 1979, but both were found to be legally inadequate.

In the 1980s, the County and LADWP conducted discussions to develop a cooperative water management plan. Various technical studies were conducted at that time concerning groundwater and vegetation in the Owens Valley. An interim agreement was executed in 1984 between the County and LADWP, which called for more cooperative studies, certain environmental enhancement projects, and continued negotiations on a long-term agreement. In 1989, a draft of a long-term agreement was released to the public. In October 1991, the County and LADWP approved the Inyo County/Los Angeles Long Term Water Agreement (Agreement). The overall goal of the Agreement is to manage the water resources within Inyo County "…*to avoid certain described decreases and changes in vegetation and to cause no significant effect on the environment which cannot be acceptably mitigated while providing a reliable supply of water for export to Los Angeles and for use in Inyo County*."

Subsequently, an EIR was completed by LADWP and the County and issued in 1991 ("1991 EIR"). It addressed the impacts of all water management practices and facilities associated with the second Aqueduct from 1970-1990, and the impacts of projects and water management practices that would occur after 1990 under the Agreement. The Agreement committed LADWP and the County to implement the Lower Owens River Project (LORP). The 1991 EIR and the Agreement were submitted to the Court with a joint request to end the litigation that commenced in 1972. The LORP was identified in the 1991 EIR as compensatory mitigation for impacts related to groundwater pumping by LADWP from 1970 to 1990 that were difficult to quantify.

1.1.2 Memorandum of Understanding

Shortly thereafter, concerns over the legal adequacy of the 1991 EIR were presented to the Court by state agencies and environmental groups. In 1994, the Court ordered the County and LADWP to respond to certain of these issues. After several years of settlement discussions among all parties, a Memorandum of Understanding (MOU) was executed that resolved the concerns regarding the EIR, particularly concerns related to the adequacy of mitigation described in the EIR for impacts due to LADWP's activities related to its water gathering in the Owens Valley from 1970 to 1990. The MOU was lodged with the court, which in June 1997, discharged its writ ending the litigation between Inyo and LADWP and freeing the parties to implement the Agreement and the 1991 EIR mitigation measures. The parties to the MOU are LADWP, the County, California Department of Fish and Game (CDFG), State Lands Commission (SLC), Sierra Club, the Owens Valley Committee, and Carla Scheidlinger (hereafter called the "MOU parties").

The MOU included provisions to expand the LORP beyond the description of the project in the Agreement and in the 1991 EIR and to clarify commitments to implement the project. The MOU specifies goals for the LORP, a timeframe for the development and implementation of the project, specific project actions, and requires that a LORP ecosystem management plan be prepared to guide the implementation and management of the project. It also provides certain minimum requirements for the LORP related to flows, locations of facilities, habitat and species. In May 1999, a draft LORP ecosystem management plan (LORP Plan) was completed by Ecosystems Sciences and was submitted to the MOU parties.

1.1.3 Draft EIR/EIS

The U.S. Environmental Protection Agency (EPA) became involved when its Fiscal Year (FY) 1999 budget included a special appropriation to assist Inyo County in carrying out the LORP. This funding action triggered EPA's obligation to conduct environmental review, including an Environmental Impact Statement (EIS) under the National Environmental Policy Act (NEPA). Subsequently, EPA's budget has included additional funding items for the LORP to be awarded to the County or LADWP in its FY 2000, 2001 and 2002 budgets. LADWP, the County, and EPA determined that a joint EIR/EIS would be the most effective way to conduct the environmental review. LADWP, as CEQA Lead Agency, began the environmental review process by issuing a Notice of Preparation (NOP) of the joint EIR/EIS in January 2000. The NOP described the project background and proposal. At the same time, EPA, as NEPA lead agency, issued a Notice of Intent (NOI) to prepare the joint EIR/EIS. The NOI, which is published in the Federal Register, briefly identifies the project and provides contact information. Thereafter, several MOU parties expressed concern about the capacity the pump station (maximum pump capacity of 200 cubic feet per second) proposed by LADWP in the NOP. These MOU parties asserted that the maximum pump capacity should not exceed 50 cubic feet per second (cfs), as specified in the Agreement. The parties also asserted that the MOU does not allow for a pump station greater than 50 cfs. LADWP disagreed, indicating that it believed that provisions of the MOU supercede the Agreement and allow a pump station to be constructed with a pump capacity up to 200 cfs.

In December 2000, LADWP as CEQA lead agency decided that because disagreement remained on the pump station issues, and to avoid a further delay in the preparation and release of the draft EIR/EIS, the EIR/EIS should describe and address alternative pump capacities that reflect the differing opinions of LADWP and the other MOU parties. In 2001, EPA identified the 50 cfs pump station capacity as its preferred alternative. Consequently, the Draft EIR/EIS, published in November 2002, described these main options: (1) a pump station with a capacity of up to 150 cfs; and (2) a pump station with a capacity of 50 cfs. Several alternatives to these proposals were also identified, including a 50-cfs pump station with physical modifications to the Delta Habitat Area to modify the flow patterns of water released to the Delta.

1.1.4 February 2004 Stipulation and Order and Final EIR/EIS

After the publication of the Draft EIR/EIS, the MOU parties continued to hold additional negotiations to resolve the dispute over the two alternatives for the pump station capacity and other issues related to the MOU. In February 2004, the MOU parties reached an agreement, and a Stipulation and Order was entered in Inyo County Superior Court (Case Number S1CVCV01-29768, Sierra Club and Owens Valley Committee v. City of Los Angeles et al., February 13, 2004). This February 2004 Stipulation and Order specifies the following with respect to the LORP project description:

- The maximum flow to be diverted by the pump station from the river will be 50 cfs. (See Section 2.4.)

- LADWP will provide matching funds for LORP saltcedar control equal to the amount obtained by the County up to a total of $1.5 million (not to exceed $500,000 in any given year). Matching funds will be in addition to the funds provided by LADWP for saltcedar control under the Inyo County/Los Angeles Long Term Water Agreement. LADWP will commence providing funding by matching the $560,000 Wildlife Conservation Board (WCB) grant that was awarded to the County in February 2004. (See Section 2.2.2 and Section 10.4.4.)

The LORP project description presented in Section 2.0 of this Final EIR/EIS reflects these requirements specified in the Stipulation and Order. In addition, the Stipulation and Order specifies an implementation schedule for the LORP, and requires that the baseflow of 40 cfs be achieved in the river no later than April 1, 2006 (see also Section 2.2.3 "Schedule and Phasing").

1.2 LORP GOALS AND ELEMENTS

The evolution of the LORP from the mid-1980s, through the Agreement and the 1991 EIR and the MOU is summarized below. The LORP project area is shown on Figure 1-1 (see Appendix A for all figures). The full project description is contained in Section 2.0.

Lower Owens River Rewatering Project. The Lower Owens River Rewatering Project was initiated in 1986 by LADWP and Inyo County. The project was one of 25 Enhancement/Mitigation Projects jointly implemented by the two agencies between 1984 and 1990. Under the project, 18,000 acre-feet per year was to be released from the Blackrock spillgate to maintain a continuous flow in the Lower Owens River from the Blackrock area to the Owens River Delta. The objective of the project was to improve habitat for waterfowl, shorebirds, and fish in the river corridor and at the Delta. In addition, water is supplied to the project through various spillgates along the Aqueduct to support the following lakes: Upper and Lower Twin Lakes, Goose Lake, Thibaut Ponds, and Billy Lake.

Agreement. As described in the Agreement (1991), the LORP consists of rewatering the Lower Owens River below the Aqueduct Intake with an unspecified flow of water, maintenance of off-river lakes and ponds, a pumpback system near Keeler Bridge with a pumping capacity of up to 50 cfs to recover water released to the river and return it to the Los Angeles Aqueduct, with average annual pumping not to exceed approximately 35 cfs. The Agreement provided that a management plan to be developed by LADWP, the County, and California Department of Fish and Game would set the amount of the river flows and water releases to the southern end of the river and the Owens River Delta, maintain existing off-river lakes and ponds, and set forth management to maintain the project elements.

1991 EIR. In the 1991 EIR, the LORP was identified as a mitigation measure for impacts resulting from activities associated with LADWP's water gathering operations in the Owens Valley from 1970 to 1990. The 1991 EIR clarified and expanded upon the description of the project contained in the Agreement. The pump station was intended to return water to the Aqueduct so a substantially larger flow could be placed in the river without requiring additional groundwater pumping in the valley to make up for the loss and to prevent excessive flows through the Delta waterfowl habitat onto Owens Lake dry lake bed.

The 1991 EIR provided that a 56-mile reach of the river from Blackrock to Lone Pine would be rewatered with a flow of water averaging approximately 35 cfs annually. Seasonal releases of water to wetland areas near Blackrock and the Delta to supply two major waterfowl management units consisting of approximately 850 acres were added to the project. The 1991 EIR stated that the project would be managed by LADWP, the County and the California Department of Fish and Game in accordance with a Habitat Management Plan that would be developed for the project. The 1991 EIR stated that the LORP would be the subject of a separate EIR.

<u>MOU</u>. The 1997 MOU augmented the Agreement and the 1991 EIR. The MOU states that "*[E]xcept as it modifies the scope of the Lower Owens River Project as described in the Inyo County/Los Angeles Long Term Water Agreement approved in October 1991…nothing in this MOU affects any other provision of that agreement*." Therefore, to the extent that the MOU modifies the scope of the LORP as described in the Agreement and 1991 EIR, the modifications of the MOU must be implemented. The MOU added specific goals for the LORP, a timeframe for the development and implementation of the project, requirements that certain actions be undertaken, and a requirement that a LORP ecosystem management plan be prepared to guide the implementation and management of the project. It also provides certain minimum requirements for the LORP related to flows, locations of facilities, and habitat and species.

The overall goal of the LORP, as stated in the MOU, is as follows:

> "*The goal of the LORP is the establishment of a healthy, functioning Lower Owens River riverine-riparian ecosystem, and the establishment of healthy functioning ecosystems in the other elements of the LORP, for the benefit of biodiversity and threatened and endangered species, while providing for the continuation of sustainable uses including recreation, livestock grazing, agriculture, and other activities.*"

The MOU provides that natural habitats will be created and maintained consistent with the needs of certain "habitat indicator" species through flow and land management in the project area. The MOU identifies the four physical features of the LORP: (1) Lower Owens River Riverine-Riparian Ecosystem; (2) Owens River Delta Habitat Area; (3) Blackrock Waterfowl Habitat Area; and (4) Off-River Lakes and Ponds. A summary of the four physical features of the LORP is provided below:

- <u>Riverine-Riparian Habitats</u>. The MOU specifies that a baseflow of 40 cfs will be established throughout the river, an increase from the 35 cfs specified in the Agreement. The MOU also specifies a seasonal habitat flow of up to 200 cfs. The annual amount of the seasonal habitat flow will depend on the runoff amount in Owens Valley each year. The MOU includes goals for certain "habitat indicator species" associated with the river. This element of the LORP also includes a pump station designed to capture water released to the river, and to convey the water to the Los Angeles Aqueduct or the Delta (see below).

- <u>Owens River Delta Habitat Area.</u> The MOU specifies that an average annual baseflow of approximately 6 to 9 cfs be released from the pump station to the Delta to enhance and maintain approximately 325 acres of existing habitat, and to establish and maintain new habitats in the Delta. This baseflow does not include any flows that by-pass the pump station during the seasonal habitat flows in the river. The MOU includes goals for certain "habitat indicator species" associated with the Delta.

- <u>Blackrock Waterfowl Habitat Area.</u> The MOU specifies that a 1,500-acre off-river area with a mixture of pasture and wetlands be enhanced through flow and land management to benefit wetlands and waterfowl. Approximately 500 acres of the habitat area are to be flooded at any given time when runoff is forecasted to be average or above average with reductions in water supplies in less than average runoff years. The MOU includes goals for "habitat indicator species" associated with the Blackrock Waterfowl Habitat Area.

- <u>Off-River Lakes and Ponds.</u> The MOU specifies that existing off-river lakes and ponds near the Blackrock Waterfowl Habitat Area be maintained for fisheries, waterfowl, shorebirds, and other animals through flow and land management. The off-river lakes and ponds identified in the MOU are: Billy Lake, Goose Lake, Thibaut Ponds, and Upper and Lower Twin Lakes. The MOU includes goals for "habitat indicator species" related to the actions at the off-river lakes and ponds.

The MOU includes a requirement that LADWP and the County direct and assist Ecosystem Sciences, Inc., of Boise, Idaho, to serve as a consultant in the preparation and implementation of a LORP ecosystem management plan (LORP Plan) following the procedures outlined in an Action Plan (Hill and Platts, 1997), which is contained in the MOU. The MOU provides that the consultant was chosen due to their education, training, experience, and philosophical approach to resource planning that focuses on holistic management principles, with a goal of promoting biodiversity and sustainable uses. The MOU states that, "For this reason, and based upon their professional record and their exercise of independent judgment, the Parties have agreed to vest consultants with the responsibility to develop many of the plans identified in this MOU." Ecosystem Sciences conducted the background studies to identify and determine river flow requirements for fish, wildlife, and riverine-riparian habitats, which are now the agreed upon flows for the LORP.

The Action Plan specified the scope of the various plans that would comprise the overall LORP Plan including plans for river management, wildlife and wetlands management, habitat conservation, land management, and monitoring. A draft LORP Plan was issued in May 1999 for review and comment by the MOU parties. A revised draft LORP Plan was developed in August 2002 and is available for review at the offices of LADWP and the Inyo County Water Department and at the Inyo County libraries in Lone Pine, Independence, Big Pine, and Bishop.

As provided in the MOU, the LORP will be adaptively managed. This means that project management will be modified if ongoing monitoring and analysis reveal that such modification is necessary to ensure the successful implementation of the project and the attainment of the project goals. The LORP includes a long-term monitoring plan for collecting and analyzing data on the progress toward meeting the LORP goals (see Section 2.10).

The proposed project also includes a land management plan for LADWP leases within the LORP area (see Section 2.8). The land management plan is designed to complement and facilitate the LORP actions and to comply with the MOU requirements along the river, in the Blackrock Waterfowl Habitat Area, and the Delta Habitat Area. The land management plan focuses on enhancing native habitat diversity while allowing for sustainable grazing. The plan focuses on riparian areas, irrigated pastures, and areas with sensitive species or habitats.

Although the MOU specifies that a Habitat Conservation Plan (HCP) will be prepared as one part of the LORP Plan, LADWP has concluded, after conferring with MOU parties, to delay initiating the development of an HCP until the project proposal and environmental documentation (EIR/EIS and associated documents) are finalized. The reason for delaying the HCP is that the MOU parties agreed that developing and finalizing a formal HCP would be time-consuming and could further delay implementation of the project if the HCP is tied to the project. In addition, some members of the public expressed concern over the possibility that endangered species could be introduced to popular fishing spots, and resolving those concerns could potentially add to the delay in implementing the LORP. LADWP believes that initiating the LORP implementation will provide an opportunity to better understand what is needed in the project to protect special status species. Furthermore, LADWP prefers to address all of its lands as a whole in an HCP, rather than focusing on the boundaries of the LORP. Thus, while the LORP contains provisions to develop habitat that is suitable for threatened and endangered species, there are no plans at this time to introduce those species to the LORP area.

The proposed project does not include any changes to existing recreational uses. With the exception of new signage, the project does not include construction of new recreational facilities, including roads, trails, or campgrounds. However, the LORP will provide new recreational opportunities over time due to enhanced natural resources, including game fisheries, waterfowl habitat, and a well-developed riparian corridor. If adverse impacts or threats to resources from recreational uses are observed, LADWP will implement the recreation management strategies described in Section 2.9.

1.3 ENVIRONMENTAL REVIEW

1.3.1 CEQA Lead Agency and Responsible Agencies

The MOU specifies that an EIR be prepared for the LORP in accordance with the California Environmental Quality Act (CEQA). The MOU also specifies that LADWP, as the CEQA Lead Agency, and the County as a CEQA Responsible Agency, will jointly prepare the EIR on the project. LADWP is the CEQA Lead Agency because it has the primary responsibility for the project through discretionary actions to fund and physically implement the LORP.

There are several CEQA Responsible Agencies that must act independently of LADWP to implement the project by granting approvals or issuing permits, including: the County, Lahontan Regional Water Quality Control Board (Regional Board), CDFG, and SLC. The County has responsibility for funding a portion of project implementation (up to $3.75 million) and for funding one half of, and jointly managing, most post-implementation activities. The Regional Board must issue water quality certifications, and CDFG must issue stream alteration agreements under their respective authorities in order for the project to proceed. The SLC must issue land use approvals for installation of two temporary stream gages on State lands within the Delta Habitat Area.

1.3.2 Purpose and Contents of an EIR

An EIR is an informational document designed to "…*inform public agency decision-makers and the public generally of the significant environmental effects of a project, identify possible ways to minimize the significant effects, and describe reasonable alternatives to the project*." (CEQA Guidelines 15121). The focus of an EIR is to identify significant environmental effects of the proposed project (CEQA Guidelines 15126.2). The significant effects should be discussed with emphasis in proportion to their severity and probability of occurrence (CEQA Guidelines 15143).

An EIR must also "… *describe a range of reasonable alternatives to the project … which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project, and evaluate the comparative merits of the alternatives*." (CEQA Guidelines 15126.6). The Guidelines state further: "*Because an EIR must identify ways to mitigate or avoid the significant effects that a project may have on the environment, the discussion of alternatives shall focus on alternatives to the project or its location which are capable of avoiding or substantially lessening any significant effects of the project, even if these alternatives would impede to some degree the attainment of the project objectives, or would be more costly*." (Section 15126.6).

CEQA Guidelines Section 15151 state that "*An EIR should be prepared with a sufficient degree of analysis to provide decision-makers with information which enables them to make a decision which intelligently takes account of environmental consequences. An evaluation of the environmental effects of a proposed project need not be exhaustive, but the sufficiency of an EIR is to be reviewed in the light of what is reasonably feasible. Disagreement among experts does not make an EIR inadequate, but the EIR should summarize the main points of disagreement among the experts. The courts have looked not for perfection but for adequacy, completeness, and a good faith effort at full disclosure*."

1.3.3 EPA Role in LORP and Federal Environmental Review

A portion of the funding from the County and LADWP will be derived from federal grant funds provided by the U.S. Environmental Protection Agency (EPA). At this time, the bulk of the funding is planned to be applied toward project implementation costs, such as environmental compliance; construction of the pump station and its associated power line, water control and measuring facilities; modification of the River Intake structure; and fence installation (see Section 2.2.2). The allocation of such funds from EPA to the County and LADWP to implement the project is a federal action by EPA subject to the environmental review requirements of the National Environmental Policy Act (NEPA). Although the LORP is a project that will be implemented by non-federal local agencies, it is subject to federal environmental review requirements because EPA's provision of funding is an "action" under NEPA. EPA is thus the NEPA Lead Agency. The amount of federal funding designated for the LORP at this time is approximately $6.3 million (see Section 2.2.2).

NEPA specifically prohibits segmenting interconnected actions. As such, it applies to all elements of the project, not just elements directly funded by EPA. Therefore, EPA must address the entire project in its environmental review.

1.3.4 Purpose and Contents of an EIS

NEPA requires the preparation of an Environmental Impact Statement (EIS) if the proposed action has the potential to "significantly affect the quality of the human environment." EPA has determined that the LORP has the potential to cause significant adverse impacts to the environment that are incidental to the intended environmental benefits of the LORP. This conclusion is consistent with LADWP's finding under CEQA that an EIR is necessary because the project could cause significant impacts. Many of the environmental review requirements under NEPA parallel those of CEQA. For example, the purpose of an EIS is to inform the public and decision-makers so that an informed decision can be made on the project.

An EIS is similar to an EIR in that both documents must describe the environmental consequences of the proposed action, identify mitigation measures to reduce impacts, and evaluate alternatives to the proposed project. However, an EIS has several different requirements, as listed below:

- In an EIS, the federal lead agency must evaluate the impacts of a range of reasonable alternatives that would fulfill most of the project objectives. These alternatives must be feasible, but may include alternatives outside the jurisdiction of the lead agency. In contrast, CEQA only requires an evaluation of alternatives that would avoid or reduce significant impacts.
- Mitigation measures must be identified for all impacts. However, none of the recommended mitigation measures in the EIS are mandatory. The federal lead agency has the discretion during the decision-making process to select mitigation measures from the EIS. In contrast, mitigation measures must be implemented for significant impacts under CEQA, unless a finding of overriding considerations is made. In addition, a CEQA lead agency must adopt all mitigation measures unless they are determined to be infeasible, or outside the jurisdiction and authority of the lead agency.
- An EIS must address consistency with applicable provisions of other key federal laws and regulations, including the Clean Water Act, Clean Air Act, National Historic Preservation Act (NHPA), and Endangered Species Act (ESA).
- An EIS must address consistency with applicable Executive Orders, such as those related to protection of wetlands and floodplains. In addition, an EIS must evaluate impacts of the project on minority and low-income communities pursuant to the Executive Order on Environmental Justice.

- Finally, an EIS must address specific considerations related to short-term uses of the environment relative to long-term productivity, irreversible and irretrievable commitment of resources, and economic or social impacts (as they relate to physical changes in the environment).

EPA's intention is to ensure full disclosure of environmental impacts pursuant to NEPA, and to assist public agencies in making decisions that are based on a complete understanding of environmental consequences, and to take actions that protect, restore, and enhance the environment (40 CFR 1501). EPA's role in the LORP is to fund a portion of the project, not to provide day-to-day management. EPA does not intend to assume an active role in project implementation. Hence, EPA's focus during the environmental review process and during the local decision-making process will be to ensure its obligations under NEPA are fulfilled, and that the overall design and implementation of the LORP are consistent with federal environmental laws and regulations. In addition, EPA will ensure that an adequate range of alternatives is addressed in the EIR/EIS, and that the document discloses all relevant information for other federal agencies that become involved when LADWP and the County seek federal permits and approvals from agencies such as the U.S. Army Corps of Engineers and Bureau of Land Management.

EPA's decision to fund the project is an independent decision from that of LADWP (as the CEQA Lead Agency) and the County (as a key CEQA Responsible Agency). EPA will consider the environmental impacts of the project as described in the Final EIR/EIS, and prepare a Record of Decision (ROD). In that document, EPA's preferred project will be identified, as well as the environmentally preferred alternative, which may or may not be the same alternative. The ROD will explain the basis of EPA's final decision, which may include identifying certain mitigation measures from the Final EIR/EIS which EPA has determined are necessary to comply with the intent of NEPA.

1.3.5 Public Scoping

The Notice of Preparation (NOP) issued by LADWP on January 14, 2000 went to five federal agencies, eight state agencies, 11 local agencies, 8 tribes, five environmental groups, and over 50 individuals, organizations, and other interested parties. EPA issued a Notice of Intent (NOI) in the Federal Register on February 1, 2000. The NOP and NOI requested comments on the scope and contents of the EIR/EIS. A public scoping meeting was conducted on February 16, 2000 in Lone Pine. Approximately 40 people attended the scoping meeting and provided verbal comments. Letters of comment in response to the NOP and NOI were received from the following parties and are included in Appendix B.

- U.S. Department of the Interior, Bureau of Land Management, Bishop Field Office
- California Department of Fish and Game, Inland Desert-Eastern Sierra Region, Bishop Field Office
- California Regional Water Quality Control Board, Lahontan Region
- California State Lands Commission
- Counties of Inyo-Mono, Agricultural Commissioner
- Independence Chamber of Commerce
- The Owens Valley Committee and the Sierra Club
- Fort Independence Indian Reservation
- Big Pine Paiute Tribe
- Eastern Sierra Audubon Society
- Tom Hurley
- Andrew Morin
- Arlene Grider
- Mark Belles

1.3.6 Draft and Final EIR/EIS

The Draft EIR/EIS was issued on November 1, 2002. The public review and comment period began on November 1, 2002 and ended on January 14, 2003. A total of 241 written comment letters were received on the Draft EIR/EIS. In addition, public meetings were held in Lone Pine on December 4, 2002 and in Bishop on December 5, 2002 to receive oral comments on the Draft EIR/EIS. A total of 19 people provided oral comments at the two meetings.

Appendix J (Volume 2) of this Final EIR/EIS presents the written comment letters on the Draft EIR/EIS and the written transcripts of the two public meetings, and Appendix K (Volume 3) presents responses to these comments. Please note that URS Corporation, consultant to Inyo County for the Draft EIR/EIS, assigned numbers to the comment letters; specific number series (61 through 69 and 71 through 79) were not assigned to any letters.

Throughout 2003 and until early May 2004, LADWP, EPA, and Inyo County coordinated closely to prepare the Final EIR/EIS, with the objective of reaching consensus on all issues among the three agencies. However, in order to meet the court-established deadline to release the Final EIR/EIS by June 23, 2004, LADWP informed Inyo County Superior Court on May 10, 2004 that LADWP would complete the document on its own, without further consultation with EPA and Inyo County. On May 11, 2004, LADWP informed EPA and Inyo County that LADWP would strive to incorporate the comments that had been received from the two agencies thus far, and also invited the two agencies to submit any additional comments by May 14 for LADWP's consideration and incorporation to the extent possible within the remaining time available. Therefore, this Final EIR/EIS reflects the consensus reached on the issues discussed by the three agencies as of May 2004.

1.4 PERMITS AND OTHER APPROVALS REQUIRED

Implementation of the LORP would require several permits and approvals from various agencies, as listed in Table 1-1.

TABLE 1-1
PERMITS AND APPROVALS REQUIRED

Agency	Permit or Approval	Project Element
Administrative Approvals		
LADWP Board of Water and Power Commissioners	Certification of Final EIR, and Issuance of Notice of Determination indicating that CEQA process is completed and project can proceed	All project elements
Inyo County Board of Supervisors	Adoption of LADWP's certified Final EIR/EIS, approval of final LORP, and directive to staff to proceed with joint implementation and funding of the project with LADWP	All project elements
Environmental Protection Agency (EPA)	Issuance of Record of Decision by Regional Administrator, indicating that NEPA process (including NHPA Section 106 and ESA Section 7 obligations) are completed and funding for implementation can be released to Inyo County and LADWP	All project elements
U.S. Fish and Wildlife Service	Letter to EPA indicating that ESA Section 7 consultation requirements have been completed; consultation with the U.S. Army Corps of Engineers regarding 404 permit.	All project elements
State Historic Preservation Officer	Letter of concurrence to EPA on NHPA Section 106 compliance	All project elements
Permits		
U.S. Army Corps of Engineers	Section 404 permit for discharge of dredge or fill materials associated with certain construction activities	Pump station, River Intake structure modifications, new stream gaging stations, spillgate modification and maintenance activities in wetland areas
California Department of Fish and Game	Streambed Alteration Agreement (Fish and Game Code 1602), consultation under the California Endangered Species Act	Pump station, River Intake structure modifications, new stream gaging stations, spillgate modification and maintenance activities in wetland areas
Bureau of Land Management	Right of way grant	Power line to pump station
Regional Water Quality Control Board, Lahontan Region	401 Water Quality Certification or Waiver for all Section 404 permit activities	Pump station, River Intake structure modifications, new stream gaging stations, spillgate modification and maintenance activities in wetland areas
Regional Water Quality Control Board, Lahontan Region	Waste Discharge Requirements	Temporary dewatering during pump station or other construction
State Water Resource Control Board	NPDES construction stormwater permit	Construction activities at pump station
California State Lands Commission	Land use approvals	Installation of temporary stream gages in the Delta
Great Basin Air Pollution Control District	Permit to conduct control burns (if this action is implemented under adaptive management)	Land management activities
Inyo County	Grading and building permits	Pump station

2.0 PROJECT DESCRIPTION (PROPOSED ACTION)

2.1 INTRODUCTION

2.1.1 Purpose and Need

The LORP is mitigation for certain water gathering activities by LADWP from 1970-1990. The LORP will implement applicable provisions of the 1991 Inyo County/Los Angeles Long Term Water Agreement (Agreement), the 1991 EIR, and the MOU. In regards to the LORP, the MOU augments the Agreement and the 1991 EIR. The LORP must be implemented in compliance with the specific objectives, project elements, implementation schedule, agency responsibilities, and limitations contained in the MOU. Substantive changes to the LORP that are not in conformance with the MOU can only be implemented following the processes outlined in the MOU and Agreement, and may need Court approval. Furthermore, issues in the MOU that are subject to differing interpretations by the various MOU parties must be resolved either through the dispute resolution process identified in the MOU, or through Court action.

2.1.2 LORP Plan

The MOU requires LADWP and the County to direct and assist Ecosystem Sciences in the preparation and implementation of a “LORP Plan” following the procedures outlined in an Action Plan, which is incorporated into the MOU. The Action Plan requires that the LORP Plan describe the four physical features of the LORP: (1) Lower Owens River Riverine-Riparian Ecosystem; (2) Owens River Delta Habitat Area; (3) Off-River Lakes and Ponds; and (4) Blackrock Waterfowl Habitat Area. The LORP Plan is comprised of several plans. The Action Plan specifies the scope of the various plans that comprise the overall LORP Plan, including plans for river management, wildlife and wetlands management, habitat conservation, land management, and monitoring.

In May 1999, LADWP issued a draft LORP Plan, which was prepared by Ecosystem Sciences for review by the MOU parties. The May 1999 draft LORP Plan and comments received on the plan are available for review at the offices of LADWP and Inyo County Water Department in Bishop, California and at the offices of the EPA in San Francisco, California. In response to comments from the MOU parties, the draft LORP Plan was revised by Ecosystem Sciences in August 2002. The LORP Plan describes Ecosystem Sciences’ recommendations for general goals, and specific objectives and actions to implement the various elements of the LORP. The recommendations described in the LORP Plan are intended to meet the goals and objectives specified in the MOU and to address the specific areas identified in the Action Plan.

The August 2002 LORP Plan is available for public review at the offices of LADWP and Inyo County in Bishop, California, and at the offices of EPA in San Francisco, California. The LORP Plan draws from various studies conducted by Ecosystem Sciences, which were incorporated into the LORP Plan. To the extent that there is an inconsistency or conflict between a provision of the LORP Plan and the contents of a technical memorandum, the provisions of the LORP Plan represent Ecosystem Sciences’ current recommendations and, therefore, supercede the technical memoranda. The technical memoranda are listed below.

1. Hydrologic Plan for Implementing Initial Maximum and Minimum River Flows (no date)
1a. Addendum to Hydrologic Plan for Implementing Initial Maximum and Minimum River Flows
2. Initiation of Resource User Group/Recreation Plan (no date)

3. Distribution and Abundance of Beaver in the Lower Owens River (no date)
4. Mapping Existing Vegetation Types for the Blackrock Waterfowl Habitat Area (no date)
5. Outline of a Preliminary Plan for the Conservation of Threatened and Endangered Species (no date; out of date – no longer applicable)
6. Results of User Group Interviews (no date)
7. Water Quality in the Lower Owens River – Existing and Future Conditions (no date)
8. Owens River Delta Habitat Area (January 1999);
   - 8a. Addendum to Technical Memorandum 8 (February 14, 2000)
   - 8b. Addendum to Technical Memorandum 8 (April 10, 2000)
   - 8c. Tables for Addendum to TM-08c (June 2000)
9. Management of Tules and Organic Sediments (no date)
10. Framework for the Recreation Plan (no date)
11. Critical Path for Flow Management During the Initial Years (no date)
12. Springs and Seeps Inventory and Assessment (no date)
13. Groundwater- Surface Water Interaction (no date)
14. Fisheries in the Lower Owens River (no date); revised version issued April 2001
15. Resource Management in the Blackrock Waterfowl Habitat Area (November 1998)

15a. Macroinvertebrates: A protocol for sampling seeps and springs (no date)

16 Revised Projections of Wildlife Habitat Units for the Lower Owens River Using HSI Models (June 1998)

17. Alternative Rewatering Techniques (February 1999)
18. Wetland Management Plan: Blackrock Waterfowl Habitat Area Implementation (April 1999)
19. Riparian Wildlife Management – Summary of Management Concepts and Priorities (March 1999)
20. Special Status Wildlife and Plant Species Accounts (August 1999)

No number. Grazing Management Plans for Blackrock, Thibaut, Island and Delta, Twin Lakes, and Lone Pine leases (five plans, 1999)*.

* The individual grazing management plans were developed by Ecosystem Sciences and LADWP in cooperation with each leaseholder. Lessees agreed to provide the proprietary information to Ecosystem Sciences and LADWP with the understanding that the information would remain confidential. Therefore, the lease-specific grazing management plans are not available for public review (see also Section 2.8.1).

2.1.3 Relationship of the EIR/EIS Project Description to the LORP Plan

The LORP Plan has been developed by Ecosystem Sciences as mandated in the MOU. The LORP Plan is grounded in the concept of adaptive management (see Section 2.10), which assumes findings made over the course of time will direct future actions of the parties. The project description in this EIR/EIS has been developed from the August 2002 LORP Plan. The project description incorporates management actions contained in the LORP Plan, including the adaptive management concept, and provides the specificity required for environmental analysis of impacts and subsequent project approval and implementation. Actions to be completed as described in the most recent LORP Plan are analyzed in this EIR/EIS.

2.1.4 Approach to Ecosystem Restoration

If monitoring results indicate that the changes in environmental conditions are inconsistent with the LORP objectives, LADWP and the County will implement feasible adaptive management measures. The adaptive management approach is described below in Section 2.10.5. Under the proposed project, the effects of altered river flows, changed flooding patterns in wetland areas, and modified land management practices will be monitored on an ongoing basis to determine if the desired goals are being achieved, and if not, the adaptive management actions will be considered and implemented as necessary and to the extent consistent with the MOU. This approach contrasts with alternative habitat restoration approaches that involve active planting of vegetation and/or introduction of wildlife species.

While the natural hydrology of the river was considered in developing the water regime for the Lower Owens River and the Delta Habitat Area, the proposed river flows will differ from flows which would result under natural, pre-Los Angeles Aqueduct conditions. In the Blackrock Waterfowl Habitat Area, ditches and levees will be modified to allow year-to-year and seasonal manipulation of water regimes to periodically flood different areas. Also, the Blackrock area of the LORP will be actively managed to meet habitat and waterfowl goals. Similarly, the modified land management practices on LADWP leases in the LORP area will be based on active modifications of grazing practices and pasture boundaries based upon ongoing monitoring.

2.1.5 Relationship of the LORP to Groundwater Pumping and Surface Water Management in the Owens Valley

The LORP does not include the construction of new groundwater wells in the Owens Valley to supply the LORP, nor does the LORP include an increase in groundwater pumping in the Owens Valley as part of the project (aside from new or replacement stockwater wells with no substantial increase in groundwater pumping over exiting conditions; see Section 2.8.1.2). Further, the LORP does not include any changes in surface water management practices in the Owens Valley except for those changes within the LORP area specifically described in the project description that are necessary for the implementation of the LORP. Groundwater pumping and changes in surface water management practices in the Owens Valley are governed by the 1991 Inyo County/Los Angeles Long Term Water Agreement. The Agreement establishes procedures for managing groundwater pumping to avoid/minimize impacts to groundwater-dependent vegetation, monitoring pumping and surface water management practices to identify vegetation impacts, and implementing mitigation measures, if necessary.

2.2 ADMINISTRATION OF THE PROJECT

2.2.1 Roles and Responsibilities of Involved Agencies

The LORP will be implemented through a joint effort by LADWP and the County. The other MOU signatories will not have any direct management responsibilities for the LORP. EPA will provide funding for the project, and will ensure that its federal responsibilities associated with the funding are met, but EPA will not be actively involved in the implementation of the project. Regulatory agencies including the CDFG, Lahontan Regional Water Quality Control Board, and Corps of Engineers, will influence the LORP through various permits and approvals.

The County and LADWP will conduct the monitoring associated with the LORP, provide analysis of technical data, and prepare an annual report that includes monitoring data, analysis and recommendations on the need for adaptive management actions. The annual report will be made available to the public. The construction of physical facilities and modification of land and water features associated with the LORP will be conducted by LADWP personnel and consultants/contractors working for LADWP.

The Inyo/Los Angeles Technical Group ("Technical Group") was formed in 1982, and is comprised of staff from LADWP and the County. It will meet to review the annual report prepared by LADWP and the County, and will meet as necessary to review other monitoring data and recommendations, to determine if management actions need to be modified within the framework of the adaptive management approach in order to better achieve the LORP goals. Agendas of Technical Group meetings are provided to the public in advance of each meeting and the Technical Group meetings are open to the public.

Also, following the implementation of the LORP, in December of each year, the Technical Group will develop and adopt an annual work program describing the work to be performed in regard to the LORP (including the implementation of adaptive management measures) during the following fiscal year. Each work program will identify who will perform or oversee the work, a schedule for the performance of the work and a budget. Following adoption by the Technical Group, the work programs will be submitted to the County and LADWP governing boards for consideration of approval. Meetings of each governing board are open to the public. Before the work plans and accompanying budgets can be implemented, they will have to be approved by each governing board.

If the Technical Group is in disagreement over the need to implement an adaptive management measure or over the content of a work program, the disagreement will be submitted to the Inyo County/Los Angeles Standing Committee ("Standing Committee") for resolution. The Standing Committee was formed in 1982 and consists of both managers and elected and appointed officials from the County and LADWP. Its meetings are open to the public. If the Standing Committee is unable to resolve a disagreement, the disagreement will be submitted to the governing boards of each entity for resolution. If the governing boards are unable to agree on all, or any part, of a work program, the portion of the program in disagreement will not be implemented. Further, if the governing boards are in disagreement over the need to implement an adaptive management measure, the measure will not be implemented. The dispute resolution process, including mediation/facilitation and litigation, is detailed in the MOU (Sections VI and VII).

2.2.2 Costs and Funding Sources

2.2.2.1 Implementation Period Costs

Under the Agreement between the County and LADWP, the County must reimburse LADWP for the costs of implementing the LORP (up to a maximum of $3.75 million), less any funds for the project that are provided by sources other than LADWP (such as grants). LADWP will pay for implementation costs in excess of $3.75 million.

Major implementation costs include construction of the pump station and its associated power line and water control and measuring facilities; modification of the River Intake structure; fence installation; improvements to spillgates; road work; construction and improvement of berms and ditches in the Blackrock area; channel clearing; and installation of stream gages. Implementation also includes planning and development work for the LORP, including the technical consulting services of Ecosystem Sciences for preparing the LORP Plan, the services of URS Corporation for assistance in preparing the EIR/EIS, project permitting efforts by LADWP, the removal of the temporary stream gages, and the construction of a new ditch or pipeline near Goose Lake.

As shown in Table 2-1A, the total cost of implementing the project is estimated to be approximately $15.5 million. The estimates for the other project implementation costs identified in Table 2-1A were developed by LADWP between June and October 2001.

TABLE 2-1A
ESTIMATED LORP IMPLEMENTATION COSTS*

Project Component	Estimated Cost
Pump station**	$9,800,000
Pump station contingencies**	1,700,000
Pump station subtotal	11,500,000
Intake modification	721,000
Spillgate Improvements	96,000
Channel clearing	172,500
Temporary stream gages	191,000
Fencing	1,047,000
New culverts	31,000
Blackrock berms and ditches	139,000
Pump station power line	881,000
Environmental review	375,000
Sub-total (excluding pump station)	3,653,500
Contingencies (+10 percent)	365,350
TOTAL =	$15,518,850

*Does not include the following implementation costs: technical consulting services of Ecosystem Sciences, the removal of the temporary stream gages, installation of at least four permanent stream gages, project permitting, paving of the road from the Aqueduct to the pump station, and construction of a new ditch or pipeline near Goose Lake.
**Based on preliminary cost estimates developed by Bureau of Reclamation in May 2004.

2.2.2.2 Post-Implementation Period Costs

The Agreement provides that, once the LORP has been implemented, LADWP and the County will each be responsible for one-half of the annual operation costs of the LORP that are not related to the pump system, and that LADWP will pay all operation and maintenance costs of the pump system. These "post-implementation" costs are for activities related to operation and maintenance, monitoring and reporting, adaptive management, and mitigation measures. Both the County and LADWP intend to fully fund their share of the post-implementation costs of the LORP in accordance with the Agreement and the more recent provisions of the Stipulation and Order entered in Inyo County Superior Court Case Number S1CVCV01-29768 (*Sierra Club and Owens Valley Committee v City of Los Angeles et al*., February 13, 2004; see also Section 1.1). The stipulation calls for LADWP to provide matching funds to Inyo County for saltcedar control as detailed in Mitigation Measure V-3 (Section 10.4.4). Except for LADWP funding to be provided to the Inyo-Mono County Agricultural Commissioner as described in Mitigation Measure V-2 (Section 10.4.4; non-saltcedar noxious weed control), all mitigation measures identified in this EIR/EIS are considered post-implementation costs to be shared equally by LADWP and Inyo County.

After adoption of the LORP, the governing bodies of the County and LADWP will adopt a policy that sets forth each entity's responsibilities for the funding of the LORP during the implementation and post-implementation periods and which describes the procedures for managing the LORP during the post-implementation period. Although not finalized, a working draft copy of the post-implementation policy that will be considered by the governing bodies is provided in Appendix C. As required by law, decisions as to the availability of funding for the LORP will be made annually by the Inyo County Board of Supervisors and by the LADWP Board of Water and Power Commissioners. In the event that one or both governing boards determine that there are insufficient funds available to cover the entity's share of the costs of the LORP, each entity will evaluate the situation and will take such action as it deems appropriate under the then existing applicable law.

Intensive monitoring and implementation of adaptive management measures to better achieve the goals of the LORP are expected to only be necessary during the initial 15 years of the project (Ecosystem Sciences, 2002). After that time, it is anticipated that the goals of the project will largely have been achieved. Therefore, the estimates of the monitoring and operation and maintenance activities are based upon this 15-year period. Since the future needs for adaptive management and, to some extent, mitigation, are unknown, it is not possible to accurately estimate these components of the post-implementation costs.

It is estimated that the cost of operating and maintaining the project (including the maintenance of project flows, maintenance of certain ditches, levees, spillgates, flow measuring devices, beaver control, and certain grazing fences – but not including the operation and maintenance of the pump station) will be approximately $4.2 million during the 15-year period following the implementation of the LORP. LADWP developed estimates of the costs of project operation and maintenance by estimating the amount of time it would take LADWP staff to maintain the project's facilities and calculating LADWP's costs to fund that staff time; the estimates do not include the costs of materials. The 15-year operation and maintenance estimate includes a 3 percent annual inflation adjustment. It is currently anticipated that LADWP staff would perform the maintenance and operation activities and that the County would reimburse LADWP for one-half of LADWP's costs. Over the long term, County staff could perform some of this work.

The costs of implementing the monitoring program identified in Section 2.10 during this 15-year period are estimated to be approximately $2.6 million. To develop the estimates of the costs for project monitoring, LADWP, the County, and Ecosystem Sciences developed estimates of the staffing and time required to conduct each monitoring component identified in Section 2.10. Hourly and daily costs were assigned to each staff position (e.g., hydrologist, biologist, field technician) based on a range of hourly costs for similar positions charged by a sample of consulting firms. The annual cost of each monitoring component was estimated as the staff costs multiplied by the estimated time to perform a given monitoring component plus a daily vehicle charge. The estimated total cost for implementing the 15-year monitoring program includes a 3 percent annual inflation adjustment. It is currently anticipated that the monitoring responsibilities for the LORP would be shared equally by staff from the County's Water Department and LADWP.

Taken together, the costs of the LORP for operation, maintenance, monitoring and mitigation during the 15 years following the implementation of the LORP are estimated to be approximately $13.4 million (see Table 2-1B).

TABLE 2-1B
ESTIMATED LORP POST-IMPLEMENTATION COSTS*

Post-Implementation Item	Estimated Cost
Operation and Maintenance	$4,200,000
Monitoring	2,600,000
Mitigation	6,600,000
Total	**$13,400,000**

* Does not include the following post-implementation costs: adaptive management costs (which are unknown at this time) and maintenance, operation or other related costs associated with the pump station (which are funded by LADWP as provided in the Agreement).

2.2.2.3 Project Funding

LADWP has committed to provide funding for the LORP as described in Table 2-1C.

TABLE 2-1C
LADWP FUNDING COMMITTMENTS

Funding	Amount
LORP Implementation	Total implementation cost minus $3,750,000
Pump station operation and maintenance	All
Non-saltcedar noxious weed control for first 7 years (Mitigation Measure V-2, see Section 10.4.4)	$1,400,000
Matching funds for WCB grant for saltcedar control (Mitigation Measure V-3, see Section 10.4.4)	$560,000 (min) $1,500,000 (max)
All other post implementation costs	One-half

Table 2-2 shows the amount of funding currently available to support the County's share of the costs of the LORP. The County currently has approximately $2.8 million available to be applied toward post-implementation costs of the LORP. EPA is the primary outside funding source. Congress has appropriated, through EPA, a total of $6.3 million for the project ($5,393,033 to the County and $862,200 to LADWP). In addition to EPA funds, to date, the County has received $360,000 from the U.S. Bureau of Reclamation and $250,000 from the U.S. Department of Housing and Urban Development (HUD). The County has also obtained a grant in the amount of $560,000 from the Wildlife Conservation Board (WCB) for saltcedar control. These funds, when combined with funds that will come from the EPA, will provide a total of about $6.6 million to the County to cover its share of the costs of the LORP.

TABLE 2-2
LORP FUNDING CURRENTLY AVAILABLE TO SUPPORT THE COUNTY'S SHARE OF THE COSTS OF THE LORP

Funding	Amount
EPA grant to County	$5,393,033
HUD grant to County	250,000
Bureau of Reclamation grant to County	360,000
WCB Grant to County for Saltcedar Control	560,000
Total funding currently available to County (A) =	$6,563,033
Amount of funding currently available to County that will be applied to implementation costs (B) =	$3,750,000
Amount of funding currently available to County that will be applied to post-implementation costs (A – B) =	$2,813,033

In addition, both LADWP and Inyo County will actively seek additional funds from non-County/non-LADWP sources.

2.2.3 Schedule and Phasing

The MOU requires implementation of the LORP in the following timeframe:

> *"DWP will commence the baseflow of 40 cfs in the river channel by the 72nd month after the discharge of the writ unless circumstances beyond DWP's control prevent the completion of the pumpback system and/or the commencement of the baseflow within the 72-month period. DWP will commence implementation of the other physical features of the LORP upon the certification of the LORP EIR."*

The writ was discharged on June 13,1997; hence, the MOU required that the baseflows be established in the Lower Owens River by June 13, 2003. This deadline has not been met, and is replaced by the new schedule specified in the February 2004 Stipulation and Order (see Section 1.1.5). The February 2004 Stipulation and Order specifies that LADWP release the Final EIR/EIS by June 23, 2004, and present the Final EIR/EIS to the LADWP Board of Water and Power Commissioners for certification in August 2004. Initial releases of water (Phase 1 flows) to the lower Owens River are to begin no later than 6 months after all relevant permits have been granted, and the baseflow of 40 cubic feet per second (cfs) is to be achieved no later than April 1, 2006. Table 2-3 shows the proposed implementation schedule for the LORP.

TABLE 2-3
PROPOSED LORP IMPLEMENTATION SCHEDULE

Task	Approximate Date
LORP EIR/EIS AND APPROVAL PROCESS (Section 1.3)	
Issue final EIR/EIS	June 23, 2004
LADWP/Inyo County project approvals EPA issues Record of Decision	August 2004
30-day NEPA no-action period	September 2004
PUMP STATION (Section 2.4)	
Final design for pump station completed	July 2004
Construction (12 months)	Begin in Fall 2004/Winter 2005
LORP POWERLINE (Section 2.4)	
Construction (3 months)	Fall 2004/Winter 2005
PROJECT PERMITS (Section 1.4)	
Permit applications, agency review, & permit issuance	Ongoing
FEDERAL AGENCY CONSULTATIONS (Section 1.4)	
Agency consultation, review, & determinations	Ongoing
WORK PRIOR TO RELEASES TO RIVER CHANNEL	
Clear channel, modify River Intake, upgrade other intakes & spillgates, install staff gages and culverts (Section 2.3)	Begin in Fall 2004/Winter 2005
Install fences (Section 2.8)	Spring 2005 to Winter 2006
PREPARATION AT BLACKROCK AREA (Section 2.7)	
Modify or replace gates, construct berms, modify ditches, install fences, begin flow releases	Fall 2004
RELEASE FLOWS TO RIVER (Section 2.3)	
Initiate Phase 1 flows	No later than 6 months after all permits have been granted
Achieve baseflow of 40-cfs	No later than April 1, 2006
Release first seasonal habitat flow	Winter 2006/2007

2.3 LOWER OWENS RIVER RIVERINE-RIPARIAN SYSTEM

2.3.1 Objectives

The overall objective of rewatering the river is to restore aquatic and riparian habitats of the river from the River Intake to the proposed pump station, located at the upper end of the Owens River Delta (Figures 2-1a - e). A continuous flow of approximately 40 cfs will be established and maintained in the river channel from the River Intake to the LORP pump station near the Owens River Delta. This reach is approximately 62 river miles and 33 linear miles long. A seasonal habitat flow (with a total flow ranging from 40 to 200 cfs depending on the predicted amount of annual Owens Valley runoff) will also be released to the river each spring. The goal for the Lower Owens River Riverine-Riparian System is to create and sustain healthy and diverse riparian and aquatic habitats and a healthy warm water recreational fishery with healthy habitat for native fish species. Diverse natural habitats will be created and maintained through flow and land management, to the extent feasible, consistent with the needs of the "habitat indicator species" for the riverine-riparian system that are identified in the LORP Action Plan.

2.3.2 Background

At present, all flows in the Owens River channel are diverted into the Los Angeles Aqueduct (Aqueduct) at the River Intake for delivery to the City of Los Angeles for municipal and industrial uses, and there are no releases from the Aqueduct downstream of the River Intake with the following exceptions (see also Table 2-4):

- Diversions to the Aqueduct at the River Intake and at downstream locations are curtailed when the capacity of the Aqueduct downstream of the diversion is exceeded due to inflows from runoff and rainfall. Under these conditions, the flow in the river is released through the River Intake structure. Since 1980, these releases have occurred in 1982, 1983, and 1986. The duration of the releases lasted until the high runoff declined sufficiently so that the flows no longer exceeded the capacity of the Aqueduct.

- Diversions to the Aqueduct at the River Intake are reduced or discontinued, and downstream releases are made from the Aqueduct in emergencies, such as in 1989 and 2003 when flash floods filled the Aqueduct with rocks and sediment.

- Diversions to the Aqueduct at the River Intake are reduced or discontinued and downstream releases may be made from the Aqueduct when the Aqueduct is temporarily shut down for maintenance. This occurs on an as needed basis and the duration can vary from days to weeks. Typically, one release is made per year with a 2 to 4 week duration.

- Releases downstream of the River Intake are made from the Aqueduct to support grazing operations for leases along the Lower Owens River. Some of these releases periodically reach the river between Billy Lake and Alabama gates (see Figure 2-1e).

- Releases are currently made from the Aqueduct at the Independence, Locust, and Georges spillgates (see Figures 2-1b and c) to provide water to the river for fish and habitat purposes under an "Enhancement/Mitigation Project" called the "Lower Owens River Rewatering Project" that was initiated by the LADWP and the County in 1986. The releases under that project will be replaced by the releases under the LORP.

- Releases are made from the Aqueduct at the Blackrock, Thibaut, and Independence spillgates (see Figure 2-1b) to provide water to Twin Lakes, Thibaut Ponds, Goose Lake, and Billy Lake for purposes of maintaining game fish and wetland/wildlife habitat. These releases will continue after implementation of the LORP. However, the source of supply to Goose Lake will be alternated during years when the Waggoner Unit is dry (see Sections 2.5.10.1 and 2.6.4).

- Releases are made at two locations (Lubkin Canyon and Cartago spillgates) from the Aqueduct that are adjacent to the west shore of Owens Lake for dust control purposes or measures.

The current total average annual releases from the LADWP spillgates described above are approximately 20 cfs. Currently, other inflows to the Lower Owens River consist of intermittent winter and spring runoff from tributary streams and groundwater seepage to the channel in certain reaches. Much of the project reach contains degraded habitat conditions due to historic diversions from the river. Existing conditions include:

- General absence of riparian woodland on the dry reach of the river above Mazourka Canyon Road.
- Absence of open water and game fish above Mazourka Canyon Road.
- Continual low flows with little variation below Mazourka Canyon Road, which promotes the accumulation of bulrush and cattails.
- Excessive beaver activity along the wet reach, which reduces tree cover and impounds water, causing high summertime water temperatures.
- Excessive accumulation of organic sediments below the Billy Lake Return ditch due to lack of scouring flows.

2.3.3 Water Release Facilities

Under most circumstances, water would be released to the river for the LORP from the existing River Intake structure located along the river south of Tinemaha Reservoir (Figure 2-1a). The concrete structure was completed in 1913. It currently blocks the river channel, impounds the water and diverts flows by gravity to the nearby Aqueduct Intake to the Los Angeles Aqueduct.

In addition to the River Intake, water may be released to the river through several of the existing spillgates along the Los Angeles Aqueduct (downstream of the River Intake), if necessary, to achieve the required river baseflow. A summary of these spillgates and a description of current releases from the spillgates are provided in Table 2-4. Water could be released from these spillgates to augment the baseflow in the river, if needed. Under the LORP, the principal point of release to the river will be at the River Intake; therefore, the amounts of the current releases from the spillgates (shown in Table 2-4) may be reduced once the LORP is implemented.

The River Intake is 300 feet long and consists of 28 concrete spillway cells (six spillgates and 22 floodgates). Each of the six spillgates is approximately 8 feet wide by 8.5 feet high, and has the capacity to pass up to 200 cfs. Each of the 22 floodgates is approximately 9 feet wide by 4 feet high, and has the capacity to pass up to 125 cfs. A wooden walkway is present along the top of the structure.

The three spillgates at the western end of the structures (Spillgates Nos. 1, 2, and 3) have not been used for the past 25 years, and their steel radial gates have been removed. The three spillgates at the eastern end of the structure (Spillgates Nos. 4, 5, and 6) contain manually operated steel radial gates that are used to release water into the river. Each gate has a capacity of about 160 to 200 cfs. These gates are infrequently used to release water to the river, as noted above in Section 2.3.2.

The old river channel, located directly downstream of the diversion is mostly devoid of vegetation. Spoil piles composed of sediments periodically removed from the river above the River Intake are placed along the western and eastern banks of the river (upstream of the diversion structure).

Under LORP, the River Intake structure will be modified by installing a 20-foot wide automated gate approximately 75 feet downstream from the existing spillgates Nos. 4, 5, and 6. The new gate would be capable of conveying up to a maximum of 200 cfs with adjustments in releases of 1 cfs up to 200 cfs.

The installation of the new automated gate would require the following construction activities, which are anticipated to require about 120 to 150 days:

- Construction of a temporary cofferdam on the upstream side of the diversion, around spillgates Nos. 4, 5, and 6.

- Construction of a 30-foot long wing wall (concrete) on the east side of the spillgates Nos. 4, 5, and 6.

- Raising of the existing steel radial gate in spillgate No. 5 to the fully opened position and permanently anchoring the gate in this position. (The existing radial gates in spillgates Nos. 4 and 6 will be normally closed unless more flows are needed to augment flow to the new automated gate.)

- Installation of the new automated gate would include installation of a new hardened concrete sluice (approximately 28-foot wide and 85-foot long) to the downstream face of spillgates # 4, 5, & 6.

- A 225-foot long concrete spillway channel will be constructed downstream from the new automated gate to protect a flow metering station from vegetative overgrowth and submersion and excessive scouring during high flow conditions.

- Construction equipment would access the east side of the river by an existing dirt road that extends across the currently dry river channel. This existing dirt road will be elevated by approximately 3 to 4 feet using compacted native soil road base to prevent wash out and scour during high flows. New culverts will be installed under the road, and the approach to the existing rail car bridge will be reinforced by rip-rap armoring.

- An existing steel rail car bridge (approximately 11-foot wide and 52-foot long) will be rehabilitated and reinstalled on new bridge abutments approximately 175 feet downstream from spillgates Nos. 4, 5, and 6. A flow metering station will be installed in the same location to replace the existing station.

- Construction equipment would include pickup trucks, water trucks, weld trucks, tracked excavator, pitman crane, American Lattice boom crane, concrete delivery trucks, supply/ material delivery trucks, and excavating equipment (backhoe or G-100 Gradall®).

TABLE 2-4
SUMMARY OF CURRENT SPILLGATE OPERATIONS IN THE LORP PROJECT AREA

Spillgate [see Figures 2-1a to e for locations]	Purposes of Current Releases	Current Release Regime (avg monthly flow unless otherwise noted)	Distance from Los Angeles Aqueduct to Owens River (channel miles)	Distance from Pump Station Site (miles)
Blackrock Spillgate	Water for livestock on Twin Lakes and Blackrock leases using Blackrock, Winterton, and Waggoner ditches; maintain water in Twin Lakes and Goose Lake; release excessive flows in the Aqueduct due to high inflows	6.4 cfs (1986-2001 avg), year-round	3.4 miles in well-defined channel; currently, no water reaches the river	56.1 miles
Thibaut Spillgate	Water for livestock; irrigation for pastures on Thibaut Lease and to maintain Thibaut Ponds; stockwater; release excess flows in above average runoff years	1-2 cfs (1986-2001 avg), year-round	No connection to the river; water remains in Thibaut Pasture	Not applicable
Independence Spillgate	Water to maintain Billy Lake and to support fish in the river under the 1986 Lower Owens River Rewatering Project; Release excessive flows in the Aqueduct due to high inflows; Aqueduct maintenance; spreading of water in	4.7 cfs (1986-2001 avg), year-round	3 miles; conveyed from Long Pond to Independence channel, to Billy Lake, then to Billy Lake Return near Mazourka Canyon Road in well-defined channels	38.0 miles

Spillgate [see Figures 2-1a to e for locations]	Purposes of Current Releases	Current Release Regime (avg monthly flow unless otherwise noted)	Distance from Los Angeles Aqueduct to Owens River (channel miles)	Distance from Pump Station Site (miles)
	above average runoff years			
Dean Spillgate	Water for livestock on Blackrock lease in Steven's Ditch; spreading of water in above average runoff years	< 1 cfs	No direct connection to the river; water in Steven's Ditch eventually reaches the river at George's Ditch Return	Not applicable
Russell Spillgate	Water for livestock on Blackrock lease in Steven's Ditch; spreading of water in above average runoff years	< 1 cfs	No direct connection to the river; water in Steven's Ditch will eventually reach the river at George's Ditch Return	Not applicable
Locust Spillgate	Water for livestock on Blackrock lease in Locust Ditch and Steven's Ditch; release excessive flows in the Aqueduct due to high inflows; Aqueduct maintenance; spreading of water in above average runoff years	5.4 cfs (1986-2001 avg) year-round	1.5 miles; conveyed through Steven's Ditch to river in well-defined channel	31 miles
Georges Spillgate	Water for livestock on Blackrock lease in Steven's Ditch and Georges Ditch; irrigation for pasture; releases for fish; release excessive flows in the Aqueduct due to high inflows; Aqueduct maintenance; release excess flows in above average runoff years	2.1 cfs (1986-2001 avg) year-round	1.9 miles; direct connection through George's Ditch to river in well-defined channel	24.8 miles
Alabama Spillgate	Release excessive flows in the Aqueduct due to high inflows; Aqueduct maintenance; release excess flows in above average runoff years; emergency spills	Approximately 200 cfs for 2 hours, 4-6 times/year	0.5 to 1.5 miles through various poorly defined channels and wetlands in the "Islands"	17.5 miles

2.3.4 Required River Flows and Habitat Indicator Species

Baseflows

As required by the MOU, a continuous flow of approximately 40 cfs will be maintained from the River Intake to a pump system located near the river delta at Owens Lake. The pump system will capture and pump the water either to Owens Lake for use in the implementation of dust control measures on Owens Lake or to the Los Angeles Aqueduct for export. The MOU provides that any water in the river that is above the amount required in the MOU for release to the Owens River Delta may be captured by the pump station. The specified flow regime in the MOU is as follows:

> *(i) A base flow of approximately 40 cfs from at or near the Intake to the pumpback system to be maintained year round.*

(ii). A seasonal habitat flow. It is currently estimated that in years when the runoff in the Owens River watershed is forecasted to be average or above average, the amount of planned seasonal habitat flows would be approximately 200 cfs, unless the Parties agree upon an alternative habitat flow, with higher unplanned flows when runoff exceeds the capacity of the Los Angeles Aqueduct. (The runoff forecast for each year would be DWP's runoff year forecast for the Owens River Basin, which is based upon the results of its annual April 1 snow survey of the watershed.) In years when runoff is forecasted to be less than average, the habitat flows would be reduced from 200 cfs to as low as 40 cfs in general proportion to the forecasted runoff in the watershed….

(iii) A continuous flow in the river channel will be maintained to sustain fish during periods of temporary flow modifications.

The baseflow of approximately 40 cfs from the River Intake to the pump station will be maintained year-round. Initially, the baseflow of 40 cfs will be verified by measurements at the temporary stream gages described in Section 2.3.5.2. Once the 40-cfs baseflow has been established, it will be verified at a minimum of four permanent stream gages located along the river, as specified in the MOU. The permanent gaging sites will be established before monitoring at the temporary sites is discontinued. The baseflow will be managed to maintain the required approximately 40-cfs flow throughout the river.

Except for temporary flow decreases or increases resulting from operational or maintenance activities, the parties to the MOU would have to agree to any decrease or increase in the 40 cfs baseflow specified in the MOU. Since the baseflow addressed in this EIR/EIS for the riverine-riparian system is approximately 40 cfs, if the baseflow were to be substantially changed, additional CEQA and NEPA compliance may be necessary.

Seasonal Habitat Flows

Annual seasonal habitat flows are intended to create a natural disturbance to establish and maintain native riparian vegetation and channel morphology. The MOU states the following purpose of the seasonal habitat flows (also called "riparian" flows):

> "To achieve and maintain riparian habitats in a healthy ecological condition, and establish a healthy warm water recreational fishery with habitat for native species, the plan would recommend habitat flows of sufficient frequency, duration and amount that would (1) minimize the amount of muck and other river bottom material that is transported out of the riverine-riparian system, but would cause this material to be redistributed on banks, floodplain and terraces within the riverine-riparian system and the Owens River delta for the benefit of the vegetation; (2) fulfill the wetting, seeding, and germination needs of riparian vegetation, particularly willow and cottonwood; (3) recharge the groundwater in the streambanks and the floodplain for the benefit of wetlands and the biotic community; (4) control tules and cattails to the extent possible; (5) enhance the fishery; (6) maintain water quality standards and objectives; and (7) enhance the river channel."

Habitat Indicator Species

The MOU states that: "*The goal for the Lower Owens River Riverine-Riparian System is to create and sustain healthy and diverse riparian and aquatic habitats, and a healthy warm water recreational fishery with healthy habitat for native fish species. Diverse natural habitats will be created and maintained through flow and land management, to the extent feasible, consistent with the needs of the 'habitat indicator species' for the riverine-riparian system."* The habitat indicator species for the river that are identified in the LORP Action Plan are listed in Table 2-5. They include non-native game fish and a variety of native, resident and migratory riparian and water birds. Although the primary goal of the rewatering of the Lower Owens River is to restore a warm water fishery (i.e., non-native game fishery), the Action Plan states that consideration should be given to the needs of the native fish that once inhabited the river.

TABLE 2-5
LORP HABITAT INDICATOR SPECIES: RIVERINE-RIPARIAN SYSTEM

Fish	Birds and Mammal
Non-native game fish: Largemouth bass Smallmouth bass Bluegill Channel catfish Native fish: Owens sucker The MOU states that other species would also receive proper consideration: Owens pupfish*, Owens tui chub*, and Owens speckled dace. ** State or Federal threatened or endangered species.*	Yellow warbler Willow flycatcher* Yellow-breasted chat Blue grosbeak Yellow-billed cuckoo* Warbling vireo Tree swallow Belted kingfisher Nuttall's woodpecker Long-eared owl Swainson's hawk Red-shouldered hawk Northern harrier Rails Least bittern Marsh wren Wood duck Great blue heron Owens Valley vole

2.3.5 Proposed Release Regime

2.3.5.1 Basis for Establishing 40 cfs Baseflow

In July 1993, Ecosystem Sciences conducted a field experiment along the Lower Owens River to gather data on flows and water quality for use in developing a proposed release regime and to calibrate hydrological, biological, and water quality models for predicting flow requirements for the Lower Owens River. The results of this study are described in detail in Section 4.0.

The 1993 study was very short-term, therefore, the results of the study must be considered with this limitation in mind. The study indicated that significant flow losses (via evaporation and percolation to the shallow alluvial aquifer) must be accounted for when designing a release regime, particularly in the early years of the LORP when losses to the unconfined shallow aquifer under and adjacent to the river will be greatest. In order to achieve the target baseflow of 40 cfs, higher releases may be necessary from the River Intake, as well as possible augmentation of flows from the Aqueduct spillgates. The study also indicated that flows can potentially degrade water quality and conditions for fish, at least initially, due to scouring of old organic sediments (muck) on the riverbed below Mazourka Canyon Road (Figure 2-1c).

Following the 1993 controlled flow study, Don Chapman Consultants (1994) conducted various modeling analyses to develop a release regime. The analyses indicated that a 40-cfs baseflow would provide suitable habitat for game fish, forage fish, and native fish in the Lower Owens River, and that a 200-cfs seasonal habitat flow would provide significant out-of-bank flooding to stimulate germination of willows and spread organic material on the floodplain. The analyses suggested that once the groundwater and bank storage areas are stabilized, the variability in the 40-cfs baseflow would be about plus or minus 5 cfs (i.e., 35 to 45 cfs).

2.3.5.2 Initiating Baseflow – Proposed Release Regime

The proposed two-phase release schedule is designed to: (1) allow for the release of water to the river as soon as possible without adversely affecting the construction of the pump station diversion structure, and (2) achieve a baseflow of approximately 40 cfs throughout the river as soon as possible after the completion of construction of the pump station. The two phases and the planned schedules for commencing each phase are described below.

TABLE 2-6
FLOW AND WATER QUALITY MONITORING STATIONS

Station (all temporary except for the River Intake, Keeler Bridge, and the Pump Station)	Distance from River Intake (miles)	Monitoring	
		Water Quality	Flows
Below River Intake (permanent station)	0		X
1. Above Blackrock Ditch Return	5.6		X
2. Below Blackrock Ditch Return	5.7		X
3. East of Goose Lake	12.1		X
4. Goose Lake Return	15.1		X
5. 5 Culverts	17.3		X
6. Below Billy Lake Return*	23.6		X
7. Mazourka Canyon Road*	24.1	X	X
8. Below Locust Ditch Return*	30.7		X
9. Manzanar Reward Road*	32.9	X	X
10. Below Georges Ditch Return*	36.9		X
11. Reinhackle Springs*	39.2	X	X
12. Below Alabama Gates Return*	44.2		X
13. Lone Pine Narrow Gage Road*	50.7		X
14. Keeler Bridge* (permanent station)	56.4	X	X
15. Above pump station*	61.0		X
Pump station* (permanent station)	61.7		X

*Stations in the currently wetted reach

<u>Phase 1 Releases</u>

Once LADWP has completed the channel clearing work, the modification of the River Intake structure (including a permanent flow measuring station), and the installation of 14 temporary and 3 permanent flow measuring stations identified in Table 2-6 and several culverts, LADWP will begin releasing water to the Lower Owens River via the River Intake. The Phase 1 releases will occur no later than 6 months after all permits have been granted. Releases will be increased daily in 5-cfs increments until a continuous flow is achieved from the Intake to the Delta. During this phase, flow throughout the Lower Owens River would be the same as has occurred under past practices in the currently wet reach of the river, as indicated by the monthly average flow at Keeler Bridge shown in Chart 4-4 of about 5 to 17 cfs (see Section 4.3.1). Except as to provide a refuge for fish as described below, releases from the spillgates that currently supply the wet reach of the river will be reduced as new flows released from the River Intake are conveyed to the wet reach.

Phase 2 Releases (40 cfs)

Once construction of the pump station is completed, LADWP will ramp the flows as rapidly as possible while attempting to avoid adverse impacts on fish. Releases from the River Intake will be supplemented as necessary by various spillgates, until a 40 cfs baseflow is achieved from the Intake to the pump station site. As required by the February 2004 Stipulation and Order, the baseflow of 40 cfs will be achieved no later than April 1, 2006. Flow adjustments based on the monitoring and thresholds described below will be conducted once the releases commence. An additional 6 months may be required to stabilize a baseflow of approximately 40 cfs throughout the channel.

Water Quality Monitoring and Spillgate Releases

During Phase 1 and Phase 2, water quality data will be collected at the four monitoring stations identified in Tables 2-6 and 2-7, with the monitoring frequencies identified in Table 2-8. Water quality constituents to be measured at the monitoring stations will include electrical conductivity, dissolved oxygen, pH, turbidity, temperature, ammonia, hydrogen sulfide, and tannins and lignins.

If it is determined that a water quality threshold or fish condition identified in Table 2-9 has been exceeded at a monitoring station, water will be released to the river through the spillgate linked to that monitoring station to create a refuge for fish in the spillgate channel and at the confluence with the river below the spillgate channel. If monitoring indicates that the trend in water quality is downward toward any of the thresholds, water may be released to the river through the linked spillgate in anticipation of reaching the water quality threshold. Once operation of a spillgate is commenced, water quality monitoring by spot measurements will be conducted in the river below the spillgate channel. Monitoring below spillgate channels will be in addition to the water quality monitoring at the four monitoring stations.

Operation of the three spillgates to create refuges for fish will be discontinued when: (1) water quality at the monitoring station linked to the spillgate and at the confluence with the river below the spillgate channel rises above the water quality thresholds, or (2) fish at the monitoring stations are not exhibiting signs of stress. If releases from one or more of these spillgates are required, flows to the river will be adjusted so that approximately 40-cfs are maintained.

TABLE 2-7
WATER QUALITY MONITORING STATIONS

Monitoring Station	Linked Spillgate	Equipment
Mazourka Canyon Road	Independence	Spot measurement
Manzanar Reward Road	Georges	Continuous recorder
Reinhackle Springs	Alabama	Spot measurement
Keeler Bridge*	None	Continuous recorder

* The Keeler Bridge Station is for water quality tracking purposes only, and is not linked to a spillgate and, thus, the water quality thresholds do not apply to Keeler Bridge.

TABLE 2-8
WATER QUALITY MONITORING FREQUENCY

Time Period	Monitoring Frequency
Baseflows	
1 month prior to Phase 1	3 days per week
Phase 1	1 to 2 days per week (depending on conditions)
Phase 2	1 to 5 days per week (depending on conditions) during the period when spillgates may be operated (see above)
Post-Phase 2	1 to 5 days per week (depending on conditions) for 6 months after 40-cfs baseflow has been established
Seasonal Habitat Flows (first three releases in excess of 40 cfs)	
During Seasonal Habitat Flows	5 days per week
After Seasonal Habitat Flows	1 to 5 days per week (as needed) for up to 2 weeks

TABLE 2-9
WATER QUALITY AND FISH CONDITION THRESHOLDS

Constituent or Observation	Threshold	Source
Dissolved oxygen	1.5 mg/l and downward trend in data	USFW, 1982 (1.0 mg/l)
Hydrogen Sulfide	0.030 mg/l	96 hour LC_{50} for adult bluegill 0.045 mg/l (Smith et al, 1976)
Ammonia	Acute Criterion (one-hour average concentration) for Non-Salmonids (pH dependent)	EPA, 1999
Fish Conditions	The condition of fish visible at each station will be observed for evidence of stress such as excessive jumping, lying motionless near the surface, rapid gill movement, and poor coloring or body appearance. The threshold will be observance of one or more of these behaviors in several fish.	

2.3.5.3 Seasonal Habitat Flows

The first seasonal habitat flow will be released in the winter immediately following the completion of the pump station construction. The magnitude of the first seasonal habitat flow will be 200 cfs at peak flow, regardless of forecasted runoff. The first seasonal habitat flow will be ramped up from the 40 cfs baseflow to reach a peak flow of 200 cfs in 7 days, then ramped back down to the 40 cfs baseflow in 7 days. The first seasonal habitat flow will be released in the winter (i.e., when temperatures are lower) to reduce the potential for substantial decreases in dissolved oxygen and adverse effects on fish health.

After the first seasonal habitat flow, subsequent annual seasonal habitat flows will be released in May or early June, to coincide with seed production by willows and cottonwoods in the floodplain, thereby providing an opportunity to stimulate growth of new trees on the floodplain adjacent to the river channel. The exact timing will be determined each year based on an assessment of the projected timing of the cottonwood and willow seeding, which varies from year to year depending on temperature, rainfall, and other environmental factors.

After the first seasonal habitat flow, the amount of each annual seasonal habitat flow will be determined each year based on forecasted runoff conditions. As part of its operations, LADWP uses a Runoff Forecast Model to predict each year's water supply for the Aqueduct based on the results of snow surveys, precipitation data, and weather forecasts. Snow surveys consist of measuring depth and water content of snow in the Eastern Sierra Nevada Mountains. The forecasts correspond to the runoff year (April 1 to March 31).

Chart 2-1 shows the relationship between the magnitude of seasonal habitat flow (at peak flow) and the forecasted runoff condition, expressed as percent of normal runoff. Normal runoff is defined as the mean of annual runoff volume over 50 years, and is adjusted every 5 years. For example, normal runoff for 2004 is the mean of annual runoff for 1950-1951 to 1999-2000 water years. In April of 2005, a new normal runoff will be recalculated based on the record from 1955-1956 to 2004-2005.

No flows above the 40-cfs baseflow will be released from the River Intake in years when the runoff is predicted to be 50 percent or less of the annual average (normal) runoff. If runoff is greater than 50 percent of normal, the amount of the seasonal habitat flows will increase proportionally in accordance with Chart 2-1, up to a maximum release of 200 cfs. When runoff is 100 percent of normal or greater, the peak seasonal habitat flow will be 200 cfs. Seasonal habitat flows will be established annually by the Standing Committee in accordance with the provisions of the MOU and using Chart 2-1 (Nomograph of Seasonal Habitat Flows) and based on LADWP's Runoff Forecast Model for the Owens Valley.

As shown in Chart 2-1A, 50 percent of normal runoff represents extremely dry years that occur infrequently. The sloping portion of the nomograph in Chart 2-1 begins at 50 percent of normal, since it is close to the lowest runoff observed in the past. During the 50-year period between 1950 and 2000, runoff near or below 50 percent of normal has occurred only four times. Runoff near or below 75 percent of normal has occurred 17 times. Runoff above or near 100 percent of normal has occurred 22 times. The magnitude of the seasonal habitat flow is in general proportion to the forecasted runoff so that it is in line with the natural weather patterns and emulates the runoff pattern experienced in the river above the River Intake. Thus, not releasing flows above 40 cfs when runoff is 50 percent or less of normal (i.e., extremely dry years) is consistent with this approach and the general proportionality requirement of the MOU.

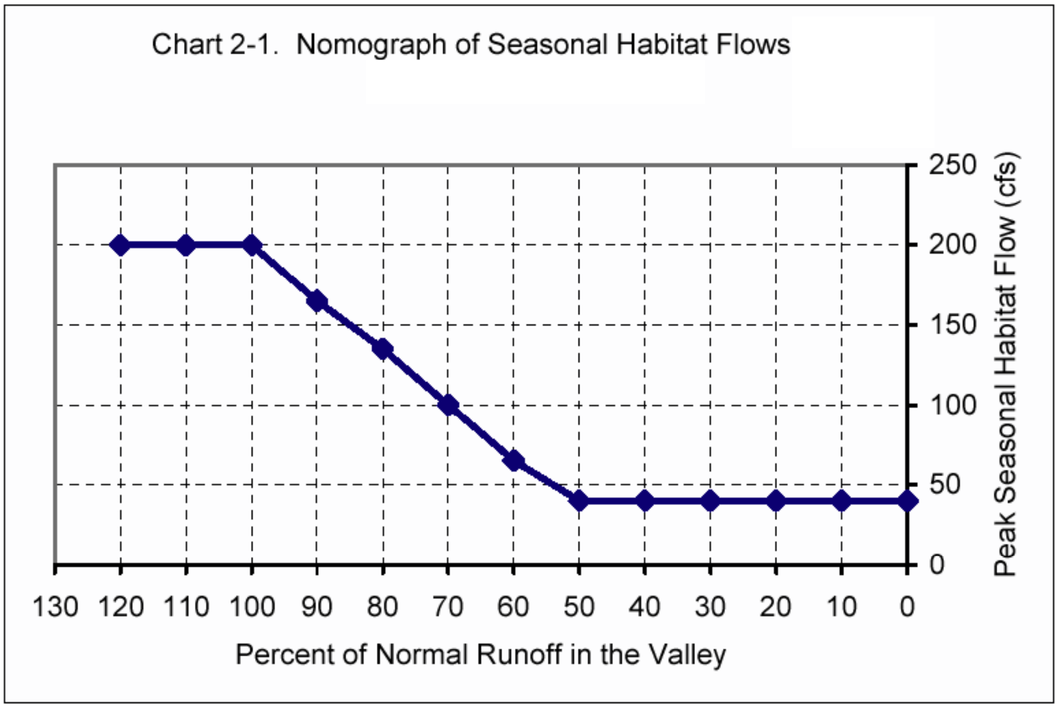
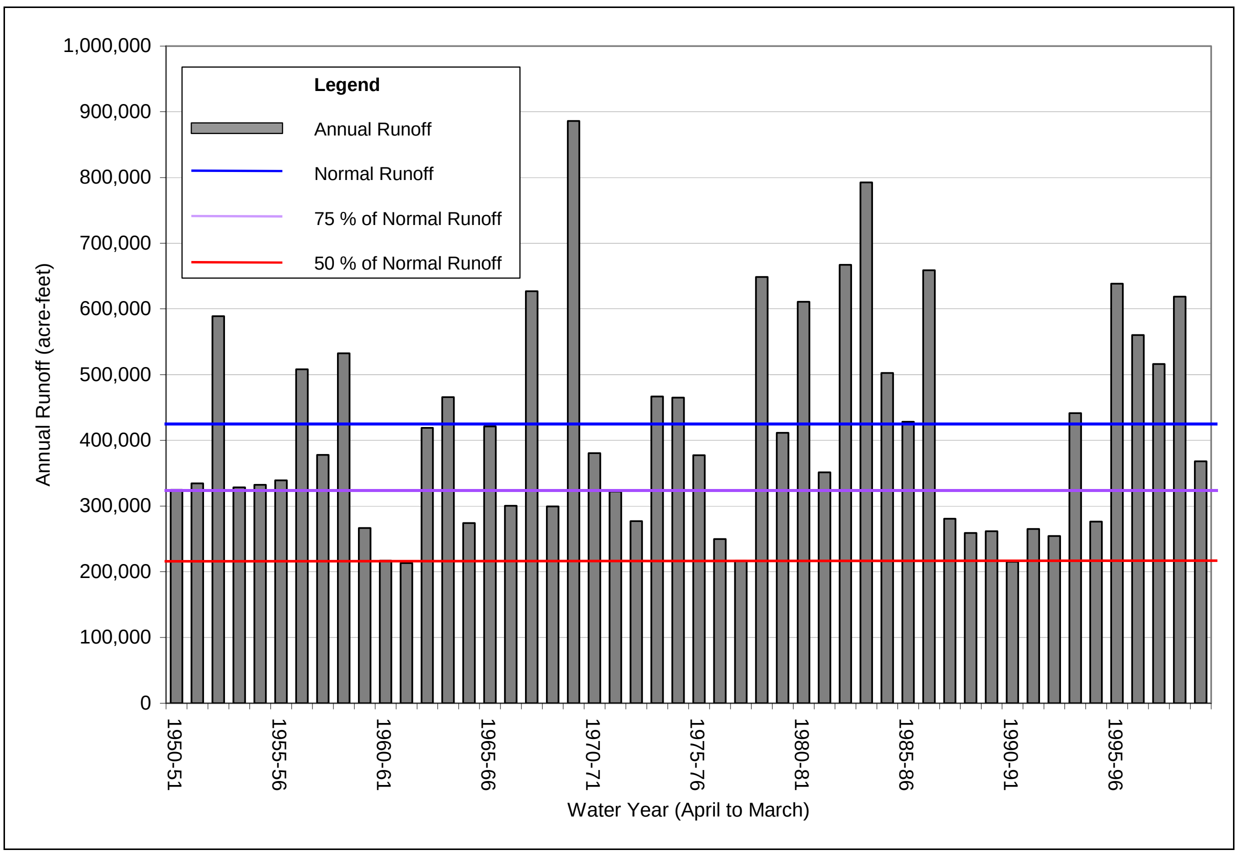


CHART 2-1A
OWENS VALLEY ANNUAL RUNOFF (1950-1951 TO 1999-2000 WATER YEARS)



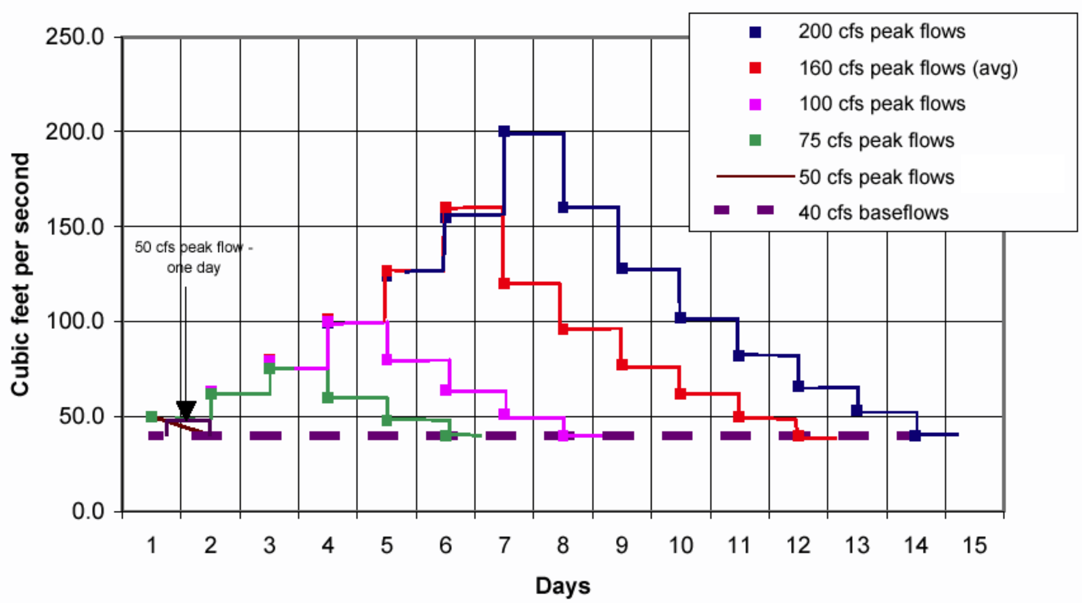
Source: LADWP, Unpublished Data. 1950 to 2000.

The volume of water reaching the pump station would be reduced by evapotranspiration, percolation, flows overtopping the river channel, and other channel losses. Seasonal habitat flows not captured by the pump station will flow to the Owens River Delta. Over the life of the project, it is expected that the annual average and median seasonal habitat flows, based on an analysis of 62 years of existing runoff records in the Owens Valley and using the graph shown in Chart 2-1, will be 150 and 180 cfs, respectively (Inyo County Water Department, Randy Jackson, pers. comm.).

The seasonal habitat flows will be released from the River Intake and will not be augmented by water released from spillgates downstream of the River Intake, except as noted in Section 2.3.5.4. The amount of water released from the River Intake for the seasonal habitat flows will be ramped up from the 40 cfs baseflow to reach the peak flow and back down to the baseflow rate in accordance with a specified ramping schedule. Flow will be increased daily by approximately 25 percent or more until the target peak flow is achieved. The target flows will be maintained for 1 day, then flows will be decreased by approximately 20 percent each day. An example of the ramping schedule for different flows is shown on Chart 2-2. The number of days of flows above 40 cfs will range from 1 day for a 50-cfs peak flow, to 6 days for a 75-cfs peak flow, to 14 days for a 200-cfs peak flow. Seasonal habitat flows will be ramped up starting from the 40-cfs baseflow to achieve the specified seasonal habitat flow magnitude for that year. For example, if a seasonal habitat flow of 200 cfs is specified, flows will increase 160 cfs above the 40-cfs baseflow to achieve a peak magnitude of 200 cfs.

The proposed flow ramping schedule is generally designed to emulate the characteristics of natural flood events, which include a gradual rise and decline in flow. The gradual rise and fall is designed to prevent entrapment of fish and to allow water to spread outside of the channel then gradually recede to allow time for sediments and seeds of riparian woody species to be deposited onto the floodplain and groundwater to be recharged. Based on monitoring of flows and habitat development, the currently proposed ramping schedule will be adjusted, if necessary, as part of adaptive management (see Section 2.10).

Chart 2-2. Example of Ramping of Seasonal Habitat Flows



The amount of water released under the maximum seasonal release regime (i.e., 200 cfs) is estimated to be 2,778 acre-feet (see Table 2-10).

TABLE 2-10
ESTIMATE OF WATER RELEASED TO THE RIVER FOR VARIOUS SEASONAL HABITAT FLOWS

Day	Released to the River with Different Peak Flows* (acre-feet)				
	200 cfs Peak Flow	160 cfs Peak Flow	100 cfs Peak Flow	75 cfs Peak Flow	50 cfs Peak Flow
1	99	99	99	99	99
2	125	125	125	123	
3	157	157	157	149	
4	198	198	198	119	
5	246	246	159	95	
6	307	317	127	79	
7	397	238	101		
8	317	190	79		
9	254	153			
10	202	123			
11	163	99			
12	131	79			
13	105				
14	79				
Total =	2,780	2,024	1,045	664	99

* Flows will be increased each day, starting with the 40 cfs baseflow, over a 1-hour period. Total quantity of water calculated as 1 cfs for 1 day = 1.98 AF.

2.3.5.4 Water Quality Monitoring for Seasonal Habitat Flows

Prior to the release of the first three seasonal habitat flows that are in excess of 40 cfs, water quality will be monitored at the four monitoring stations listed on Table 2-7. During the first three releases of flows that are in excess of 40 cfs, water quality will be measured 5 days per week during the seasonal habitat flows, then 1 to 5 days per week (depending on conditions) for up to 2 weeks after the seasonal habitat flows.

The following water quality parameters will be measured: electrical conductivity, dissolved oxygen, pH, turbidity, temperature, ammonia, hydrogen sulfide, and tannins and lignins. After the first three flow releases, water quality monitoring will be discontinued.

If it is determined that a water quality threshold identified in Table 2-9 has been exceeded at a monitoring station, water will be released to the river through the spillgate linked to that monitoring station to create a refuge for fish in the spillgate channel and at the confluence with the river below the spillgate channel. If monitoring indicates that the trend in water quality is downward toward any of the thresholds, water may be released to the river through the linked spillgates in anticipation of reaching the water quality thresholds. The amount and duration of supplemental water will depend on the severity of the observed water quality degradation. Once operation of a spillgate is commenced, water quality monitoring by spot measurements will be conducted in the river below the spillgate channel. Monitoring below spillgate channels will be in addition to the water quality monitoring at the four monitoring stations.

Operation of the three spillgates to create refuges for fish will be discontinued when (1) water quality at the monitoring station linked to the spillgate and at the confluence with the river below the spillgate channel rises above the water quality thresholds, or (2) fish at the monitoring stations are not exhibiting signs of stress.

2.3.6 Channel Clearing Prior to Phase 1 Releases

Periodic and intermittent flow releases from the River Intake in the recent past have created obstructions (i.e., "plugs") in the river channel immediately downstream of the River Intake (Figure 2-2). The channel obstructions consist of scattered concentrations of: (1) organic and inorganic sediments, and (2) dense cattail and bulrush marsh. The latter consists of impenetrable stands on the bottom of the channel. These obstructions will restrict the flow of water when it is released from the River Intake, potentially causing overbank flooding. In order to ensure successful and efficient establishment of the 40-cfs baseflow and seasonal habitat flows, LADWP proposes to remove these obstructions.

Prior to initiating the Phase 1 releases, LADWP will mechanically remove sediments and marsh vegetation obstructions from 10,800 feet (approximately 2 miles) of the river channel downstream of the River Intake. It is estimated that approximately 7,800 cubic yards of sediment and organic material will be removed. The depth of excavation will be about 1 to 2 feet on average. A 15-foot wide swath will be excavated within the middle of the existing 40-50 foot wide channel to allow 40 cfs to pass. It is anticipated that the 40-cfs baseflow, coupled with seasonal habitat flows up to 200 cfs, will generate enough erosive force to remove the remaining material.

All channel clearing work will occur from the west bank using a tracked excavator. Both banks will remain undisturbed. Excavated material will be placed directly into dump trucks, and then hauled to a permanent sediment stockpile area adjacent to the River Intake (Figure 2-2). A temporary 20-foot wide haul road will be established on the top of the west bank for the excavator and trucks. It will be created by driving over the existing vegetation in flat areas, and by minor grading where the terrain is uneven. Several temporary roads will be created perpendicular to the main haul road to provide access to an existing dirt road along the Aqueduct (Figure 2-2). These roads will be restored to pre-construction grade and revegetated.

Approximately six trucks will be used in the operation (four 4-cubic yard trucks and two 8-cubic yard trucks). The amount of material removed and hauled will range from 192 to 288 cubic yards per day, requiring about 32 to 48 truck round trips per day. Work will occur after project approval and will require 4 months to complete.

In 2003, LADWP and Ecosystem Sciences examined the river for significant obstructions (Ecosystem Sciences, 2003b). These obstructions will be removed only if they would significantly impede flows. Known obstructions to be removed prior to the commencement of releases for the Phase 1 baseflows are listed below.

- Several 36-inch diameter steel pipe culverts at the "5 Culverts" crossing (Figure 2-1b) would be replaced with larger culverts (60 inch diameter) to increase capacity.

- Beaver dams that significantly obstruct flows will be breached by a helicopter-mounted Grabber or by hand to allow a more unrestricted flow. Debris from the dams would be placed in the floodplain for wildlife use and decomposition (see Section 2.3.7).

- Three instream rock dams between “5 Culverts” and Mazourka Canyon Road (Figures 2-1b,c) would be mechanically removed with heavy equipment (e.g., loader, excavator) and the debris would be trucked off site for proper disposal.

- Additional structures in the channel that may be removed or modified to accommodate the proposed flows include bridge abutments near Blackrock Ditch Return (Figure 2-1a), Mazourka Canyon Road culverts (Figure 2-1c), Manzanar Reward Road culverts (Figure 2-1c), an earthen dike located between Billy Lake Return and Locust Return (Figure 2-1c), and Lone Pine Narrow Gauge Road culverts (downstream of Lone Pine Pond, Figure 2-1e).

- Saltcedar slash (cuttings of saltcedar that have been piled in and around the channel as part of the Inyo County Saltcedar Control Program) will be removed by Inyo County from channel where it may impede flows or riparian recruitment.

As a best management practice to reduce potential water quality impacts, tules and other vegetation debris removed during initial channel clearing will be moved out of the channel to the extent possible to reduce the amount of organic materials that could potentially consume oxygen during initial flow releases.

2.3.7 Beaver Dam Removal and Beaver Control

Beavers are abundant along the existing wetted portion of the river and many of its tributaries. High concentrations of dams are located at the Locust Ditch Return, Georges Ditch Return, the Island Reach, and from upstream of the Lone Pine Ponds to below Keeler Bridge. The dams create significant backwater areas, which promote tule growth, as well as open-water rearing habitat for bass and bluegill. Beavers consume riparian vegetation and alter the hydrology of the river, which can adversely affect native riparian vegetation, especially woody species. Beaver dams within the LORP area have resulted in the continuous inundation of riparian woodlands and the loss of vigor and death of a significant number of willow trees. Beavers are an exotic species not native to the Owens Valley. The presence of significant beaver activity in the LORP area will inhibit achievement of the goals of the LORP and may negatively impact the health of the Lower Owens River ecosystem.

As an ongoing management activity separate from the LORP, LADWP began removing beaver dams along the river in the spring of 2002. LADWP completed a Mitigated Negative Declaration under CEQA for the beaver dam removal, and signed a 1602 Streambed Alteration Agreement with CDFG. The project described in the Mitigated Negative Declaration included the removal of the majority of beaver dams along the river from the Islands area to the proposed pump station site (Figure 2-3). This program was an extension of LADWP’s ongoing beaver management efforts on LADWP lands. The program is described here because the beaver dam removals occurred in the LORP area and will benefit the LORP and these removals exemplify the methods that will be employed under the LORP.

During its review of LADWP’s application for a 1602 Agreement, CDFG expressed concern that the removal of beaver dams would impact water quality and cause fish kills, because the dams trap a considerable amount of organic material and muck that could be released upon removal. In August 2001, LADWP, with the County and CDFG, conducted an experimental removal of six beaver dams between the Alabama Gates and Lone Pine Station Road. Dams were removed using a set of pilot-operated Grabber jaws attached via a cable to a helicopter. Dam material was lifted from the dam and deposited outside of the riparian corridor. During this experiment, LADWP and the County monitored water quality parameters (i.e., dissolved oxygen, electrical conductivity, temperature, and turbidity) upstream and downstream of each dam, prior to and immediately after dam removal, and no significant water quality impacts were observed. A discussion of the results of the water quality measurements is provided in Section 4.4.

LADWP has removed many of the 31 beaver dams that impeded flows in the river channel from the Islands area to the proposed pump station site (see Figure 2-3). Removal of the dams was accomplished by the use of a set of pilot-operated Grabber jaws attached via a cable to a helicopter. Material that was removed and deposited on adjacent upland sites outside of the floodplain that are not subjected to seasonal inundation or river flow. Removal of beaver dams did not require use of explosives, construction of access roads, mechanical dredging, or mechanical clearing of riparian vegetation. Dams were removed incrementally, starting from the pump station site and proceeding upstream. The use of this approach avoided the sudden failure of dams downstream due to a release of impounded water upstream, and minimized the chance of water quality impacts during dam removal. No more than six dams were removed during any 2-day period. Flows in the Owens River were monitored at Keeler Bridge to ensure that no large fluctuations in flow occurred that could have affected fish or water quality. Additional dams were removed only after dam removal-induced flow changes had stabilized.

Beaver dam removal is an ongoing activity that is conducted as additional dams are built or repaired. Prior to the release of flows to the river under LORP, additional beaver dams that are obstructing the channel, if any, and would inhibit the establishment of the proposed flow regime in the river will be removed. In the future, additional beaver dam removal will be implemented in the LORP area if beaver activity is causing excessive flooding, restricting flow significantly, or is inhibiting the development of diverse vegetation types. The methods that will be used to remove beaver dams will be similar to the methods applied in a recent beaver dam removal effort conducted by LADWP, which is described above. Beaver dams will be removed from November through May, when water temperatures are at their lowest, and in accordance with the 1602 Agreement. Beaver dam removal will be accompanied by the trapping and removal of beavers by an authorized trapper.

2.3.8 Fish Management

The Riverine-Riparian element of the LORP was designed to create a wide variety of aquatic habitats that would primarily benefit the existing warm water sport fisheries for largemouth and smallmouth bass, bluegill, and catfish. The project will create fish habitats by forming new and expanded open water in the river, maintaining off-river lakes and ponds, and enhancing corridors between off-channel lakes and ponds and the river. Except as a potential mitigation measure, which could include fish stocking (see Section 4.6), no active management of the fisheries (such as fish rescue, creation of in-stream fish habitat structures, or predator control) is proposed under the LORP.

Under the LORP, flows will be provided in certain existing off-river channels on a year-round basis to provide a long-term connection between the river and off-river lakes and ponds for fish to move freely between the river and off-river areas. No physical modification of the channels will be performed, as Ecosystem Sciences (Technical Memorandum 14, 2001) has determined that such modifications are not necessary to meet the objectives of ensuring hydrologic connection to the river and creating suitable habitat for fish. The channels are described in Section 2.6.4.

2.3.9 Other Management Actions

<u>Channel Sediment (Muck) Management</u>

With the exception of the initial channel clearing near the River Intake (see Section 2.3.6), the LORP does not include any actions to physically remove channel sediments (also called muck) or other organic debris from the river channel either prior to, or after, the establishment of baseflows and the release of seasonal habitat flows. Ecosystem Sciences (Technical Memorandum No. 9) has postulated that muck will be suspended by seasonal habitat flows in the river.

Tule Management

The wetted portion of the Lower Owens River (downstream of Mazourka Canyon Road) supports extensive and dense stands of bulrushes (*Scirpus acutus*) and cattails (*Typha latifolia*), collectively known as "tules." Tules provide habitat for fish and birds, and provide water quality benefits by removing nitrogen and phosphorus from the water. However, widespread tule growth decreases diversity and other habitat values for wildlife. Also, when tules die, they add organic matter to the bottom sediments, which could potentially degrade water quality by increasing biological oxygen demand. Excessive tule growth also reduces channel capacity.

Ecosystem Sciences (Technical Memorandum No. 9) indicate that with time, shade from new riparian canopy trees and deeper water resulting from increased flow would hinder tule growth. Active tule removal will only be conducted in rare instances, and would probably only be considered where there are significant constrictions along the river or at culverts. Extensive removal or active management of tule stands to retard the expansion of tule growth or to increase open water habitat will not be considered unless funding for such work is obtained from sources other than LADWP or the County.

In the rare instances of active tule removal, they would be removed by mechanical means. A tracked excavator would work from adjacent dry banks or levees to remove tules (both above and below ground parts). Excavated material would be temporarily stockpiled in upland areas to dewater, then would be removed from the site. The excavator would typically create a 15- to 25- foot wide open channel, removing whole tule plants and roots from the channel bottom. Tules would not be removed or managed by controlled burns. To the extent possible, existing roads would be used to access tule removal sites. If new roads are needed, subsequent CEQA and NEPA review would be performed.

Saltcedar Management

Management of saltcedar and other noxious weeds are discussed in Section 10.4.

Riparian Vegetation Management

Riparian vegetation will be monitored along and adjacent to the river for the first 15 years to determine if the MOU goals for this vegetation are being achieved (see Section 2.10). If it is determined that the seasonal habitat flows are not achieving the riparian vegetation goals of the MOU, adjustments to the seasonal habitat flow releases may be considered as adaptive management measures. In addition, if before the 15th year after the implementation of the LORP, it is determined that the goals are not being achieved due to other reasons, other actions to promote the growth of such vegetation will be considered as an adaptive management measure. The implementation of any such measures will be subject to the funding limitations described in Section 2.2.2 and consistent with the MOU.

2.3.10 Land Management Along and Adjacent to the River

As part of the LORP, a land management plan to address livestock grazing along the river on Los Angeles-owned land within the LORP project area will be implemented. Six major individual leases and one small lease occur in the LORP planning area. The goal of the land management plan is to maintain upland and riparian habitats along the river, while allowing continued grazing uses on the leases. The primary management practices that will enhance riparian resources along the river and complement the releases to the river include adjusting the timing, distribution, and utilization rates of current grazing practices, if necessary, around sensitive seeps/springs, selected riparian areas, and rare plant populations. In many instances, new fencing will facilitate these management actions. The land management plan is more fully described in Section 2.8.

2.3.11 Threatened and Endangered Species

Habitat suitable for Owens pupfish and Owens tui chub will be maintained and created in the river as a result of the LORP (Ecosystem Sciences, Technical Memorandum 14, 2001). However, as explained in Section 2.7, the project does not include any actions to create sanctuaries in the river for these species, nor does the project include any deliberate actions to introduce these species into the river. Any actions to introduce these species and/or to create sanctuaries for these species in the river would only occur under the provisions of an Endangered Species Act Section 10(a) permit and Habitat Conservation Plan ("HCP") approved by the U.S. Fish and Wildlife Service. An HCP and Section 10(a) permit are not proposed as part of the LORP. However, LADWP is planning to prepare an HCP for all LADWP lands in Owens Valley, and seek a Section 10(a) incidental take permit in the near future. Consultation with and approval from USFWS and CDFG will be required for the HCP.

2.4 DELTA HABITAT AREA, INCLUDING PUMP STATION

The MOU identified general boundaries of the Delta Habitat Area, and the area along the river where the pump station must be located, as shown on Figure 2-4. The boundary of the proposed Delta Habitat Area is shown on Figure 2-5. The Delta is dominated by a combination of alkali playa, alkali meadow, riparian scrub, riverine habitat, and transmontane alkali marsh. A description of the vegetation mapping in the Delta and changes in wetland acreages over time is provided in Section 6.1.3.

The Delta contains two major channels (see Figure 2-5), with numerous shallow braided channels and pools scattered throughout a flat alluvial fan, and varying in depth from about 6 feet to less than 1 inch. Flows from the river that top the channel banks spread across the Delta and create small, shallow (less than 6 inches deep) seasonal water bodies used by shorebirds and wading birds.

The MOU includes a pump station to be located between Keeler Bridge and the Lower Owens River Delta (Figure 2-4). The facility is intended to capture flows in the river and divert the water to the Owens Lake Dust Mitigation Program or to the Aqueduct for use by LADWP. The Aqueduct is located about 4 miles west of the pump station. Although the pump station will be located along the river itself, it is described in this section because of its ability to control the amount of flows released to the Delta Habitat Area. The pump station proposed under the LORP is described in Section 2.4.3.

Most of the Delta Habitat Area occurs on State-owned lands, managed by the State Lands Commission (SLC) (Figure 2-6). These lands are grazed by a single private party. The existing grazing operation on State lands within the Delta Habitat Area currently occurs without a land use agreement with SLC. State lands are not managed by LADWP or the County, and thus, there are no proposed LORP-related land disturbances on State lands, except for the installation of two temporary gaging stations. Additionally, monitoring is proposed within Delta lands under SLC jurisdiction. LADWP will obtain a land use approval from SLC prior to installation the gaging stations.

The small portion of the Delta Habitat Area that occurs on LADWP land is included in LADWP's 7,100-acre Delta Lease, which extends north of the Delta area. LADWP land included in the Delta Habitat Area consists of a narrow band about 1,500 feet wide along the upper 4,000 feet of the west branch of the river

(Figure 2-6). The total area of LADWP land in the Delta Habitat Area is 361 acres[1]. The proposed land management plan for the Delta Lease is described in Section 2.8.2.5.

2.4.1 Goals for the Delta Habitat Area

The enhancement of the Delta Habitat Area is described in the MOU as follows:

> *"The goal is to enhance and maintain approximately 325 acres of existing habitat consisting of riparian areas and ponds suitable for shorebirds, waterfowl and other animals and to establish and maintain new habitat consisting of riparian areas and ponds suitable for shorebirds, waterfowl and other animals within the Owens River Delta Habitat Area. Diverse natural habitats will be created and maintained through flow and land management, to the extent feasible, consistent with the needs of the 'habitat indicator species' for the Owens River Delta Habitat Area. These habitats will be as self-sustaining as possible."*

LADWP, as the CEQA lead agency, believes that by enhancing and maintaining the acreage of vegetated wetlands and water that existed in 1996 (645 acres; see Table 6-3 in Section 6.1.3) at the time of the approval of the MOU, LADWP will have met and exceeded the MOU goals of maintaining and enhancing 325 acres of existing Delta habitats. Notwithstanding this position, LADWP is in concurrence with Ecosystem Sciences' analysis, the proposed flow regime for the Delta Habitat Area will enhance and maintain the approximately 831 acres of water and vegetated wetland that existed in 2000 and the water and vegetated wetland within the Delta Habitat Area boundary existing at the time of the implementation of flows to the Delta under the LORP. The water and vegetated wetland within the Delta Habitat Area boundary existing at the time of the implementation of flows to the Delta under the LORP are hereafter referred to as the "Delta conditions." Delta conditions will be described both in terms of areal extent and quality as measured by Habitat Suitability Index (see Section 2.10.3). The vegetation types to be included in the definition of "Delta conditions" are: alkali marsh, wet alkali meadow, alkali meadow (on floodplain and lucustrine landtypes), Goodding-red willow, and water. The intermittently flooded playa (unvegetated) within the brine pool transition area will not be included in the definition of "Delta conditions." (See Table 6-2 and Section 6.1.3 for a description of these vegetation types.)

Prior to implementation of LORP (during the first growing season after the adoption of the Final EIR/EIS), the water and vegetated wetlands in the Delta Habitat Area will be mapped from aerial photographs (procedure described in Section 6.1.3.2). This map will serve as the description of the "Delta conditions." The aerial photographs that will be used to develop the "Delta conditions" map (as well as those to be used in future monitoring) will be taken between June and September. The exact date will vary from year to year depending on several factors including: weather conditions and resultant annual variation in the duration and timing of the growing season; events that affect visibility (e.g., fire); and the timing of other monitoring activities in the Owens Valley (e.g., aerial photographs needed for vegetation monitoring under the Inyo County/Los Angeles Long Term Water Agreement). Open water and shallow flooded areas will be reflected in the vegetation (e.g., wet alkali meadow versus alkali meadow).

The Delta ecosystem is dynamic, and the ratio of water to vegetated wetlands within the Delta Habitat Area will fluctuate seasonally and over time from the "Delta conditions." Maintenance of "Delta conditions" does not imply that exactly the same type of wetlands or their location must be maintained. New wetlands may be established and conversion of existing wetlands to different types of wetlands will occur. Shifting of open water habitats is also anticipated as vegetation changes exert control over Delta hydrologic processes. The proposed flow regime for the Delta is designed to maintain the acreages and

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[1] Since the publication of the Draft EIR/EIS, the acreage of LADWP land in the Delta Habitat Area was recalculated based on more recent GIS data compiled by CH2MHILL, consultant to LADWP for the Owens Lake Dust Mitigation Program.

similar habitat quality of wetlands within the Delta habitat area occurring at the time of project implementation, recognizing the dynamic nature of Delta landforms and their plant communities.

LADWP proposes that if monitoring indicates that the MOU goals are not being met, or if the “Delta conditions” are not being maintained, adjustments of flows to the Delta Habitat Area within the 6 to 9 cfs annual average range specified in the MOU will be made to attempt to meet the MOU goals and to maintain the “Delta conditions”. Also, if monitoring indicates that flows to the Delta can be reduced while still meeting the MOU goals and maintaining the “Delta conditions”, flows may be adjusted downward within the 6 to 9 cfs annual average range.

The Delta is a dynamic system much like an alluvial fan. As a result, it is possible that a future uncontrolled high flow in the river caused by very high natural runoff in a high water year or a flash flood could result in a dramatic change in the habitat in the Delta. These events could change present landforms and drainage configurations, potentially drying or otherwise removing existing habitat or relocating habitat to another position in the Delta area. In such circumstances, the goals for the Delta and the “Delta conditions” described above might be temporarily disrupted. If this should occur, LADWP will implement appropriate adaptive management measures, examples of which are described in Section 2.10, Table 2-20. to restore or replace the lost habitat. After a catastrophic event, it could take many years before “Delta conditions” are restored.

As called for in the MOU and developed by Ecosystem Sciences, the restoration of the Delta Habitat Area will not initially include physical modifications within the Delta, such as modifying existing channels, creating new channels, constructing berms, or otherwise modifying the topography to increase water spreading or ponding in the Delta. Such a management scenario is described as an alternative to the project in Section 11, and will also be considered as part of adaptive management. Instead of such modifications, the proposed management approach relies on flow management, natural hydraulic and biological processes, and land management practices (on the portion of the Delta within the LADWP lease) to maintain and enhance wetlands. This is consistent with the approach adopted under the MOU.

The habitat indicator species listed in the MOU for the Delta are:

- Owens pupfish and Owens tui chub (state and federal endangered species)
- Resident, migratory, and wintering waterfowl
- Resident, migratory, and wintering wading birds
- Resident, migratory, and wintering shorebirds

Habitat suitable for Owens pupfish and Owens tui chub will be maintained and created in the Delta as a result of the LORP (Ecosystem Sciences, Addendum to Technical Memorandum 8, April 2000). However, as explained in Section 2.7, the project does not include any actions to create sanctuaries for these species in the project area, nor does the project include any deliberate actions to introduce these species into the project area. Any actions to introduce these species and/or to create sanctuaries for these species in the Delta or any other part of the LORP area would only occur under the provisions of an Endangered Species Act Section 10(a) permit and Habitat Conservation Plan (“HCP”) approved by the U.S. Fish and Wildlife Service. An HCP and Section 10(a) permit are not proposed as part of the LORP. However, LADWP is planning to prepare an HCP for all LADWP lands in Owens Valley in cooperation with USFWS, and seek a Section 10(a) incidental take permit in the future.

2.4.2 Baseflows, Pulse Flows and Seasonal Habitat Flows

The MOU states:

> *"Subject to applicable court orders concerning the discharge of water onto the bed of Owens Lake, the quantity of water that will be released below the pumpback station for these purposes will be an annual average of approximately 6 to 9 cfs (not including water that is not captured by the station during periods of seasonal habitat flows). The portion of the Wildlife and Wetlands Management Plan element of the LORP Plan which addresses the Owens River Delta Habitat Area will, in view of the quantity of water to be released below the pumpback system, determine the amount of water needed to maintain existing habitats, to enhance existing habitats, and to create new habitats, and will determine the amount and use of seasonal habitat flows. The plan will evaluate the feasibility and the relative environmental benefits of the enhancement of existing habitat and the establishment of new habitats. Based upon this evaluation, the plan will recommend how existing habitats should be maintained, which existing habitats should be enhanced, what new habitats should be established, and how the water should be released and used so that these habitats are maintained in a healthy ecological condition."*

The management action for creating and enhancing habitats in the Delta is to establish baseflows to the Delta from the Lower Owens River with an average annual flow of 6 to 9 cfs, as specified in the MOU. Within the 6 to 9 cfs annual average flow, four pulse flows of 20 to 30 cfs will be released to the Delta for short periods of time to increase the distribution and amount of water in the Delta to benefit certain vegetation growth periods and shorebird activity, as described in Section 2.4.2.3. The daily baseflow would be the amount necessary to maintain "Delta conditions" and to conserve water for use in the Delta during other times of the year (within the 6 to 9 cfs annual average and a minimum of approximately 3 cfs at any time) and for delivery to Los Angeles. In addition, higher flows may pass through the pump station to the Delta during the annual seasonal habitat flows in the Lower Owens River (up to 200 cfs) and natural flood events and/or necessary Aqueduct releases (see Section 2.3.2).

To summarize, LADWP's proposed management actions for the Delta Habitat Area consist of three types of flow releases: (1) baseflows; (2) four pulse flows; and (3) bypass of annual seasonal habitat flows. The average of baseflows and pulse flows will be within the 6 to 9 cfs average annual flow allocation stipulated in the MOU. Seasonal habitat flows are not included in the 6 to 9 cfs annual average flow range.

2.4.2.1 Establishment of Baseflows (First Year)

Flow into the Delta (inflow) less flow out of the Delta (outflow) is a measure of the water stored and consumed, or that needed to sustain existing water and vegetated wetlands for those flow periods. The difference between inflow and outflow is an estimate of the total water demand (evaporation, transpiration, storage and infiltration) integrated over all existing vegetation types in the Delta Habitat Area. The Delta Habitat Area functions as a basin, which fills to capacity, then overflows to the brine pool. When the Delta Habitat Area is overflowing to the brine pool, it is a good indication that the evapotranspiration demands have been met and the storage capacity has been exceeded. Baseflow releases into the Delta will be established within the 6 to 9 cfs annual average specified in the MOU (with a minimum baseflow of approximately 3 cfs at any time), based on monitoring of outflow from the Delta during the first year of pump station operation. The goal of the baseflow releases will be to maintain the "Delta conditions" mapped during the first growing season after the adoption of the Final EIR/EIS..

Delta baseflows will be established during the first year following completion of the pump station. During the first year, LADWP will manage releases from the pump station to maintain an average daily outflow of approximately 0.5 cfs from the vegetated portion of the Delta Habitat Area, as described in the bulleted items below. (An outflow of 0.5 cfs was selected since it is the smallest flow rate that can be measured reliably and can be used to confirm that water is overflowing from the Delta Habitat Area). The daily releases from the pump station to maintain the 0.5 cfs outflow during the first year will serve as the schedule of releases to be made in subsequent years. These releases may be modified as part of adaptive management if monitoring results indicate a reduction in habitat quantity and/or quality (see criteria described in Section 2.4.2.2).

- Following completion of pump station construction, an initial baseflow of 5.3 cfs will be released to the Delta Habitat Area. This initial baseflow was established based on an estimate of evapotranspiration demand of the vegetation (GBUAPCD, 1997). Temporary stream gages equipped with recording devices will be installed where the vegetation ends in the channel of the lower west branch and the lower east branch (Figure 2-5).
- Outflow will be recorded hourly and collected biweekly during the first year.
- If the total average daily outflow from the two gages for any 14-day monitoring period is less than approximately 0.5 cfs, baseflows for the subsequent 14-day monitoring period will be increased.
- If the total average daily outflow from the two gages for a 14-day monitoring period is greater than approximately 0.5 cfs, baseflows may be decreased for the subsequent monitoring period.

A record of baseflows needed to maintain approximately 0.5-cfs average daily outflow for 14-day monitoring periods will be compiled the first year after project implementation. This record will be used to calculate the amount of baseflows for each of the following periods: May 1 to September 30, October 1 to November 30, December 1 to February 28, and March 1 to April 30. Hence, seasonal baseflows will be established based on direct measurement of outflows during the first year following completion of pump station, which reflects assumed water demand for vegetation resources that exist in the first year . No pulse flows will be released to the Delta during the first year when the baseflow regime is being determined.

2.4.2.2 Adjustment of Baseflow (Subsequent Years)

Once the baseflows have been established, it is anticipated that the vegetation in the Delta will eventually consume all of the baseflow releases during the growing season and that outflow from the vegetated Delta wetlands may occur only during the four pulse flow periods and with minimal outflows during the cooler periods of the year when evapotranspiration is not occurring or minimal.

Once the seasonal baseflow releases have been established as described above, baseflow releases in subsequent years will be adjusted within the 6 to 9 cfs annual average range based upon the following monitoring triggers:

(1) A decrease of 10 percent or more during any 3-year period (i.e., the present year and the previous two years) from the “Delta conditions” (total acreage of vegetated wetlands plus water as defined above) as estimated from aerial or satellite imagery or other appropriate methods (see also Section 2.10.1).
(2) A 20 percent or greater reduction in habitat suitability index (areal extent and habitat quality; see Section 2.10.3) as measured at 5-year intervals after the commencement of releases of baseflows to the Delta.
(3) A reduction in baseflows to the Delta will be considered if monitoring indicates: 1) an increase of 10 percent or more in area during any 3-year period from the “Delta conditions”, and 2) an increase of 20 percent or more in habitat suitability index as measured at 5-year intervals.

2.4.2.3 Pulse Flows

Beginning in the second year of LORP implementation, four pulse flow periods will be released to enhance water distribution and habitat. Pulse flows will be applied for four periods as follows:

- Period 1: Flows of 25 cfs will be released for 10 days (496 acre-feet) at the on-set of the plant-growing season (late-March to mid-April) to replenish the freshwater lens prior to plant emergence from dormancy. This pulse flow is also expected to enhance saltgrass production (the dominant species in alkali meadows) because it can utilize water more effectively and efficiently at this time (Jim Paulus, GBUAPCD, personal communication). This pulse flow will also enhance foraging areas along the vegetation-playa-water interface to attract migratory species.

- Period 2: Flows of 20 cfs will be released for 10 days (397 acre-feet) in the late spring to mid-summer (late-June to early-July) when evapotranspiration rates are high. This pulse flow will help ensure that adequate water is available to sustain plants during the critical summer period and will provide direct and indirect benefits to invertebrates and wildlife.

- Period 3: Flows will be increased to 25 cfs for 10 days (496 acre-feet) in September during the late growing season to enhance wetland habitat for early migrants.

- Period 4: A late fall – early winter (November – December) pulse of 30 cfs for 5 days (298 acre-feet) will be released to benefit wildlife and to recharge the freshwater lens.

The magnitudes and durations of these flows are summarized below in Table 2-11. The total amount of water allocated to pulse flows is 1,687 acre-feet per year. However, this amount may be modified since the amount, duration and timing of both baseflows and pulse flows may be adjusted (within the range of 6 to 9 cfs annual average) as part of adaptive management based upon the monitoring triggers described in Section 2.4.2.2.

TABLE 2-11
SUMMARY OF PROPOSED PULSE FLOWS TO THE DELTA*

Pulse Flow	Dates	Duration (days)	cfs/day	Ecological Purpose
Period 1	Mar-Apr	10	25	Early growth of saltgrass
Period 2	June-July	10	20	General wetland support
Period 3	Sept	10	25	Wetlands and early migrating birds
Period 4	Nov-Dec	5	30	Wintering birds
Total =		35		

* This table does not include seasonal habitat flows that could reach the Delta.

2.4.2.4 Seasonal Habitat Flows

In addition to the baseflows and pulse flows, higher flows may pass through the pump station to the Delta during the seasonal habitat flows in the Lower Owens River. The magnitudes of the seasonal habitat flows that will reach the Delta will depend on the amount of water released at the River Intake (which will vary each year based on forecasted runoff; see Section 2.3.5.3) and channel losses during these releases (evaporation, transpiration, and percolation). A detailed analysis of the amount of water that is expected to reach the Delta from seasonal habitat flows is presented in Section 6.0. Seasonal habitat flows that bypass to the Delta are not included in the calculation of the 6 to 9 cfs annual average flow.

2.4.3 Pump Station and Associated Facilities

A pump station will be constructed in the MOU-designated area between Keeler Bridge and the Delta (Figure 2-4). The facility will capture a portion of the flows in the river and divert it to Owens Lake for use in the Dust Mitigation Program (see Section 12.3) or to the Aqueduct for use by LADWP. LADWP's first priority will be to deliver water as needed to the Dust Mitigation Program, and secondarily to the Aqueduct if flows are not needed for the Dust Mitigation Program. Water that is not captured will be bypassed to the Delta.

2.4.3.1 Location

The MOU requires that the pump station be located in a designated area downstream of Keeler Bridge (see Figure 2-4). The specific site was selected by Bureau of Reclamation (BOR) during their conceptual design study. It is located about 4.5 river miles south of Keeler Bridge. This location was chosen because of several key factors: (1) it is within the area specified by the MOU and is located on LADWP land; (2) it is located above the dune areas around the lake margins, thus avoiding areas where construction would be difficult; (3) the river channel at that location has a steep western bank, which provides ideal circumstances for keying the pump station into the western bank; and (4) the site has a natural backwater area which will be converted to a forebay for the pump station.

The pump station site is located in an 800- to 1,000-foot wide floodplain, with an active river channel on the west side of the floodplain that meanders and creates a small oxbow with a permanent pond (Figure 2-9). The floodplain is about 15 to 20 feet lower than the adjacent upland areas. There are steep bluffs along the western edge of the floodplain. The active channel is about 200-feet wide and 5-feet deep. Riparian and wetland vegetation is present in the channel bottom, which currently contains year-round flow.

2.4.3.2 Pump Station Design

The pump station will be located in a 229- by 189-foot facility yard (approximately 1 acre) that is placed below grade on the western bank of the river (Figure 2-11) with 3:1 (H:V) cut slopes, which together with the facility yard will encompass about 1.25 acres. The yard will be enclosed by a 7-foot high chain link fence. The pump station itself will be 60 by 60 feet with a nearby electrical transformer yard. The pump station will consist of the following main elements:

- A 28- by 46-foot buried sump with two openings and two chambers where the pumps will be immersed (Figure 2-12). The two individual openings to the sump will each be about 9 feet wide and 12 feet tall. A 20-foot wide by 42-foot long intake will be connected to the sump. The intake will contain bulkhead gates to close the intake for maintenance. In addition, each opening will contain a trash rake and a trash screen with ¼-inch openings (Figure 2-13). An open pad area will be provided for operation of the trash rake and the trash screen. The trash screen will be routinely cleared of floating debris. Water depth in the sump will vary from 8 to 12 feet. Both chambers would typically be used simultaneously, but one can be closed off for maintenance while the other side remains operational.

- Four pumps will be located in separate bays. Two bays at a time can be closed off with bulkhead gates for maintenance. The preliminary design concept is to have three duty pumps (two variable speed and one on/off) and one on/off standby pump (for maintenance), which will allow the necessary degree of flexibility to manage flows to the Delta. Under this scenario, each pump will have a capacity of approximately 17.5 cfs. Depending on economic considerations, the successful contractor may elect to supply pumps with a slightly different capacity. Consequently, the exact capacity of the pumps will not be known until a contract for construction of the pump station has been awarded by LADWP. However, as required per the Stipulation and Order entered in Inyo County Superior Court Case Number S1CVCV01-29768 (Sierra Club and Owens Valley Committee v. City of Los Angeles et al., February 13, 2004), the maximum flow leaving the pump station will be 50 cfs as measured by the flow meter with a continuous recorder (see also Section 2.4.3.10 regarding pump station operation).

- A 60- by 60-foot prefabricated metal building that will enclose a control room and a pump room (Figures 2-11 and 2-13). The electrical control room will be equipped with heating and air conditioning units. The building will be about 32 feet tall.
- A 24-foot diameter spherical air chamber partially buried above the 36-inch diameter pipeline outside the facility yard (Figure 2-11).
- A 36-inch diameter buried discharge pipe will extend about 400 feet to a connection with the existing 60-inch diameter pipeline to the Dust Mitigation Program, which also connects to the Aqueduct (Figures 2-7 and 2-7A).
- A service area with gravel surfacing for parking and equipment maintenance will be incorporated within the main facility yard (Figure 2-11).
- Lighting at the pump station will be designed to minimize impacts on nighttime viewscape and wildlife. The wattage and number of lights will be minimized to the extent feasible while ensuring employee safety and security. Most lighting will be full cutoff, shielded, and downward pointing. An exception will be the lighting for the trash rack, which will be directed towards the water for cleaning and maintenance of the trash rack. All lighting will be normally off, unless necessary nighttime maintenance is being performed. Lighting at the doorway to the pump station will be equipped with a motion sensor (with manual overrides), and the remainder of the lights will be operated with a manual switch. Height of free standing light posts will be less than 20 feet. Light spill or glare beyond the facility yard footprint will be minimized to the extent possible using the above measures (exceptions include the lighting for the trash rack). Lighting during nighttime construction, if any, will be minimized and directed towards the immediate work areas; however, the safety of construction personnel will be the first priority.

Note: The description of the pump station design and dimensions provided above reflect detailed design, and has been modified from the description in the Draft EIR/EIS, which reflected preliminary design.

2.4.3.3 Diversion Structure

A diversion structure will be constructed across the river channel consisting of the following individual elements: 40-foot wide spillway, 30-foot wide spillway weir plate, bypass/flushing gate, 150-foot long spillway abutment, and 650-foot long erosion control structure (Figures 2-7 and 2-8). The spillway will consist of a 6-foot high rock-filled embankment with a 25-foot deep sheet pile cutoff wall, and the spillway weir plate will be a concrete structure (Figure 2-8). The top of the rock-armored spillway will be at elevation 3,589.5 feet, and the spillway weir plate will be at elevation 3,589.00 feet. The elevation of the river channel invert at the upstream base of the diversion will be 3,583.5 feet. A 185- by 270-foot sediment basin will be maintained upstream of the diversion with an invert elevation of 3,579 feet (Figure

2-7). The spillway width and depth will be sufficient to pass a discharge of 1,400 cfs, which is the largest observed flow between 1945 and 2001. The upstream and downstream faces of the rock-filled spillway will have 36-inch diameter ungrouted riprap rock on sand.

The diversion structure will include a 10-foot wide, 100-cfs gate for controlled releases to the Delta Habitat Area and to flush out sediments from behind the diversion, which will be used during seasonal habitat flows or as needed to flush sediment.

A 150-foot long spillway abutment will be constructed east of the spillway, extending across the active channel (Figure 2-8). It will protect the spillway from being washed out during flood flows. The diversion structure will be constructed of compacted on-site material. It will have a 25-foot deep sheet pile cutoff wall for the westerly 50 feet and a 10-foot deep sheet pile cutoff wall for the remaining length. The spillway abutment will have a 10-foot wide top, and rock riprap on the upstream slope. The crest of the spillway will be about 40 feet wide. The top elevation of the structure will be 3,594 feet, about 4 feet higher than the spillway. It is estimated that flows of 150 cfs over the spillway will have an elevation of 3,590.3 feet. During significant flood flows, the water body behind the diversion will increase in elevation as controlled flows pass over the spillway up to elevation 3,590.5 feet. Above that elevation, river flows will also begin to pass around the east end of the spillway abutment, over the erosion control structure (elevation 3,590.5 feet) described below.

An erosion control structure (an earthen berm 650 feet in length and up to 2 feet in height) will be constructed at the east end of the spillway abutment (Figures 2-7 and 2-8). It will consist of a sheet pile cut-off wall with a minor berm constructed to elevation 3,590.5 feet. The berm and sheet pile will be designed to contain flows in minor channels meandering through the floodplain (outside the main channel) during the seasonal habitat flows (up to 200 cfs). The structure will mostly be below grade, except where it will cross several of these small channels. At these locations, the structure will be about 1 to 2 feet in height. The aboveground portions of the sheet pile cut-off wall at these locations will be buried under an unarmored earthen berm. Flows higher than 200 cfs will pass over the erosion control structure, eventually joining the main channel downstream of the diversion.

During construction of the permanent diversion structure, a 2- to 3-foot high temporary earthen berm will be constructed to divert flow from the river and around the diversion site. Construction of the berms will require clearing a 100-foot wide corridor across the river, and temporarily constructing an earthen berm across the river channel (using riverbed materials) that diverts flows to a bypass culvert or open channel on the east side of the river (Figure 2-7). The berm and bypass culvert or channel will be removed after construction is completed. The riverbed will be re-graded to pre-construction conditions, and flows would be returned to the river.

2.4.3.4 Forebay

A flooded area, or "forebay," will be created in the river channel upstream of the diversion structure. Under the 40-cfs baseflow conditions, the forebay would be about 17 acres in extent (see Figure 2-14).

2.4.3.5 Service Roads

A 2,200-foot long, 16-foot wide gravel service road (West Service Road) will be constructed between the existing access road to the Dust Mitigation Program and the sediment basin in the forebay (Figure 2-9). This road will be used by heavy equipment to access the sediment basin. It will be constructed on a fill slope. The base of the fill will have an average width of about 45 feet. Approximately 6,000 cubic yards of fill material will be required for this road.

A 400-foot long, 16-foot wide gravel access road (South Service Road) will be constructed from the existing dust control road to the pump station (Figure 2-9). The existing grade will be excavated as the road slopes down to the pump station.

A 600-foot long, 16-foot wide gravel service road (East Service Road) will be constructed on the east side of the river to allow inspection of the diversion structure and sediment pond (Figure 2-9). The road will connect to an existing dirt road. It will be constructed on a fill slope with a base of about 45 feet. Approximately 2,000 cubic yards of fill material will be required for this road.

2.4.3.6 Road Surfacing

As part of this project, approximately 3,200 feet of an existing roadway to the pump station site will be surfaced with an aggregate base. This road was constructed in conjunction with and as part of the Phase 1 dust mitigation project for Owens Lake. Since the surfacing of this road will be confined to the limits of the existing roadway there will be no impact to vegetation in the area. It is anticipated that approximately 1,000 cubic yards of aggregate base will be placed 6 inches deep and 16 feet wide over the surface of the 3,200-foot segment of the road. The material required for surfacing will be acquired from existing sand and gravel mining operations approved under the Surface Mining and Reclamation Act (SMARA). It is estimated that, at maximum, it will require two road graders, two water trucks, two compactors and 10 dump trucks to complete this portion of the project. This work will be performed during the first 2 months of pump station construction.

2.4.3.7 Sediment Management

A 185- by 270-foot, 4-foot deep sediment basin will be constructed and maintained in the forebay about 200 feet upstream of the diversion with an invert elevation of approximately 3,579 feet (Figures 2-7 and 2-9). The total capacity of the sediment basin will be about 7,400 cubic yards. Maintenance dredging will occur on an as-needed basis. It is anticipated that maintenance dredging will occur at least every other year. Sediments will most likely be removed by a wheeled excavator, or by a crane with a clamshell bucket. Sediments will be placed in two upland locations (approximately 1.8 acres) for dewatering (Figures 2-9 and 5-2) over several weeks. The dried sediments will then be spread along the top of the west bluff well above the river in a barren sandy area, up to a height of 6 feet with a potential footprint of 100 by 150 feet (3,000 cubic yards). Additional sediments that accumulate over time will be transported to appropriate off-site areas. If significant floatables collect in the forebay, a boom will be installed across the pond and floating debris will be removed as needed using a boat.

2.4.3.8 New Power Line

The new power requirements for the pump station can be met with the existing generating capacity within the LADWP's Owens Valley electrical generation system, which includes the Cottonwood Power Plant. Specific power requirements for the pump station include: four 600-hp pumps, a minimum of five butterfly valves (5 hp each), two 1-hp bulkhead gates, and one approximately 40-hp air chamber compressor.

Power will be conveyed to the pump station along a combination of a new power line from the Cottonwood Power Plant (located about 10 miles southwest of the pump station along Highway 395; Figure 2-10) and a new conductor on an existing line, as described below. The new, 7-mile long single conductor power line will be constructed between LADWP's Cottonwood Power Plant substation west of Owens Lake to a tie-in point on an existing line (Figure 2-10). The new line would be located 12 feet east of an existing single-conductor, wooden pole line for the first 6 miles, spanning Highway 395 at its northern end. The final mile of the new line would be located 60 feet west of the Owens Gorge

Transmission line with large steel lattice towers. The new line traverses lands owned by LADWP and the Bureau of Land Management. The new power line will consist of single wooden poles placed approximately 250 feet apart, and the conductor will be placed approximately 43 to 48 feet above the ground surface (approximately 5 to 10 feet higher than the existing line). The new power line will employ vertical construction with conductors spaced at least 4 feet apart in vertical distance to prevent raptors or other large birds from touching both conductors simultaneously and becoming electrocuted. The distance between the existing and new power lines (approximately 12 feet or more) will also be sufficient to prevent electrocution. In addition, the vertical construction does not have a crossbar, which minimizes the potential for large birds to perch on the pole. Each pole has a diameter of approximately 7 to 8 inches at the top and 15 to 18 inches at the base.

The proposed power line would tie-in to an existing east-west wooden pole line that conveys power to the Dust Mitigation Program on the north lake (Figure 2-10). This line was installed in 2000 and is located about 500 feet north of the older existing power line to Keeler. A new conductor would be installed on the recently constructed wooden poles for a distance of about 2.5 miles. Power for the pump station would be delivered to a small substation located about 30 feet from the pump station.

Construction of the new power line and installation of a new conductor would require about 6 months. Construction and maintenance access would be provided by the existing dirt road along the existing nearby power line. The new poles would be installed using an auger truck accessing the pole locations by overland travel from the nearest dirt road. No new dirt roads would be constructed along the new power line. A daily crew of five to eight people would typically be involved in the installation of a new power line, with four to five trucks along the construction corridor.

2.4.3.9 Construction

Construction would occur over a 12-month period. It will involve the following major phases (some of which will be conducted simultaneously):

1. <u>Prepare Site; Road Surfacing</u> – Build temporary diversion and bypass pipeline or open channel, then divert flows around the construction site; remove vegetation from alignment of the diversion; install temporary cofferdams around the pump station site and dewater; install service roads to sediment basin and east side of river; place, grade, and compact aggregate base on existing access road;. This phase would require about 2 months. The temporary diversion and bypass pipe are shown on Figure 2-7.

2. <u>Install Diversion Structure</u> – Construct the spillway, spillway abutment, bypass/flushing gate, and erosion control structure; excavate sediment basin. This phase would require about 3 months.

3. <u>Construct Pump Station Structure</u> – Install foundations, concrete sump, structural backfill, and piping. This phase would require about 5 months, of which 2 would overlap with the above activities.

4. <u>Install Pumps, Mechanical, Electrical, Controls, and Pipeline</u> – Install pumps, electrical, and mechanical equipment; install air chamber and electrical transformer yard; install fencing; site clean up; remove temporary river diversion and bypass; install 36-inch diameter pipeline to the Dust Mitigation Program pipeline; test system. This phase would require about 5 months, 1 of which would overlap with the above activities. Once this phase in completed, Phase 2 releases to achieve the 40-cfs baseflows in the river would begin.

Construction activities would occur within the 24-acre construction area shown on Figures 2-7 and 5-2. About 15,000 cubic yards would be excavated from the banks above the river to create a flat pad for the pump station facility yard (Figure 2-11). The site would be over-excavated and backfilled with an engineered foundation. About 1,250 cubic yards of the excavated material would be used to construct the entire diversion and erosion control structure. The remainder would be spread out on the top of the riverbank west of the pump station in a barren sandy area. About 1,800 cubic yards of rock will be imported from off-site sources, and about 1,250 cubic yards of concrete will be required for the pump station facility.

An estimated 9,000 cubic yards would need to be removed during the construction of the sediment basin (Figure 2-7). The material will be disposed on the adjacent riverbanks. Rock will be imported for the spillway and for armoring the abutments. Gravel will be imported to build the access road to the sediment basin, and the service road on the east side of the river. Estimated total quantities of imported construction materials are listed below in Table 2-12. Imported materials will be obtained from existing borrow pits.

TABLE 2-12
ESTIMATED CONSTRUCTION QUANTITIES

Task or Project Facility	Material	Estimated Imported Material
Diversion structure	Rock and sand	1,800 cubic yards
Diversion structure	Sheetpile	700 linear feet
Pump station	Concrete	1,250 cubic yards
Facility yard and roads	Gravel	8,000 cubic yards

The primary construction access would be provided from Highway 395 and the existing dirt road that extends from Boulder Creek Resort to the river. This road is the major access road to LADWP's North Lake Dust Mitigation Program. Access would also be provided from Keeler Road to the east side of the river during the construction of the diversion structure. An estimate of the average number of workers, employee vehicles, and trucks is provided in Table 2-13.

TABLE 2-13
ESTIMATED CONSTRUCTION DURATION AND WORKFORCE

Phase	Approximate Duration (months)	Average Daily Number of Workers	Average Daily Number of Worker Vehicles
1. Prepare site	2	6	5
2. Install diversion structure	3	10	8
3. Construct pump station structure	5 total, 3 net (2 overlap with above phase)	12	10
4. Install pumps, controls, mechanical, and electrical	5 total, 4 net (one overlaps with above phase)	8	7
Total duration =	12 months		

2.4.3.10 Pump Station Operation

The pump station will be unmanned and operated under local automated control at the facility. Operations will be remotely monitored and controlled by LADWP from Keeler. The facility will be inspected routinely by LADWP personnel to clean the trash rack, ensure proper functioning of all mechanical equipment, and to secure the facility. The pump station will have several lights mounted on 20-foot poles at the South Service Road gate, air chamber enclosure and pump station facility yard. These lights will be manually controlled and will only be used during nighttime inspections.

The diversion structure will contain a 10-foot wide bypass/flushing gate (Figure 2-8). The gate will measure the bypass flow. The invert of the gate will match the channel bottom next to the diversion (about 3,583.5 feet). Flows will pass over the gate on a continuous basis. The gate is designed to pass up to 30 cfs. The gate will be used to bypass to the Delta the baseflows, the four pulse flows of up to 30 cfs, and a portion of the seasonal habitat flows. The remainder of seasonal habitat flows will pass over the spillway. Flows that are not bypassed will be pumped from the river.

The pumps would operate automatically based on the water level in the forebay. When water levels rise because bypass flows and pumping are less than river inflows, the pumps will be energized in sequence. The converse will occur as water levels drop. As required per the Stipulation and Order entered in Inyo County Superior Court Case Number S1CVCV01-29768 (Sierra Club and Owens Valley Committee v. City of Los Angeles et al., February 13, 2004), the maximum flow leaving the pump station will be 50 cfs as measured by a flow meter with a continuous recorder.

Under typical operating conditions when flows in the river at the diversion are about 40 cfs, the forebay would have an operating water elevation of 3,588.5 feet, established by the combination of river inflows, bypass flows and pumping. Under these conditions, the depth of water at the upstream base of the diversion would be about 5 feet, while the depth of water in the sediment basin about 200 feet upstream would be about 9 to 10 feet. The impoundment under these conditions would extend upstream for about 3,000 feet, and create a water body with a surface area of about 17 acres (Figure 2-14). The daily water level fluctuation is expected to be about 1 foot.

When river inflows exceed pumping capacity plus bypass flows, the ponded water surface would rise and water would spill over the spillway weir plate at 3,589.0 feet. The pump station will divert up to 50 cfs of seasonal habitat flows, and the remainder of the flows will pass over the bypass/flushing gate. If flood flows of greater than 200 cfs occur, the flows will pass over the bypass/flushing gate and the spillway and around the east end of the diversion structure over the erosion control structure.

Most of the flows recovered at the pump station will be diverted to the lake Dust Mitigation Program. At present, the water for the Dust Mitigation Program is being supplied from the Aqueduct through the 60-inch diameter pipeline, which extends from the Aqueduct to the northern portion of the lake, where it is conveyed to several spreading areas through distribution lines (Figure 2-7A). Water recovered by the pump station will be discharged into the 36-inch diameter pipe and conveyed to the existing 60-inch pipeline.

Water will only be pumped to the Aqueduct when recovered flows exceed Dust Mitigation Program demands. No valve will be installed to direct the flows – they will follow a pressure gradient, first to the lake, then to the Aqueduct.

2.5 BLACKROCK WATERFOWL HABITAT AREA

2.5.1 Background

The Blackrock Waterfowl Habitat Area consists of four separate management units: Drew, Waggoner, Winterton, and Thibaut (Figure 2-15). The total area within which flooding could potentially occur within the four units is approximately 1,342 acres. Under the MOU, LADWP is required to flood 500 acres out of the 1,342 acres, except in years when runoff is forecasted to be less than average. In addition, the areas within 300 feet of the flooded areas, called “adjacent zones,” are expected to benefit from the flooding and to provide important nesting, resting, and feeding habitat for waterfowl and many other wildlife species that use the Blackrock area. The total area of these adjacent zones in the four Blackrock management units is 1,241 acres (Figure 2-15). Thus, the Blackrock Waterfowl Habitat Area consists of a total of 2,583 acres within four management units.

Table 2-14 shows the approximate extent of the maximum area of potential flooding for each of the four management units in the Blackrock area and for the areas adjacent to the flooded areas, which are expected to be influenced by the flooding.

TABLE 2-14
MAXIMUM AREA OF POTENTIAL FLOODING AND ADJACENT HABITAT ZONES

Management Unit	Potential Flooded Area (acres)	Adjacent Habitat Area (acres)	Total Management Unit Area (acres)
Drew	246	151	397
Waggoner	327	271	598
Winterton	281	244	525
Thibaut	488	575	1,063
Total =	1,342	1,241	2,583

Source: Ecosystem Sciences.

Portions of the management units currently include waterfowl habitat in various man-made lakes and seasonally flooded pastures. Over the past 40 years, the Blackrock area has been used for water spreading in high runoff years, grazing, and other activities. For example, when runoff has exceeded the Aqueduct capacity, water has been spread over extensive areas normally used for dry grazing that extend from Blackrock Ditch to Billy Lake. To facilitate spreading, LADWP has constructed miles of dikes, levees, ditches, roads, culverts, and basins. The water spreading basins are connected by ditches, culverts, and spillgates. Significant areas were recontoured in the past to facilitate spreading and percolation and to reduce the need to release water to Owens Lake, which was limited by a court injunction.

Much of the existing wetland vegetation in the Blackrock area was created and is maintained by these water releases. Natural wetlands are present in the area at seeps and springs along the 1872 earthquake fault line. Existing wetlands in the Blackrock Waterfowl Habitat Area include open water areas, emergent wetlands (cattail and bulrush marsh), rush/sedge meadow, and alkali meadow. The Blackrock area is currently grazed by livestock in various LADWP leases, as described in Section 2.8. Due to historical land and water management practices, the vegetation communities in the Blackrock area have been significantly altered.

2.5.2 Goals for the Blackrock Waterfowl Habitat Area

The MOU provides that the overall management goal for the Blackrock Waterfowl Habitat Area is to: *“… maintain the existing habitat in order to provide opportunities for the establishment of resident and migratory waterfowl populations, and to provide habitat for other native species. Diverse natural habitats will be created and maintained through flow and land management, to the extent feasible, consistent with the needs of the ’habitat indicator species’ for the Blackrock Waterfowl Habitat Area. These habitats will be as self-sustaining as possible.”*

The habitat indicator species listed in the MOU for the Blackrock Waterfowl Habitat Area are:

<u>*Native fish:*</u>
- Owens pupfish (state and federal endangered species)
- Owens tui chub (state and federal endangered species)

<u>*Native birds:*</u>
- Northern harrier
- Least bittern
- Rails
- Marsh wren
- Resident, migratory, and wintering waterfowl
- Resident, migratory, and wintering wading birds
- Resident, migratory, and wintering shorebirds

The MOU also states that *"Approximately 500 acres of the habitat area will be flooded at any given time in a year when the runoff to the Owens River watershed is forecasted to be average or above average. In years when the runoff is forecasted to be* less *than average, the water supply will be reduced in general proportion to the forecasted runoff in the watershed."*

As described in the following sections, under the LORP an annual average of 500 acres will be flooded in the Blackrock Waterfowl Habitat Area in average or above average runoff years, subject to seasonal water level fluctuations.

2.5.3 Overall Management Strategy

Specific project objectives for the Blackrock Waterfowl Habitat Area include the following: (1) provide a reliable and dependable source of water and wetland habitat that will attract resident and migratory waterfowl and shorebirds, and the other MOU indicator species for this project element; (2) maintain the ratio of open water wetlands to emergent wetlands so that emergent wetlands do not exceed about 50 percent of the flooded area of any management unit; and (3) create and maintain diverse habitats while minimizing the use, extent, and frequency of intervention and manipulation.

During average and above average runoff years, approximately 500 acres would be flooded in one or more management units on an annual average basis (subject to seasonal fluctuations). In below average runoff years, less than 500 acres may be flooded; the exact amount would be determined by the Standing Committee each year in accordance with the MOU. The flooded wetlands in the different units would be in stages of development (wet phase) or in stages of decline (dry phase).

As part of project implementation, LADWP will establish a system of gaging stations in the four Blackrock management units, which will serve as indicators of the area of flooding in each of the units. To document compliance with the MOU's requirements for this project element, LADWP and the County will monitor water levels at the gaging stations and flows at spillgates and diversions that supply the units. The information will be reported to agency managers so that releases can be adjusted to ensure compliance with the MOU.

The project proposes flooding portions of the Blackrock Waterfowl Habitat Area to increase wetland productivity and diversity, which is consistent with the approach described in the LORP Plan. The management units would be subject to periodic cycles of wetting and drying so that one to three management units would be wholly or partially flooded at any given time. This phase of the management is considered "wet" or "active." Management units not actively managed or flooded are considered "dry" or "dormant." The purpose of the dry phase is to control excessive cattail and bulrush growth, which reduces the value of the wetlands to the MOU indicator species for the Blackrock area. In practice, depending on the quality of habitat provided by each of the management units (e.g., the extent of emergent vegetation that develops in a given unit), some units could remain flooded indefinitely, while others could be left dormant, as long as the MOU requirements are met.

Units will be converted from a wet to a dry phase when the area of emergent vegetation in an active unit reaches 50 percent of the flooded area. LADWP and the County will track the extent of emergent vegetation within the active units using remote sensing imagery, or other appropriate tools, and the estimates of flooded areas calculated from the gaging stations measurements.

Water will be conveyed through the Blackrock Waterfowl Habitat Area through a series of existing channels (Figure 2-15). The water supplied to the area from the Aqueduct will be independent of the releases to the river. Very little water will leave the Blackrock Waterfowl Area and return to the river. Therefore, water losses to the Blackrock Area will be primarily consumptive losses. Various physical improvements will be necessary to facilitate water movement, including replacement or repair of small spillgates, and reshaping of old ditches. These improvements are described in Section 2.5.10 for each management unit. An overview of the areas subject to flooding under the proposed plan is provided on Figure 2-15.

LADWP and the County may also use controlled burns as a tool to manage vegetation in the Blackrock Waterfowl Habitat Area to maintain desired ratios of open water and emergent vegetation. Controlled burns may be used on a limited basis and only if necessary. Effective water management may reduce the need to use this management tool.

The proposed water management for the Blackrock Waterfowl Habitat Area will not be conducive to promoting suitable habitat for Owens pupfish and Owens tui chub. The project does not include any actions to create sanctuaries in the Blackrock area for these species, nor does the project include any deliberate actions to introduce these species into the area. If suitable habitat were created in this area, any actions to introduce these species in the Blackrock area would only occur under the provisions of a Section 10(a) permit and Habitat Conservation Plan ("HCP") approved by the U.S. Fish and Wildlife Service. An HCP and Section 10(a) permit are not proposed as part of the LORP. However, LADWP is planning to prepare an HCP for all LADWP lands in Owens Valley in cooperation with USFWS, and may seek a Section 10(a) incidental take permit in the near future.

2.5.4 Proposed Flooding Regime

The Blackrock Waterfowl Habitat Area will be implemented in two flooding cycles that will occur during the first 10 to 15 years of the project. At this time, it is intended that the two cycles would be repeated, unless it is determined through adaptive management that the goals of the MOU would be better achieved by modifying the flooding regime. In addition, water releases to the active Blackrock management units will be controlled to induce seasonal fluctuations in water levels.

<u>Cycle 1</u>

1. Existing water releases to the Waggoner Unit will be discontinued and the unit will begin a dry phase to remove the emergent vegetation in this unit. During cycle 1, the open water and vegetated wetland habitat in the Waggoner Unit will be reduced from 268 acres (including areas of open water and vegetated wetland in the "adjacent habitat" area, see Table 7-1) to 0 (Table 7-3, cycle 1). Controlled burning may be used if needed to reduce the amount of standing dead cattails and bulrushes.
2. Approximately 354 acres will be flooded in the Thibaut Unit.

3. Approximately 165 acres of the Winterton Unit will be flooded to achieve 500 acres of flooded area.

Cycle 2

When the flooded area of the Winterton Unit develops 50 percent cover of emergent vegetation, cycle 2 will be implemented:

1. Flooding will be discontinued or reduced in the Winterton Unit. The unit is expected to revert to the existing 76 acres of open water and vegetated wetland within the area that will be flooded during cycle 1.
2. Depending on conditions in the Thibaut and Winterton units, between 100 and 150 acres (estimated at 147 acres in Tables 7-2 and 7-3, cycle 2) will be flooded in the Waggoner Unit to achieve 500 acres of flooded area.
3. The Thibaut Unit will continue to be flooded at 354 acres, unless the area of emergent vegetation reaches 50 percent of the flooded area, at which time the unit would be shifted to a dry phase and flooded areas in one or more of the other three units would be increased to meet the MOU requirement.

The Drew Unit will not be flooded at any time, unless it is needed to create additional flooded areas to achieve the 500-acre MOU requirement or to better meet MOU habitat goals amongst the four management units.

It should be noted that, when a unit is placed in a dry cycle, the water supply will be discontinued and the flooded area in that unit will remain for some time thereafter, slowly disappearing over time. At the same time, the unit transitioning into a wet cycle will receive water to start the flooding process. Thus, during the transitional period, a substantial amount of acreage over 500 acres will be flooded. In addition, as the water level recedes in a drying unit, the same benefits will occur in the unit as will be provided during the seasonal fluctuations in water levels in active management units described below.

Seasonal Water Level Fluctuations

The extent of the flooded areas in all of the management units will fluctuate with the water supply and on a seasonal basis. Seasonal water level fluctuations are an important attribute of managed wetlands. Water level changes provide substrate for aquatic invertebrates and macrophytes, both of which are essential food resources for many migrant and resident waterbirds, especially brooding young.

The MOU states “approximately 500 acres of the habitat area will be flooded at any given time in a year when the runoff to the Owens River watershed is forecasted to be average or above average.” In less than average runoff years, the water supply to the Blackrock area may be reduced in general proportion to the forecasted runoff and will be set by the Standing Committee. LADWP plans to meet the above goal for the Blackrock habitat area by maintaining an average annual flooded acreage of approximately 500 acres during average or above average years, and by maintaining on an annual average basis the acreage set by the Standing Committee for years that have less than average runoff. Within the annual average, the total area flooded at any time during a runoff year will vary seasonally as described below.

Seasonal fluctuations are expected to occur in active management units between winter and summer seasons, as evaporation and plant transpiration rates vary with changing temperatures. For example, in the winter, transpiration and evaporation rates are low and minimal fluctuations in water levels are anticipated, given a constant water supply. In the summer, as temperatures rise, evaporation and transpiration rates increase, which results in higher demands on the applied water. If the water supply is not increased to meet these greater demands, the flooded area will shrink. The resulting seasonal fluctuations will create wetlands around the perimeter of the flooded area that serve as productive feeding areas for the Blackrock area indicator species. Flooded acreage would not be reduced below 450 acres or exceed 550 acres in average and above average runoff years (unless runoff exceeds Aqueduct capacity). The fluctuations will not displace wildlife and will add to the habitat diversity available to the indicator species by promoting establishment of a variety of wetland vegetation types.

Beginning April 1 of each year, up to 550 acres will be flooded in the Blackrock area. Once the area has been flooded, water releases will be held steady and water levels will be allowed to recede as summer evaporation and plant transpiration increases. As a result, flooded acreage will be temporarily reduced to less than 500 acres (but no less than 450 acres at any one time). If the flooded area approaches 450 acres, water supplies will be increased, and over the course of each runoff year, water supplies to the Blackrock area will be managed to achieve an annual average of no less than 500 acres of flooding in average and above average runoff years.

2.5.5 Water Management by Runoff Year

The management strategies for different types of runoff years are summarized below:

<u>Forecasted Average to Above Average Runoff Year (100 Percent or More of the Average Annual Runoff)</u>

The MOU requires that approximately 500 acres of habitat be flooded at any given time under these runoff conditions. This acreage requirement would be met through flooding operations in one or more of the four management units at any one time to achieve an annual average of approximately 500 acres in average and above average runoff years (see above). The area of the existing off-river lakes and ponds, which are included in the "Off River Lakes and Ponds" feature of the LORP (see Section 2.6), is not included in the calculation of flooded acreage in the Blackrock area.

<u>Forecasted Below Average Runoff Year (50 to 99 Percent of Average Annual runoff)</u>

The MOU states that water for the Blackrock Waterfowl Habitat Area will be reduced in general proportion to the reduction in the forecasted runoff. The amount of acreage to be flooded in years when the runoff is forecasted to be less than average will be set by the Standing Committee based on recommendations in the LORP Plan and in consultation with the CDFG. Under these conditions, the duration of the dry phase of a management unit then in a dry phase would be extended, and water supply to units then in a wet phase would be reduced. Hence, there would not be a rapid and substantial change in water conditions in these years. Instead, there would be small incremental changes in the amount of water in the area, reflecting the general reduction in runoff throughout the valley.

2.5.6 Anticipated Wetlands Creation

Most of the created and enhanced flooded wetlands will be managed as semi-permanent wetlands that are flooded for several years then dried to remove emergent vegetation. When full, these waterbodies would have depths ranging from a few inches to several feet. These wetlands will primarily consist of seasonal ponded water and cattail/bulrush marsh. The lands adjacent to the flooded areas will be hydrologically influenced by the flooding.

During the first year of the active phase, the newly flooded areas would consist of mostly open water. Over time, emergent wetland plants would colonize the margins of the newly flooded areas until emergent wetlands (i.e., cattail and bulrush marsh) would occur throughout much of the flooded areas. As the water is removed from these areas for a dry cycle, other wetland plants and annuals would colonize the newly exposed substrate. These areas are expected to develop into a mosaic of wet meadows, emergent vegetation, mesic meadows, and seasonally flooded areas. The degree of influence that flooding will have on these areas will depend on soil types and water holding capacities of adjacent area soils. The higher plant growth and vegetative density in these adjacent areas will provide high quality habitat for nesting waterfowl.

During the course of the flooding and drying cycles, wetlands and flooded areas will increase in some management units and decrease in others compared to current conditions. With the exception of the Waggoner Unit (which is currently flooded), during the wet cycle, when water is being supplied for flooding, the acreage of open water and vegetated wetlands in a management unit would be greater than under current conditions. The increased water supply will result in the conversion of uplands to wetlands and from drier wetlands to wetter types. New vegetated wetlands will be established within and adjacent to the flooded areas. During dry cycles when water is removed from a unit, the amount of vegetated wetlands would be reduced compared to current conditions.

2.5.7 Land Management and Saltcedar Control

The Blackrock Waterfowl Habitat Area includes portions of the Blackrock, Thibaut, and Intake livestock grazing leases. Management plans for these leases are described in Section 2.8. The plans include various measures to ensure that grazing practices will be compatible with the proposed management of the Blackrock Waterfowl Habitat Area. These measures include appropriate utilization rates, improved monitoring of utilization, fencing to create new pastures, and improved distribution of stock watering sites.

There is potential for increasing the distribution or vigor of existing saltcedar stands in the Blackrock Waterfowl Habitat Area due to periodic flooding and drying of management units. Saltcedar colonizes disturbed areas, soils with high salt concentrations, burned areas, and newly exposed wetland or mudflat areas. The potential for the growth of saltcedar and other noxious plants and control of such noxious plants are discussed in Section 10.4.

2.5.8 Schedule

The improvements to the water management facilities (described below) will be initiated as soon as the EIR/EIS for the project is approved and any necessary permits are obtained. LADWP anticipates it will take 6 months to complete the improvements. Flooding would be initiated once improvements are finished.

2.5.9 Water Use

LADWP currently supplies water to the Blackrock Waterfowl Habitat Area management units and adjacent lands for various purposes, including pasture irrigation, livestock watering (from ditches), and wetland habitat. The existing and future average annual water supplies to the Blackrock area are summarized in Table 2-15. Very little, if any, of the water supplied to the Blackrock Waterfowl Habitat Area would reach the Lower Owens River.

TABLE 2-15
EXISTING AND FUTURE WATER REQUIREMENTS
IN THE BLACKROCK WATERFOWL HABITAT AREA

Management Unit	Point of Delivery	Existing Average Annual Water Use (acre-feet per year)*	Long-term Estimated Future Annual Water Use (acre-feet per year) in Normal Runoff Years** when the Unit is Active
Drew	Drew Slough Diversion	0	0
Thibaut	Thibaut Diversion (East and South gates); Winterton Diversion	499	1,750
Waggoner	Waggoner Diversion; Twin Lakes Diversion***	0	750 (total water use for Waggoner and Winterton Units)
Winterton	Winterton Diversion	404	
Total =			2,500

*Does not include periods when water is released to the Blackrock area for Aqueduct maintenance or operations.
**Water use for future wetlands based on water demand of 5 acre-feet per acre per year, using the flooded acreage under Cycles 1 and 2: 350 acres in Thibaut Unit and 150 acres in Waggoner and Winterton units.
*** Existing water demand does not show water consumed in Waggoner area from diversions to supply Goose Lake.

2.5.10 Physical Improvements

Various physical improvements will be necessary to manage water conveyance and flooding in the management units to achieve the objectives for these units. The structural improvements to be implemented in each of the four management units are described below, and are summarized in Table 2-16.

TABLE 2-16
SUMMARY OF PHYSICAL IMPROVEMENTS AT
BLACKROCK WATERFOWL HABITAT AREA

Management Unit	No. of New or Replaced Spillgates or Culverts	Miles of New or Repaired Berms	Miles of New or Repaired Ditches
Drew	2	1.4	0
Thibaut	0	0.7	0
Winterton	1	0.2	0.4
Waggoner	4	1	1.3
Total =	7	3.3	1.7

The replacement of spillgates would involve minor earth and structural work. Spillgates are constructed of wood and steel, with concrete footings and/or walls. Construction work would only require about one week and only require truck mounted equipment and crane, a backhoe, small front loader, material trucks, and employee vehicles.

Raising and repairing existing berms would require the use of a front-end loader or bulldozer. A scraper is not expected to be necessary. Most of the existing berms are only 10 to 30 feet wide. Large earthmoving equipment would not be necessary to re-contour and raise the berms. All berm repair would use on-site borrow material taken from the sides of the berms.

New berms and ditches would also be constructed using small earthmoving equipment and on-site material. Any new berms and ditches would be constructed similarly to existing facilities. Construction of new berms and ditches is expected to require about 6 months.

2.5.10.1 Waggoner Management Unit

Management Objectives. This unit is located west of Lower Twin Lake, Coyote/Grass Lakes Complex, and northwest of Goose Lake (Figure 2-15). It receives water from the Blackrock Ditch at the Waggoner Diversion. At present, water is released from the Waggoner Diversion to support Goose Lake. The Waggoner management unit currently has water year-round. Water released from the Waggoner Diversion moves through various wetlands, through culvert No. 98 and under bridge No 97, then into the Coyote/Grass Lakes Complex and Goose Lake.

This unit has the greatest topographic diversity of the four management units, which provides an opportunity to create greater habitat diversity, including deepwater wetlands. Primary long-term objectives include: (1) increase the extent of open water in wet cycles; (2) increase shallow water brooding habitat; (3) improve the water conveyance facilities; (4) separate the water management infrastructures supporting this unit and the off-river lakes and ponds; and (5) increase nesting opportunities. The existing management practices for Lower Twin, Coyote/Grass Lakes Complex, and Goose Lake (totaling 169 acres) would remain unchanged. Under these practices, water is supplied year-round to these lakes to maintain a game fishery (see Section 2.6).

Structural Improvements. Portions of a mile-long stretch of berms and levees (i.e., berms with roads on top) would be raised 1 to 3 feet. The existing culvert (No. 105) at the south end of Lower Twin Lakes would be replaced (Figure 2-15). An earthen ditch would extend from this culvert across a man-made basin to a new culvert (No. 101), and then along a second branch of the ditch to an existing culvert (No. 99). Water would pass from culvert 101 into lower Waggoner wetlands, providing a second option for filling these wetlands, which are currently supplied water by the Waggoner Diversion. Water from existing culvert No. 99 would be conveyed through a new ditch across a second basin to an existing culvert (No. 100) that would be used to supply water to the Coyote/Grass Lakes Complex and Goose Lake. The length of the new ditch from culvert No. 105 to culvert No. 100 is about 1.3 miles. This ditch would allow water from the Lower Twin Lakes Diversion to supply the Coyote/Grass Lakes Complex and Goose Lake, which have been supplied to date from the Waggoner Diversion. Spillgate No. 98 and bridge No. 97, which convey water from the Waggoner wetlands to the Coyote/Grass Lakes Complex and Goose Lake, would be replaced.

2.5.10.2 Winterton Management Unit

Management Objectives. This unit contains a large man-made basin with scattered upland islands. The latter would become prime waterfowl nesting and brooding areas because they provide cover and protection from predators. Water is supplied to this unit from the Winterton Diversion on Blackrock Ditch.

Structural Improvements. A new spillgate (no number assigned) would be constructed at the south end of the wetlands to contain water within the unit (Figure 2-15). Several sections of existing berms (totaling about 0.2 linear miles) would need to be raised 1 to 3 feet. In addition, a new ditch about 0.4 miles in length would be constructed at the southern end of the wetlands.

2.5.10.3 Thibaut Management Unit

Management Objectives. In most years, this unit will receive water from the Thibaut Spillgate, which branches into the East Spillgate (serving the western and northern portions of the unit) and the South Spillgate (serving the southern and southeastern portions of the unit). In extremely wet years, it will receive water from the Thibaut Spillgate and possibly the Winterton Diversion. This unit contains the most natural wetlands in the Blackrock Waterfowl Habitat Area, and supports a wide diversity of wetland types. Because topographic relief in this unit is low, deep-water wetlands are not present. However, extensive wetlands can be maintained in the unit with less water than would be required at the other management units. The Thibaut East Spillgate would primarily be used to flood this unit. Water from this spillgate moves east to the Thibaut Ponds, then south through a series of ponds and mudflats (Figure 2-15). Water would also be supplied to a lesser degree from the Thibaut South Spillgate. The primary management objectives for this unit are to create shallow wetland for shorebirds, dabbling ducks, and geese.

Structural Improvements. The gaging facilities on the East and South Spillgates would be replaced. Approximately 0.7 miles of berms would be raised about one foot at seven locations in the unit (Figure 2-15). Grazing improvements would be implemented, including new fenced pastures and new gates, as described in Section 2.8.

2.5.10.4 Drew Management Unit

Management Objectives. This unit is relatively flat and is located adjacent to the Blackrock Ditch, which would facilitate water management (Figure 2-15). Water would be supplied to this unit from the Blackrock Ditch through the Drew Slough Spillgate. Currently, no water is supplied to this unit, and no water releases are planned for the unit under the LORP unless needed to meet the MOU requirement to flood 500 acres, or to meet the MOU habitat goals. If it is flooded in the future, the unit will be best suited for shallow seasonal wetland habitat for shorebird foraging (fall, winter, spring), and year-round wading bird use.

Structural Improvements. The existing dilapidated Drew Slough Spillgate would be replaced, requiring the installation of two new culverts (Figure 2-15). The Drew Slough Return gate, which appears to have been destroyed, would be re-established. About 1.4 miles of the existing dike between the unit and Blackrock ditch (on the north side of the ditch) would be elevated by several feet to prevent flooded areas from spilling into the ditch (Figure 2-15).

2.6 OFF-RIVER LAKES AND PONDS

2.6.1 Background

In the mid 1980s, LADWP and the County implemented the Lower Owens River Rewatering Enhancement/Mitigation Project. As part of this project a permanent water supply was provided to Twin Lakes (Upper and Lower), Goose Lake, Billy Lake, and Thibaut Ponds. A permanent water supply to these surface water features will be continued as part of the LORP.

2.6.2 Goals

The goals of this physical feature, as stated in the MOU, are to "…*maintain and/or establish these off-river lakes and ponds to sustain diverse habitat for fisheries, waterfowl, shorebirds and other animals … through flow and land management, to the extent feasible, consistent with the needs of the "habitat* *indicator species" for the off-river lakes and ponds."* The off-river lakes and ponds included in the LORP are Twin Lakes (Upper and Lower), Goose Lake, Billy Lake, and Thibaut Ponds. The habitat indicator species listed in the MOU are:

Non-native game fish:
Largemouth bass
Smallmouth bass
Blue gill
Channel catfish

Native fish:
Owens pupfish (state and federal endangered species)
Owens tui chub (state and federal endangered species)

Native birds:
Northern harrier
Least bittern
Rails
Marsh wren
Osprey
Resident, migratory, and wintering waterfowl
Resident, migratory, and wintering wading birds

2.6.3 Management Approach

To achieve the goals for off-river lakes and ponds for non-native game fish, LADWP will maintain the existing water supplies to, and water levels in, the following lakes: Upper and Lower Twin Lakes, Goose Lake, Thibaut Ponds, and Billy Lake (Figure 2-1b). Under the proposed project, the management of these off-river lakes and ponds will not change from existing practices. The management objectives for the off-river lakes and ponds are as follows:

- Upper and Lower Twin Lakes: Existing staff gages will be maintained between 1.5 and 3.0, which represents maintenance of existing conditions.
- Goose Lake: Goose Lake must be kept full in order to spill over and provide a continuous flow to the river. Therefore, Goose Lake will always be full. Typical staff gage readings reflecting Goose Lake at full capacity are between 1.5 and 3.0.
- Billy Lake: Billy Lake will remain full in order to maintain a continuous spill to the river. A staff gage was never placed in Billy Lake because it has always been operated at a spillover level.
- Thibaut Ponds: One or more gaging stations will be installed to monitor pond levels. The Thibaut Ponds area delineated on Figure 2-15 will be kept full.

Habitat suitable for Owens pupfish and Owens tui chub will be created in the off-river lakes as a part of the LORP (Ecosystem Sciences, Technical Memorandum 8, 2001). However, the project does not include any actions to create sanctuaries in the lakes for these species, nor does the project include any deliberate actions to introduce these species into the lakes. Any actions to introduce these species to off-river lakes and ponds would only occur under the provisions of a Section 10(a) permit and Habitat Conservation Plan ("HCP") approved by the U.S. Fish and Wildlife Service. An HCP and Section 10(a) permit are not proposed as part of the LORP. However, LADWP is planning to prepare an HCP for all LADWP lands in Owens Valley in cooperation with USFWS, and seek a Section 10(a) incidental take permit in the near future.

The LORP does not include any active management of cattails and bulrushes at the off-river lakes and ponds.

2.6.4 Water Supply

The Blackrock Spillgate conveys water from the Aqueduct to the Blackrock Ditch, which in turn, provides water to maintain Upper and Lower Twin Lakes, Coyote/Grass Lakes Complex, and Goose Lake (Figure 2-1b). These flows are also diverted for water spreading, livestock water, and off-river lakes at the following diversion gates (listed in west to east sequence): Lacey Diversion, Winterton Diversion, Four Corners Diversion, Drew Slough Diversion (currently inactive), Waggoner Diversion, Lower Twin Lakes Diversion, and Upper Twin Lakes Diversion.

Water is currently provided to Coyote/Grass Lakes Complex and Goose Lake through the Waggoner Diversion. Under the proposed project, water to supply Coyote/Grass Lakes Complex and Goose Lake will be provided from the Lower Twin Lakes Diversion instead of the Waggoner Diversion when the Waggoner Unit is in the dry cycle. Under current conditions and when the Waggoner Unit is in the wet cycle, water is supplied to Coyote/Grass Lakes Complex and Goose Lake from the Waggoner Diversion off of the Blackrock ditch (Figure 2-1b). Water released from the Waggoner Diversion moves through various wetlands and into the Coyote/Grass Lakes Complex, and Goose Lake. These flows pass through an existing steel pipe culvert (No. 98) and under a wooden bridge (No. 97) at the southern end of the Waggoner wetlands (Figures 2-1b and 2-15).

From 1991 to 1997, an average of 1,956 acre-feet per year was released through the Waggoner Diversion to supply the existing Waggoner wetlands, Coyote/Grass Lakes Complex and Goose Lake. It is estimated that about 1,213 acre-ft/year is consumed in the existing Waggoner wetlands. The remainder (743 acre-feet per year) is used in the Coyote/Grass Lakes Complex and Goose Lake.

Under the LORP, water to supply these lakes will be provided from either the Lower Twin Lakes Diversion or the Waggoner Diversion, depending on the flooding status of the Waggoner unit of the Blackrock Waterfowl Habitat Area (Figure 2-1b). This change will separate the water management of off-river lakes and ponds (see Section 8.0) from water management designed for wetlands in the Blackrock area (see Section 7.0). The alternating use of these diversions will provide greater flexibility for ecosystem management and significant water conservation (totaling 1,084 acre-feet per year, which results in a savings of 872 acre-feet per year). The amount of water supplied to the lakes currently supported by the Waggoner Diversion (Lower Twin Lake - 53 acres in size, Coyote/Grass Lakes - 53 acres, and Goose Lake - 63 acres) would remain the same as existing conditions.

The structural changes required to accomplish the proposed modification in the source of supply for Goose Lake is described in Section 2.5.10.1. To create a continuous flow between these off-river lakes and the river, 5 cfs or more will be directed through the Lower Twin Lakes Diversion into Lower Twin Lake (Ecosystem Sciences, Technical Memorandum 14, 2001). These flows will continue along existing ditches to the Coyote/ Grass Lake Complex, through Goose Lake, and then to the river at “5 Culverts.” The total linear distance of this new flow from the Lower Twin Lake Diversion to the river is about 5.3 miles. Per Technical Memorandum 14 (April 2001), a continuous flow will be maintained between Goose Lake and the river to allow unimpeded passage for fish between the lakes and river.

Billy Lake is supported by water conveyed from the Aqueduct through the Independence Spillgate and existing ditch that extends from the spillgate to the lake. Under the proposed program for off-river lakes and ponds, the level of Billy Lake will be maintained at its current level, but the amount of water supplied to the lake may be reduced because it will no longer be the main water supply conveyance to the river channel. A continuous flow will be maintained in the channel downstream of the lake that will connect the lake to the river.

Thibaut Ponds are supported by water from the Aqueduct through the East Branch of the Thibaut Spillgate. No increase in water supply to this pond is included in the LORP.
LADWP estimates the current and future water requirements to maintain the lakes and ponds to be 5,320 acre-feet per year, as described in Section 10.4.

2.7 THREATENED AND ENDANGERED SPECIES

2.7.1 Overview

The MOU contains a section describing the preparation of land management plans, which states that the plans will consider "*the enhancement of Threatened and Endangered Species habitats. Habitat conservation plans for Threatened and Endangered Species will be incorporated if and where appropriate*." The Action Plan describes the scope of the habitat conservation plan for threatened and endangered species as follows: "*The plan will identify conservation areas within the Planning Area which will be managed to facilitate restoration of threatened and endangered species to viable populations. The intent of this element is ultimately to achieve sufficient recovery of these species to warrant delisting them, while providing for the continuation of sustainable uses, including recreation, agriculture, and aqueduct operations*."

Threatened and endangered (T&E) species are considered in the LORP Plan. The actions recommended in the plan would protect and enhance habitat for these species in the LORP project area. However, the proposed project does not include any actions to create sanctuaries for these species, nor does the project include any deliberate actions to introduce, manage, or enhance populations of these species, with the exception of one action at Well 368 (see Section 2.7.2). Instead, the various elements of the LORP will improve or create habitats suitable for these and other species, and will protect individual populations of listed plant species in grazing areas. These actions are expected to generally benefit listed species. Furthermore, implementation of the project will not cause any adverse impacts to listed species nor to other species in the LORP area.

Although the MOU specifies that a Habitat Conservation Plan (HCP) will be prepared as one part of the LORP Plan, LADWP has concluded, after conferring with MOU parties, to delay initiating the development of an HCP until the project proposal and environmental documentation (EIR/EIS and associated documents) are finalized. The reason for delaying the HCP is that the MOU parties agreed that developing and finalizing a formal HCP would be time-consuming and could further delay implementation of the project if the HCP is tied to the project. In addition, some members of the public expressed concern over the possibility that endangered species could be introduced to popular fishing spots, and resolving those concerns could potentially add to the delay in implementing the LORP. LADWP feels that initiating the LORP implementation will provide an opportunity to better understand what is needed in the project to protect special status species. Furthermore, LADWP prefers to address all of its lands as a whole in an HCP, rather than focusing on the boundaries of the LORP. Thus, while the LORP contains provisions to develop habitat that is suitable for threatened and endangered species, there are no plans at this time to introduce those species to the LORP area.

Any actions to introduce T&E species to the LORP project area would only occur under the provisions of a Section 10(a) permit and Habitat Conservation Plan ("HCP") approved by the U.S. Fish and Wildlife Service. An HCP and Section 10(a) permit are not proposed as part of the LORP. However, LADWP is planning to prepare an HCP for all LADWP lands in Owens Valley in cooperation with USFWS, and to seek a Section 10(a) incidental take permit in the near future.

In 1999, USFWS prepared a Multi-Species Recovery Plan (MSRP) for a variety of listed species in the Owens Valley. They identified potential habitat "sanctuaries" and conservation areas throughout the Owens Valley and within the LORP. The LORP conservation plan for T&E species is designed to provide future habitat opportunities for listed species, and would complement the approach in the MSRP.

2.7.2 Fish and Aquatic Species

There are two listed fish species considered in the LORP, both of which are designated endangered by the state and federal governments: Owens pupfish and Owens tui chub. The only known occurrence of these species in the LORP project area is the area near Well 368 in the Blackrock lease, which supports a population of Owens pupfish. In the past, protective fencing was installed around the area where the pupfish population was originally located. However, as the local vegetation and hydrologic conditions of the area near Well 368 changed through natural processes over time, the pupfish population migrated to a location outside of the fenced area. Based on a field visit to this site conducted in May 2003, CDFG and USFWS concluded that this pupfish population and its habitat are doing well without fencing and that modifications are not needed (S. Parmenter, CDFG, and D. Threelof, USFWS, pers. comm., 2003). Therefore, LADWP does not propose any management action with regard to the existing pupfish population.

The rewatering of the river and the enhancement of off-river channels and lakes are designed to create a variety of habitats that would benefit both game and native species, including the pupfish, tui chub, and speckled dace. However, predation and competition with game fish species may limit the success of any attempts to reintroduce these sensitive species in the river.

The Owens Valley Springsnail is a CDFG Species of Special Concern. There are eight known locations of springsnails in the Owens Valley, none of which occur in the LORP project area (USFWS, 1998).

2.7.3 Wildlife Species

Two state or federally listed threatened and endangered wildlife species occur in the LORP area, as described below. The endangered Least Bell's Vireo is apparently extirpated from the Owens Valley, and as such, is not included in the LORP plan.

Yellow-billed Cuckoo

This state listed endangered species is a rare transient and summer resident and breeder in limited areas of the Owens Valley. It occurs in dense, tall willow/cottonwood woodland. Since records have been kept, sightings have been recorded near Lone Pine, Big Pine, Independence, Aberdeen Station Road, and Tinemaha Reservoir.

Willow Flycatcher and Southwestern Willow Flycatcher

The willow flycatcher (*Empidonax traillii*) is a state endangered species. The southwestern willow flycatcher (*Empidonax traillii* ssp. *extimus*) is a federally endangered subspecies of the willow flycatcher. The state listed species occurs in the Owens Valley as a rare spring and fall migrant, summer resident, and/or possible spring/summer breeder. Both subspecies occur in dense willow thickets near water. Sightings of the flycatcher in and near the LORP area in the past 10 years include between Big Pine and Baker Creek, Owens River between Steward Lane and Tinemaha Reservoir, and the Owens River between Bishop and Pleasant Valley Reservoir. Only the latter sighting included documented breeding birds, but it is located outside the LORP project area.

The southwestern willow flycatcher occurred historically in the Owens Valley; its historic northern limit represented by specimens from Independence (Riparian Bird Conservation Plan 2000). Recent genetic studies of willow flycatchers captured near Bishop identified the samples as the *extimus* subspecies (M.K. Sogge, pers. comm.). The draft southwestern willow flycatcher Recovery Plan prepared by USFWS indicates that there are 16 known territories of southwestern willow flycatcher in the "Owens Management Unit," which extends from Crowley Lake to south of Owens Lake (Draft Recovery Plan Southwestern Willow Flycatcher, April 2001, prepared by Southwestern Willow Flycatcher Recovery Team Technical Subgroup for Region 2, USFWS, Albuquerque, New Mexico).

American peregrine falcon

The American peregrine falcon (*Falco peregrinus anatum*) is a state endangered species. [The following information has been compiled from Ecosystem Sciences Technical Memorandum 20 (1999) and CDFG (2004).] Adult peregrines are slate gray above and light below, and the dark cap of the head extends to the cheeks. The wingspan exceeds 3 feet. The range includes most of California, except in deserts, during migrations and in winter. The California breeding range includes the Channel Islands, coast of southern and central California, inland north coastal mountains, Klamath and Cascade ranges, and the Sierra Nevada.

Peregrine falcons usually nest on cliffs exceeding 100 feet in height. The territories are principally located in open areas near water. The primary prey of inland peregrines is medium-sized birds, which are captured in the air. Wintering peregrine falcons utilize coastal and inland marsh and riparian areas. Wintering peregrine falcons are found inland throughout state, primarily near wetlands.

In the Owens Valley, the American peregrine falcon is a rare migrant from mid-March to Mid-November. There are no documented nesting records for this falcon in the Owens Valley. Only one adult peregrine was observed on one occasion during the Glass Mountain breeding bird census (in the Long Valley area). Between 1988 and 1992, 22 peregrine falcons were released on LADWP lands at Crowley Lake as part of an interagency cooperative project. Presently, there are no peregrines breeding at Crowley Lake, although nesting at Hilton Peak was recorded in about 1990. The current status of the released birds is unknown.

Peregrine falcon nesting habitat does not exist in the LORP area. The closest potential nesting habitat is at least 5 miles away. Much of the LORP area could be considered potential foraging habitat. Peregrine falcons are known to travel through and/or use the project area for foraging.

Proposed LORP Protection Measures

Based on Ecosystem Sciences' recommendations, LADWP proposes to protect T&E wildlife species in the LORP by: (1) avoiding direct adverse impact to these species during the construction and implementation of the LORP elements; and (2) maintaining and creating suitable habitat for these species. No special habitat restoration projects or efforts will be implemented for these species, although habitats produced by the LORP will likely be suitable for colonization by these species.

2.7.4 Plant Species

The Owens Valley checkerbloom is a state endangered species endemic to the Owens Valley. Scattered populations occur on Thibaut and Blackrock grazing leases east of the Owens River. It occurs in alkali meadows. Under the management plans for the Thibaut, Blackrock, and Delta leases, existing populations will be protected by rare plant exclosures or by appropriate management strategies (see Section 2.8.1.2). Grazing will be prohibited in all exclosures during the flowering, fruiting, and seeding period of the species (from April to July). No federally listed plant species occur in the LORP project area.

2.8 LAND MANAGEMENT

2.8.1 Background

As required by the MOU Action Plan, the LORP land management plan covers Los Angeles-owned land within the LORP area from the Aqueduct Intake to the Owens River Delta, as well as all LADWP lands east of the Aqueduct to the boundary with BLM lands at the base of the Inyo Mountains.

Six major leases and one small lease occur in the LORP planning area (Figure 2-16). Acreages of individual leases are shown below in Table 2-17. Five leases (Twin Lakes, Blackrock, Island, Lone Pine, and Delta) are cow/calf grazing operations, and two leases (Thibaut and Intake) are grazed by horses/mules.

TABLE 2-17
LEASES INCLUDED IN THE LORP LAND MANAGEMENT PLAN

Lease	Current Total Lease Acreage
Twin Lakes	4,912
Blackrock	32,674
Thibaut	5,259
Island	18,970
Lone Pine	8,274
Delta	7,110
Intake	284

For each of the seven leases, an individual grazing management plan has been developed by Ecosystem Sciences and LADWP in cooperation with each leaseholder. The methodology used to prepare the grazing management plans included interviewing the lessees on their past livestock grazing practices (number and type of livestock, pasture uses and rotations, etc.). Some of the information obtained during the interviews and documented in the grazing management plans is proprietary, as it relates to marketing strategies and other business management plans of the individual lessees. Lessees agreed to provide the proprietary information to Ecosystem Sciences and LADWP with the understanding that the information would remain confidential. Therefore, the lease-specific grazing management plans are not available for public review (additional information on this confidentiality of these plans was provided, A. Walsh, pers. comm. to L.A. Silver, April 25, 2003). The information contained in Sections 2.8 and 9 of the EIR/EIS was excerpted from the LORP Plan (Chapter 4, “Land Management Plan”), which is a public document available for review.

2.8.1.1 Goals of the LORP Land Management Plan

The LORP land management plan is designed to achieve the MOU goal of continuing and managing livestock grazing and recreational use in a manner that is sustainable and consistent with the primary goal of establishing and maintaining a healthy ecosystem. (Management of recreational uses is discussed in Sections 2.9 and 10.1.)

LADWP also identified the following additional goals for the land management plan of the LORP:

- Maintain and improve aquatic resources
- Improve water use efficiency
- Improve animal distribution
- Work with lessees to develop and implement grazing management practices
- Successfully apply the adaptive management approach to maintain and enhance healthy watersheds
- Maintain compatibility with water gathering activities and cost effective aqueduct operations
- Enhance fisheries and wildlife habitat

2.8.1.2 General Land Management Approaches

Currently, LADWP leases within the LORP area do not have formal protocols for quantitative monitoring and evaluation of rangeland conditions and grazing strategies. The proposed actions described below will modify grazing practices on LADWP leases within the LORP area and establish quantitative monitoring of rangeland conditions to complement the habitat enhancements anticipated with the re-watering of the river. Grazing practices under the land management plan will differ from the past in timing of use, intensity, and animal distribution. However, at least initially, the stocking rate (i.e., number of animals) will remain the same as in past years, except for the Thibaut Lease (see Section 2.8.2.3).

General management actions and strategies include the following (lease-specific actions are described in Sections 2.8.2.1 through 2.8.2.7):

- Establishment of fenced riparian pastures
- Establishment of lease-specific utilization rates and grazing periods
- Establishment of rare plant exclosures
- Improvement of water distribution and stockwater supplies
- Protection of continued recreational access to the river
- Accommodation of elk passage

The lessees are expected to incorporate the changes in management called for in the grazing management plans over a period of 1 to 3 years from the time the plans are signed. The lessees are expected to meet all standards, criteria, and conditions outlined in the plans by the beginning of the fourth year.

Establishment of Fenced Riparian Pastures. Currently, riparian and upland areas within each lease are generally not separated by fencing or other physical barriers. As part of the LORP land management plan, a total of approximately 40 miles of new fencing will be installed primarily on the western side of the river to create fenced riparian pastures. Lease-specific locations of fences are shown on Figures 2-18 through 2-23. Creation of fenced riparian pastures will allow lessees to rotate livestock between riparian and upland areas and optimize the distribution of livestock within each lease. Grazing in riparian and upland pastures will be managed based on prescribed grazing periods and utilization rates described below.

Establishment of Lease-Specific Utilization Rates and Grazing Periods. Under LORP, lease-specific utilization rates will be established and monitored in both riparian and upland areas to guide grazing strategies. Utilization rate is defined as the proportion of current year's forage production that is consumed and/or destroyed by grazing animals, including livestock, wildlife (e.g., elk), and insects. Utilization rates will be measured by establishing utilization cages and comparing the amount of vegetation biomass outside (grazed) and inside (not grazed) the cages. (See Section 2.8.1.5 for additional details on monitoring of utilization rates.) Utilization rates will be used to monitor and manage the use of vegetation, prevent forage overuse, and maintain the ecosystem health of rangelands.

As part of the LORP adaptive management approach, the initial allowable maximum riparian and upland utilization rates and grazing periods described below may be increased or decreased on a case-by-case basis depending on the changes in rangeland conditions as indicated by monitoring of rangeland "trend" (see also Section 2.8.1.5 below).

Riparian Utilization Rates and Grazing Periods. Under LORP, livestock will be allowed to graze in riparian pastures during the grazing periods prescribed for each lease (see Sections 2.8.2.1 through 2.8.2.7). Livestock will be removed from riparian pastures when the utilization rate reaches 40 percent or at the end of the grazing period, whichever comes first. In general, the prescribed grazing periods for riparian pastures will be several months in the spring (shorter than the existing grazing practice). The beginning and ending dates of the lease-specific grazing period will vary from year to year depending on the conditions such as climate, but the duration will remain approximately the same. The grazing periods and utilization rates are designed to facilitate the recruitment and establishment of riparian shrubs and trees. Forty percent has been selected by the Ecosystem Sciences rangeland management specialist as the initial utilization rate, since livestock are not likely to graze woody species if herbaceous forage utilization stays below 40 percent.

Upland Utilization Rates and Grazing Periods. In upland pastures, the maximum utilization allowed on herbaceous vegetation, in any year, will be 65 percent if grazing occurs between October 1 and April 1. The maximum utilization allowed will be 50 percent if the grazing occurs between April 2 and September 30; however, if all grazing is deferred until after seed-ripe of herbaceous vegetation (i.e., late summer; exact timing depends on precipitation, weather, and other factors), maximum utilization can be increased to 65 percent. If this exception is used, then no additional grazing can occur during any other period of the year on this same upland. If the lessee conducts livestock grazing during both periods (October 1 to April 1 and again from April 2 to September 30), maximum utilization allowed will only be 50 percent. The utilization rates and grazing periods for upland pastures are designed to sustain livestock grazing and productive wildlife through efficient use of forage. If there are upland vegetation types located within fenced riparian pastures, the upland vegetation will be managed using the uplands utilization criteria.

Establishment of Rare Plant Exclosures. New rare plant exclosures will be constructed on Blackrock Lease (see Section 2.8.2.2) and Thibaut Lease (see Section 2.8.2.3) for populations of Owens Valley checkerbloom and Inyo County star-tulip. In addition, an existing rare plant exclosure for Nevada oryctes located on the Twin Lakes lease will be reconstructed (see Section 2.8.2.1). Monitoring will be conducted at trend plots established in the rare plant populations. The trend plots will be circular areas that are 0.01 acre in size, with a permanent stake at the center. Data on recruitment, persistence, size of individuals and flowering and seed presence will be collected at these trend plots. Additional fencing may be installed around other rare plant populations or sensitive seeps/springs (Figure 2-16A) as part of adaptive management (see Section 2.8.1.5) if monitoring indicates that livestock grazing is substantially impacting resource values as indicated by excessive trampling, reduction in riparian vegetation, and/or reduction in overall site health.

If noxious weeds are found during monitoring of the rare plants, the survey crew will notify LADWP and appropriate treatment will be administered jointly by staff with expertise in identifying rare plants and staff qualified for noxious weed treatment. Noxious weed treatment in the vicinity of rare plants will be conducted using a weed wipe (equipment designed to apply herbicides only to plants that come into contact with the applicator) or by hand, as necessary, to prevent any adverse effects of herbicide application on the rare plants. This is LADWP's existing practice for treatment of noxious weeds in the vicinity of rare plants that will be continued under LORP.

Improvement of Water Distribution and Stockwater Supplies. To improve livestock distribution outside the river corridor or within riparian pastures, water gaps will be provided at periodic locations along the river. Water gaps are fenced access points to the river where cattle can use the river for watering, but are restricted to small locations in order to reduce impacts. In addition, new water troughs or stockwater wells will be strategically placed to encourage cattle to use areas outside the river corridor as needed. Salt and supplements will also be used to improve animal distribution.

Protection of Continued Recreational Access to the River. New fences installed for grazing management will maintain existing access to the river for recreationists. In some cases, the type of access may be modified (e.g., from vehicle to foot). Fences will be located on the outside edge of the access roads when possible to maintain access to the river. Cattle guards will be placed on roads that traverse fence lines when needed. "Walk-throughs" (Figure 2-16B) or "walk-overs" (Figure 2-16C) will be provided in heavy foot-traffic areas. Permanent fences across the river will be designed to avoid interference with boats or other watercraft (fence wings; see Figure 2-16D). Fence wings are rails that are attached to the ends of the fence and project over the edges of the banks. They will be used in locations where the channel is deep enough to prevent livestock from walking around the fence ends. The deep open area between the fence wings will allow for watercraft passage. A channel fence section (Figure 2-16E) will be used temporarily (approximately up to 3 months per year) in locations where livestock can enter the stream and walk around the fence ends. Navigation would likely be accommodated by kayaking or canoeing under the channel fence section. Channel fence sections will have smooth and flexible wires at the bottom and reflective strips to make them visible and safe for boaters when they are in place. Once the locations have been determined, this information will be posted on LORP signage. Channel fence sections will be removed when livestock are not present in the nearby pasture.

Accommodation of Elk/Deer Passage. Special fencing will be constructed at known elk/deer trails to allow safe passage and to reduce fence damage from elk/deer-crossing activities. Figure 2-17 shows a typical fence designed to accommodate elk/deer passage.

2.8.1.3 Alterations Due to Unforeseen Circumstances

In many cases, ranchers who lease LADWP lands also lease federal and other private lands for livestock grazing. If an emergency situation on a lessee's federal allotment(s) or on the lessee's deeded private lands results in serious reductions in allowable livestock numbers, Animal Unit Months (AUMs) or duration and timing of grazing, then temporary (one year or less) changes in grazing periods for upland areas within the LADWP lease may be made to help provide the necessary grazing relief to the lessee. Examples of circumstances that may allow changes in upland grazing periods are fire damage, forage loss from high snow years, and forage loss from drought conditions. During the attempt by LADWP to help provide some necessary grazing relief to the lessee, all riparian and upland utilization rates and grazing periods in the riparian areas as stated in the grazing management plans will remain in effect.

2.8.1.4 Land Management Monitoring and Adaptive Management

Monitoring for land management will consist of grazing utilization and trend measurements. The methodologies for monitoring utilization and trend are described below. To collect data on baseline conditions, a rangeland trend monitoring program was initiated in 2002 on all leases within the LORP area using the methodologies described below. Minimally, the first two years of rangeland trend monitoring will be considered baseline. In portions of the leases that overlap with the riverine-riparian area, the Blackrock Habitat Area, or the Delta Habitat Area, additional monitoring for biological resources will be conducted as part of the overall LORP monitoring program as described in Section 2.10.

Unlike the other LORP monitoring and adaptive management activities described in Section 2.10, LADWP will be solely responsible for funding and for monitoring lease conditions on its leases located wholly or partially within the LORP area. LADWP will report the results of monitoring on these leases, as they apply to achieving LORP goals, as part of the annual report presented to the Technical Group.

The results of utilization and trend monitoring, together with relevant results of other LORP monitoring programs, will be used to determine the need for adaptive management actions. Potential adaptive management actions for the LORP land management plan include:

- Modify utilization rates
- Modify grazing periods
- Modify stocking rate
- Install additional fencing
- Install additional or remove existing rare plant exclosures
- Install fences around sensitive seeps/springs
- Install additional stockwater sources
- Modify supplement locations (salt blocks, sweet feeds, etc.)

Utilization Monitoring. Utilization is defined as the proportion of current year's forage production that is consumed and/or destroyed by grazing animals, including livestock, wildlife (e.g., elk), and insects as compared to the amount of forage produced during the same growing year. Utilization rates are generally, and will be under LORP, measured by establishing utilization cages in pastures and comparing the average height of the key forage species inside the cage (ungrazed) and outside of the cage (grazed). The percent utilization of each key forage species is then determined by using a height-weight curve, which converts the difference in the average height of the grazed and ungrazed plants into percent of biomass removed. These height-weight curves are species-specific curves that represent the mathematical relationship between the height and biomass of a plant based on its dry weight.

Key forage species are species that are preferred by livestock for foraging and are abundant enough to be used to monitor utilization rate. Key forage species that will be used to monitor utilization in the LORP area include: saltgrass (*Distichlis spicata*), sedges (*Carex* spp), alkali muhly (*Muhlenbergia asperifolia*), beardless wild rye (*Leymus cinereus*), creeping wild rye (*Leymus triticoides*), and alkali sacaton (*Sporobolus airoides*). Other forage species may be included on a site-specific basis if they are found to be abundant and grazed by livestock in a particular area.

Utilization cages will be located in key areas identified by LADWP Watershed Resources staff to be representative of a pasture. These cages will be positioned in selected pastures prior to the arrival of livestock. Each utilization cage will be 1.5 meter by 1.5 meter in size. The utilization cages will be moved on an annual or seasonal basis, depending on the specific livestock operations of the lease. This is necessary to ensure that utilization of the forage produced during the same growing year will be measured.

Monitoring of utilization will be conducted by the lessees and LADWP. LADWP will train lessees in how to determine utilization percentages. The utilization rate of a pasture will be measured at least twice during the grazing period. During the initial phases of implementation, utilization may be determined more frequently. Lessees will report to LADWP when the observed utilization rate is approaching the maximum allowable utilization rate. LADWP staff will verify the utilization rate and determine whether the maximum allowable utilization rate has been reached. Following removal of livestock at the end of the use period, the total utilization for a pasture will be determined and documented.

The specific methodology for determining utilization can be found in Appendix G. The utilization methodology presented in Appendix G has been adapted from the Interagency Technical Reference "Utilization Studies and Residual Measurements" (BLM et al., 1996b).

Rangeland Trend Monitoring. The rangeland trend monitoring program will provide vegetation data necessary to evaluate the response of range condition and trend to changes in livestock management practices. Rangeland trend will be monitored annually in non-irrigated lands on all leases. Monitoring of rangeland trend will be conducted at permanent transect locations and will consist of recording:

- Foliar and basal cover for grasses and grass-likes (percent cover by species)
- Foliar cover of shrubs, subshrubs, and annuals (percent cover by species)
- Substrate cover (percent cover bare ground, litter, rock, dung, and cryptogamic crust)
- Visual obstruction (an index of vertical vegetation structure)
- Age distribution of shrubs

Sampling protocols and data summary will follow procedures outlined in the Interagency Technical Reference "Sampling Vegetation Attributes" (BLM et al., 1996a). Sampling will be done at the height of the growing season (June – July). Both forage and non-forage species as well as woody vegetation will be included in the trend monitoring.

Permanent sampling transects will be established primarily in vegetation communities classified as Type C in the Green Book (LADWP and Inyo County, 1990) (grass-dominated communities, including alkali meadow, alkali seep, rabbitbrush meadow, and Nevada saltbush meadow). These communities were selected for trend monitoring because they would likely be areas of livestock concentration due to forage availability, and be more responsive to changes in management than more xeric communities. A minimum of three transects will be established in each lease, with the exception of the Intake lease, in which only one transect will be established due to its small size. Sampling of rangeland trend will also take place in exclosures along the river designated as reference areas (excluded from livestock grazing; see Section 2.8.2). Trend data collected from grazed areas will be compared to data from the ungrazed reference areas to evaluate the influence of grazing on cover, frequency, and shrub age structure of the vegetation community.

In addition to measuring the trend parameters, general view photos and close-up photos will be taken at each transect location at the height of the growing season (June – July) to provide visual documentation of conditions.

Other Monitoring Activities. Annual field inspections will be conducted every year for the first three years of LORP implementation to inspect the conditions of fences and evaluate the location of salt/supplements and stockwater, etc. After the initial three years, field inspections will be conducted every three years. Field evaluations will be conducted at the end of the grazing period. Inspection visits to visually compare controls with reference pastures (exclosures) will be conducted in years 2, 5, 7, 10, and 15.

2.8.2 Description of Specific Management Actions on Individual Leases

2.8.2.1 Twin Lakes Lease

Current Management. Twin Lakes is the northernmost lease in the LORP (Figure 2-18). It includes a reach of the Owens River that lies mainly north of Twin Lakes, which is located at the southern end of the lease. The river channel through this lease (4.5 miles) is mostly dry. The Twin Lakes lease is a 4,912-acre cow/calf operation and is situated just south of the Intake of the Los Angeles Aqueduct. It is currently managed as a single pasture. The Lower Owens River is located on the east side of the lease. Of the 4,912 acres, approximately 4,200 acres are used as pastures for grazing; the other 712 acres are comprised of riparian/wetland habitats and open water. In all but dry years, cattle usually graze the lease from late October or early November to mid May. The current practice is to release cattle into the lease and let available vegetation and existing water determine their grazing patterns. Most of the water- and forage-producing areas occur in the south end of the pasture, along the Blackrock Ditch and around Drew Slough in the southwest corner of the lease.

Livestock numbers are provided for each respective lease using Animal Unit Month (AUM) for grazing units. An AUM is characterized as the amount of forage required to sustain a cow and her calf for one month. AUMs for each lease are presented as a range to allow for adjustments due to variances in precipitation, class of livestock, forage conditions and operational flexibility needs. The existing annual AUMs on the Twin Lakes lease range from 1,625 to 2,113. The lease provides seven months of fall through spring grazing, which begins in late October and ends in May.

Future Management. The primary future management action for the Twin Lakes lease is the establishment of a riparian pasture (Blackrock Riparian Pasture, 1,667 acres), requiring 4 miles of new fencing and a riparian grazing prescription to protect young willow development. The new riparian pasture would be established by constructing a north/south fence on the west side of the river (Figure 2-18). The proposed grazing prescription for the Blackrock Riparian Pasture is to graze livestock only in the spring, from early March to mid May. Riparian pastures will be grazed until 40 percent of the herbaceous forage is utilized or the specified grazing period ends, whichever comes first. When the cattle are not in the riparian pasture within this lease, they will be in the adjacent upland pasture (Blackrock Pasture), where the maximum allowable utilization rates for upland areas described in Section 2.8.1.3 will apply. The projected AUMs will be 1,625 to 2,113.

In addition, an existing 0.25-acre rare plant exclosure for Nevada oryctes located on this lease will be reconstructed, requiring 0.25 miles of new fencing. The exclosure will be closed to grazing year-round as a monitoring control.

There are two proposed water gaps in this lease to provide for stockwater, one at the north end and one in the middle of the riparian pasture (Figure 2-18).

2.8.2.2 Blackrock Lease

Current Management. The Blackrock lease is a cow/calf operation consisting of 32,674 acres divided into 24 management units or pastures. The lease is the largest LADWP grazing lease within the LORP area (Figure 2-19). The existing annual AUMs on the lease range from 7,340 to 8,915. The lease pastures provide eight months of fall through spring grazing, which begins in early to mid October and ends in mid May or June.

Future Management. The primary management action for the Blackrock lease is the establishment of five new riparian pastures, which would total 14,540 acres and require 20 miles of new fencing. These pastures include the White Meadow, Reservation, North River, South River, and Wrinkle Riparian Pastures. Cattle will graze these riparian pastures only for a short specified period in the spring (from late March or early April to mid or late May). Grazing will cease and cattle will be removed from riparian pastures when the utilization rate has reached 40 percent in riparian areas or the grazing period has ended, whichever occurs first. In upland areas, maximum allowable utilization rates for upland areas described above in Section 2.8.1.3 will apply. The projected AUMs will be 7,340 to 8,915.

In addition, four rare plant exclosures will be established to protect the Inyo County star-tulip and the Owens Valley checkerbloom. Three of the rare plant exclosures will use let-down fence panels to allow grazing outside the flowering, fruiting, and seeding period (April through July). The other exclosure will be closed to grazing year-round as a monitoring control.

In addition, two exclosures (each large enough to contain at least one 100-meter transect) will be established along the river and excluded from grazing to serve as monitoring controls.

Three stockwater sources will be developed on uplands east of the river and in the proposed Reservation and White Meadow pastures to better distribute cattle away from the Owens River riparian corridor. Cattle crossings will be installed at critical locations to better distribute cattle on uplands east of the river and to ensure minimal trailing of cattle in the riparian areas.

2.8.2.3 Thibaut Lease

Current Management. The 5,259-acre Thibaut Lease (Figure 2-20) is leased to three lessees for wintering pack stock. The lease is currently grazed as one large pasture by mules and horses. When the summer outfitting season ends in mid-September, the horses and mules are brought to the lease to graze the dry herbaceous forage from mid October 15 to mid June. Supplemental hay is fed starting in December until there is sufficient spring growth. The 2-mile long section of the Owens River that is included in this lease is currently a dry channel. With substantial open water and marsh habitats, only 4,650 acres of the lease are available as pasture for grazing. The annual AUMs on the existing lease are 2,700. This number is not a range since the lessees grazed the same number of livestock and made up for lost production by feeding more hay (supplemental feed).

Future Management. The primary management action for the Thibaut Lease is the creation of a new 847-acre riparian pasture (Thibaut Riparian Exclosure, Figure 2-20), requiring 2.4 miles of fencing on the west side of the river. This riparian pasture will not be grazed for a minimum of 10 years. After 10 years, LADWP Watershed Resources staff will assess the condition of vegetation in the exclosure and then determine whether grazing will be reintroduced into the area. If grazing is to be reintroduced, riparian utilization rates similar to those prescribed in other leases will be established. This riparian exclosure is proposed for the Thibaut lease since grazing by horses and mules has greater potential for impacts on riparian vegetation than cattle grazing, and the 10-year rest period is considered necessary to facilitate the establishment of riparian vegetation.

In addition, a new pasture will be created for a 247-acre waterfowl management area in the northwest corner of the lease (Figure 2-20). This waterfowl management area is part of the Thibaut Unit of the Blackrock Waterfowl Management Area, and as such, will be subject to periodic cycles of wetting and drying (see Section 2.5.3). Because the Thibaut Unit has been designated as the area of highest priority for flooding in order to achieve the 500 acres of flooded habitat for the Blackrock Waterfowl Management Area, this unit is expected to be wet in most years. The waterfowl management area pasture will be rested from grazing every other year to enable plant regrowth. This regrowth will provide waterfowl cover the following fall, winter, and spring. When the Thibaut Unit is in a wet cycle, riparian utilization standards will apply to the waterfowl management area pasture, and the pasture will be grazed from October to March, or until the grazing utilization standard is reached, whichever occurs first. When the Thibaut Unit is in a dry cycle, the waterfowl management area pasture will be grazed from September to June or until the upland utilization criteria has been reached (see Section 2.8.1.3), whichever comes first. Livestock will be excluded the first year following implementation. During the second year of implementation, the pasture will be grazed up to 40 percent utilization, since it will be in a wet cycle. The pasture will be rested again in the third year. The waterfowl management area will be evaluated after each year and the prescription modified, as necessary, to promote desirable habitat conditions.

A new 211-acre pasture will be created along the east side of the Aqueduct to protect populations of the Inyo County star-tulip and the Owens Valley checkerbloom (Figure 2-20). The stock will be removed by March or when the upland utilization criteria is met, whichever occurs first. Livestock will not graze this pasture from early March to early October of each year. The removal of livestock during the Owens Valley checkerbloom flowering, fruiting, and seeding stages is needed because horses and mules choose checkerbloom and star-tulip as preferred forage.

The establishment of the rare plant and waterfowl management areas will require 3.5 miles of new fencing. Six miles of fence along the northern and southern boundaries of the lease will be reconstructed to exclude livestock from entering the exclosure from adjacent leases and to better control livestock.

Stocking rates will be reduced on this lease by 15 percent due to the decrease in acreage available for grazing as a result of the proposed riparian exclosure and seasonal restrictions placed on grazing in the rare plant and waterfowl management area pastures.

An existing artesian well will be modified to provide a reliable source of stockwater to a new stock tank (located on the eastside of the lease near the power line road).

2.8.2.4 Island Lease

Current Management. This lease is a 18,970-acre cow/calf operation divided into 11 pastures (Figure 2-21). The annual AUMs range from 8,540 to 9,350. In some portions of the lease, grazing occurs year-round with livestock rotated between pastures based on forage conditions. Other portions of the lease are grazed October through May. The Owens River bisects the lease.

Future Management. The proposed management actions include development of two riparian pastures (Depot Riparian Pasture and Carrasco Riparian Pasture), requiring a total of 7.5 miles of new fencing. The two riparian pastures will be grazed only in the spring (February to April). In both riparian pastures, grazing will cease and cattle will be removed when the utilization of herbaceous forage has reached 40 percent on riparian sites or the grazing period has ended, whichever occurs first. The 406-acre Carrasco Riparian Pasture will require 2.5 miles of new fencing. The existing water gap at the northeast corner will remain to water livestock when they are using the terraces to the east. The 1,232-acre Depot Riparian Pasture will require 5 miles of fencing.

The 11,957-acre River Pasture, located mostly on the east side of the river channel, contains both uplands and wetlands. The riparian areas within this pasture will not be fenced; however, standard utilization rates for riparian and upland areas will apply. Grazing will be prohibited in the River Pasture from May to October of each year.

The remaining area (will be grazed from October to May using standard uplands utilization criteria. The projected AUMs will be 8,540 to 9,350.

In addition, one exclosure (large enough to contain at least one 100-meter transect) will be established along the river and excluded from grazing to serve as a monitoring control.

No new actions related to stockwater are proposed for this lease.

2.8.2.5 Delta Lease

Current Management. The Delta Lease is a cow/calf operation and consists of 7,110 acres divided into four pastures (Figure 2-23). The Owens River provides most of the stockwater. Grazing typically occurs for 6 months, from mid November to April. The annual AUMs on the existing lease range from 2,040 to 2,220.

Future Management. Proposed management for this lease applies to LADWP lands only, not State lands within the Delta Habitat Area. The current practice of excluding grazing from May through mid November will continue; however, grazing will end and cattle will be removed prior to the end of the grazing period if monitoring results show that average utilization rates on riparian sites have reached 40 percent. Upland utilization rates described in Section 2.8.1.3 will apply to upland areas. The projected AUMs will be 2,040 to 2,220.

A new 30-acre riparian exclosure, requiring 1.5 miles of fencing, will be established in the northeastern portion of the lease. The riparian exclosure will not be grazed by cattle for at least 10 years so that the vegetation response in the grazed riparian pastures can be compared with the pastures inside the exclosure. If monitoring indicates that desired riparian communities are not developing along the river sections, grazing management will be altered as part of the adaptive management plan (see Section 2.8.1.5).

In addition, a new fence will be constructed along the eastern property line of the Delta Lease to control livestock movement onto the highway east of Keeler Bridge. No actions related to stockwater are proposed for this lease.

2.8.2.6 Lone Pine Lease

Current Management. The Lone Pine Lease is a 8,274-acre cow/calf operation divided into 11 pastures and adjacent private ranch land (Figure 2-22). Grazing within the area not in the riparian pasture occurs year-round, as cows are rotated in different pastures on LADWP and private lands. The annual AUMs for this lease are currently 3,300. This number is not a range since the lessees grazed the same number of livestock and made up for lost production by feeding more hay and utilizing adjacent private property.

Future Management. Proposed management includes reconstruction of 4.5 miles of fence on the west side of the river to create a 6,016-acre pasture (consisting of approximately 550 acres of riparian areas and 5,466 acres of uplands) (River Riparian Pasture, Figure 2-22). The grazing prescription for the River Riparian Pasture is to graze livestock from early January through the end of March only. Grazing in riparian areas will cease and cattle will be removed when the utilization of herbaceous forage has reached 40 percent or the grazing period has ended, whichever occurs first. The only change to the lessees' current grazing practices is that livestock will not be allowed back on the River Riparian Pasture, as was previously practiced, from May 28 through June 12. Upland maximum allowable utilization rates described in Section 2.8.1.3 will apply to upland areas. The projected AUMs will be 3,300.

In addition, a new 8.5-acre riparian exclosure will be constructed and excluded from grazing to use as a monitoring control to compare to nearby grazed reaches of the river (Figure 2-22).

In order to better distribute livestock in the riparian pasture, an existing well in the center of Section 36 (east side of the river southern section) will be developed for stockwater.

2.8.2.7 Intake Lease

Current Management. The Intake Lease (approximately 284 acres) is used to graze horses and mules employed in a commercial packer operation. The lease is comprised of two pastures – the Intake (approximately 182 acres) and Big Meadow (approximately 102 acres). The annual AUMs for this lease currently range from 120 to 150.

Future Management. No new fencing is proposed for the management of this lease. The grazing prescription for the Big Meadow Pasture is to graze livestock from early January through February. Grazing in riparian areas will cease and livestock will be removed when the utilization of herbaceous forage has reached 40 percent or the grazing period has ended, whichever occurs first. The Intake Pasture will be managed as an upland pasture, using the upland maximum allowable utilization rates described in Section 2.8.1.3.

2.9 RECREATION MANAGEMENT

The LORP planning area is located on Los Angeles-owned land where the public has mostly unrestricted access for recreational uses during the day, with the exception of irrigated pastures. The primary recreational use is fishing in the river and in off-channel lakes and ponds. Camping is restricted to designated campgrounds outside the LORP project area. Off-road vehicular travel is prohibited. Hunting is allowed except in areas that are posted.

No changes to the current recreational uses in the LORP project area are proposed. Access to the river and off-channel lakes and ponds will be maintained. New fencing proposed under the project is designed to accommodate existing public access to these areas. There are no plans for new recreational facilities, including roads, trails, or campgrounds.

LADWP will install signs at key access points to the LORP area (such as Mazourka Canyon Road, Manzanar Reward Road, the pump station, and the Delta) describing LADWP policies on recreational uses of city-owned lands, contact information for reporting violations, and the location of fences across the river. LADWP's policies concerning recreational uses are described in Section 10.1.1. LADWP will prepare a brochure that identifies major access locations to the LORP area.

As part of the overall LORP management approach, LADWP and/or Inyo County will implement the recreation management strategies described below. Adverse impacts from recreational uses (as reported or observed by LADWP staff, Inyo County staff, or members of the public), and threats to resources, will be investigated promptly, and appropriate management action will be implemented in a timely manner. Implementation of specific strategies may be one time, continual, or seasonal (e.g., protecting of nesting birds during spring), depending on the observed or predicted recreational impacts. The management strategies may need to be modified in the future in response to increased recreational uses and associated human impacts. Such changes would be made as part of adaptive management through the process described in Section 2.10.5. Recreation management strategies include:

- For violations of the Fish and Game Code (e.g., unauthorized hunting or fishing, rare plant disturbance, and wildlife harassment), contact the Fish and Game Warden.

- For persistent violations of LADWP recreation policies (e.g., off-road vehicle travel, camping or campfires outside of designated areas, artifact disturbance or collection, woodcutting without a permit or outside of the allowable season):
  - Place flyers on windshields to alert recreational users of the relevant policies.
  - Post signs to alert recreational users of the relevant policies if violations are observed repeatedly in specific locations.
  - Install barriers (e.g., fencing, gates, boulders, etc.) to prevent access or redirect recreational activities away from sensitive resources.
  - Contact the Inyo County Sheriff Department.
- When vehicle or foot traffic patterns are observed to threaten or substantially damage sensitive resources (e.g., riparian or meadow vegetation, critical bird nesting areas, known cultural resources, or rare plants):
  - Install barriers (e.g., fencing, gates, boulders, etc.) to prevent access to or redirect recreational activities away from areas of sensitive resources.
  - Create designated trails, roads, wildlife viewing areas, parking areas, sanitation facilities, or other facilities to direct visitors away from the sensitive resources.
- Figure 2-24 (Sheets 1 through 5) indicate which roads are currently maintained by LADWP and Inyo County within the LORP Area. For degradation (e.g., substantial rutting, widening, or pot holes) of these existing maintained dirt roads or substantial increases in erosion and localized fugitive dust generation from vehicle traffic:
  - Install speed control devices or signage.
  - Conduct road maintenance (e.g., compaction and grading).
  - Install barriers (e.g., fencing, gates, boulders, etc.) to prevent access or redirect recreational activities away from areas of sensitive resources.
  - Place gravel on the road surface.
- To respond to littering, clean up trash using LADWP construction crews and/or laborers provided by the California Department of Forestry.
- For impacts to livestock operations resulting from increased recreation (e.g., open gates, livestock harassment, damage to pastures from vehicle traffic, etc.):
  - Install fences to keep livestock out of heavily recreated areas or to keep vehicles out of pastures.
  - Install cattle guards.
  - Lock gates were habitual problems occur.
  - Install “please close gates” signage.
  - Report livestock harassment to local law enforcement.

In addition to being implemented in the LORP area, the recreation management strategies listed above will be incorporated into a Land Management Plan for all City of Los Angeles lands in Inyo County, which is currently being prepared by LADWP for publication in 2007.

2.10 MONITORING AND ADAPTIVE MANAGEMENT

The overall goal of LORP is to establish and maintain healthy, functioning ecosystems in the four physical areas of the LORP. Because of the large scale and complexity of the LORP and inherent unpredictability of biological systems, the proposed method for ecosystem restoration is not to duplicate a particular ecological model, but to use monitoring and adaptive management to create desirable habitat for habitat indicator species.

The LORP includes a habitat monitoring program to assess the effects of proposed flow releases and other management actions on the habitat conditions of the LORP area (see Section 2.10.2). In addition to habitat monitoring, LORP includes flow compliance monitoring to ensure that the water releases are consistent with the MOU requirements (see Section 2.10.2) and water quality monitoring following the initial releases of baseflow and seasonal habitat flow (see Sections 2.3.5.2 and 2.3.5.4). Monitoring and adaptive management of rangelands on LADWP leases in the LORP area will be conducted as part of the LORP land management plan (see Section 2.8.1.5). Table 2-18 lists the components of the LORP monitoring program corresponding to the MOU goals.

If monitoring results indicate that the changes in environmental conditions are inconsistent with the LORP objectives, LADWP and the County will implement feasible adaptive management measures. The adaptive management approach is described below in Section 2.10.5.

2.10.1 Habitat Monitoring

The LORP habitat monitoring is designed to detect changes over time in the quantity and quality of habitat available in the project area. The habitat variables that will be monitored have been selected based on the habitat needs of the indicator species that have been identified in the LORP Action Plan. A series of tables that describe the relationship between the indicator species and various habitat attributes that will be monitored has been developed and is included in the *Lower Owens River Project – Draft Report / Baseline Data Methodologies* (Baseline Methodologies Report) (Ecosystem Sciences, 2003a), which is available for public review at LADWP office in Bishop. For example, these tables indicate for individual indicator species as well as for wildlife guilds (e.g., resident, migrant, and wintering waterfowl) if a species is neutral, positively correlated, or strongly positively correlated to a specific characteristic, such as canopy height. In addition, Technical Memoranda #14 (Fisheries and Habitat in the Lower Owens River), #19 (Riparian Wildlife Management: Summary of Management Concepts and Priorities), and #20 (Special Status Wildlife and Plants Species Accounts) include descriptions of habitat needs of habitat indicator species and special status species in the LORP area.

Habitat monitoring for the LORP will be conducted for the first 15 years. Monitoring for compliance regarding flow releases to the River and the Delta Habitat Area, flooding of Blackrock Waterfowl Habitat Area, and water levels at Off-River Lakes and Ponds will continue for the life of the project. Fifteen years is widely accepted to be the amount of time generally needed for an ecosystem to approach a steady state (M. Hill, Ecosystem Sciences, pers. comm., 2003). Over the course of the restoration process, currently identified monitoring components may be modified, and new monitoring may be developed as necessary.

In 2002 and 2003, baseline habitat surveys were conducted to establish sampling sites and to document pre-project conditions. The protocols used during the baseline surveys will be used for future LORP habitat monitoring. These protocols are summarized below and detailed in the Baseline Methodologies Report. Data collected during the baseline habitat surveys have been entered into a database. Subsequent monitoring data will be compared to the baseline data, and the results of the comparative analysis will be presented in the annual reports, which will be presented to the Technical Group and be available for public review (see Section 2.10.4).

The LORP habitat monitoring program consists of the following components:

- Macro-scale monitoring (to observe major habitat changes, enable early detection of problem areas, and assess whether changes measured at the micro-scale are representative of the overall LORP area)
  - Rapid Assessment Surveys
  - Habitat Mapping
- Micro-scale monitoring (to identify biologically significant changes by measuring specific habitat features and to substantiate changes measured at the macro-scale)
  - Habitat Development Surveys
  - Fish Habitat Surveys
- Bird and Fish Census (to evaluate the relationship between habitat development changes in wildlife populations)
  - Riverine-Riparian Avian Census
  - Wetland Avian Census
  - Angling Census

Except for the Rapid Assessment Surveys, all of the above monitoring program components were completed as part of the baseline habitat surveys conducted in 2002 and 2003.

2.10.1.1 Rapid Assessment Surveys

The rapid assessment survey is a reconnaissance-level method of sampling that can be used to quickly detect and document key environmental changes across broad landscapes and identify problem areas. Under LORP, rapid assessment surveys will be used to record the following, using written documentation, mapping, and photographs:

1) Woody riparian recruitment – location, species, extent, density, height, and browsing of woody riparian species and understory development and condition. The objective is to document the initial recruitment and subsequent survival of riparian vegetation following seasonal habitat flows and natural flooding events.
2) Beaver activities – location, type, and intensity of beaver activities (to be conducted in the spring). The objective is to identify expanding beaver populations and help direct control efforts.
3) Exotic/noxious plants – location and species of exotic/noxious plants. The objective is to provide early detection of problem areas and help target control measures.
4) Wetted area (riparian and wetland flooding extent) – extent of wetted area, water elevations, and extent of emergent vegetation. The objective is to document changes in wetted area in response to the proposed wetting and drying cycles (Blackrock Waterfowl Habitat Area) and pulse flows/seasonal habitat flows (Delta Habitat Area).
5) Recreation/land use – location, type, intensity, and impacts of anthropogenic activities (recreation, grazing, burning, road and facility maintenance, plant control measures, etc.). The objective is to document seasonal and annual changes in land use and recreation patterns.

The rapid assessment surveys will be conducted along established routes as follows:

- Riverine-Riparian System – Eight 2-mile long routes along the river corridor (total of 16 miles)
- Blackrock Waterfowl Habitat Area – Three 1-mile long routes along the shorelines of the three primary management units (Thibaut, Winterton, and Waggoner; total of 9 miles)
- Delta Habitat Area – Four routes totaling 10 miles

Initially, the rapid assessment surveys will be conducted at least three times each year (spring, summer, and fall) to capture the seasonal changes in environmental conditions. The exact timing will be determined each year taking into account annual and seasonal variations in temperature, runoff, growing season, and water and land management. The number of rapid assessment surveys per year may be reduced in the future if it is determined that three per year is not necessary.

2.10.1.2 Habitat Mapping

Remote imagery (satellite and/or aerial photographs) will be acquired and interpreted to produce a digital vegetation/habitat map of the entire LORP area. Extensive field surveys were conducted in 2002 so that the remote imagery can be interpreted using the "photographic signatures" of the various vegetation types found on the ground. The map will be analyzed using a Geographic Information System (GIS) software to measure large-scale vegetation trends, describe habitat extent and distribution, document tule development, beaver dams, and open water areas. Remote imagery will be acquired during the growing season in the 2nd, 5th, 7th, 10th, and 15th years after initial flow releases. Imagery will be collected between June and September, dependent on weather and satellite conditions.

2.10.1.3 Habitat Development Surveys

Habitat development surveys will consist of measuring habitat characteristics that relate to the habitat indicator species, special status species, and plants of concern to Native Americans (e.g., taboose and willow) at permanent sampling sites. A total of 329 permanent sampling sites (242 in the riverine-riparian area, 58 in Blackrock Waterfowl Habitat Area, and 29 in Delta Habitat Area) will be surveyed during the growing season in years 2, 5, 7, 10, and 15.

Each sampling site (Figure 2-25) has been established along a 50-meter transect marked with T-posts at each end. In some areas, a longer transect (75 or 100 meters) will be used to capture additional plant communities. Each sampling site includes a Plant Species Plot, a Riparian Tree Inventory Plot, and a Channel Plot. Habitat characteristics that will be measured in each plot are:

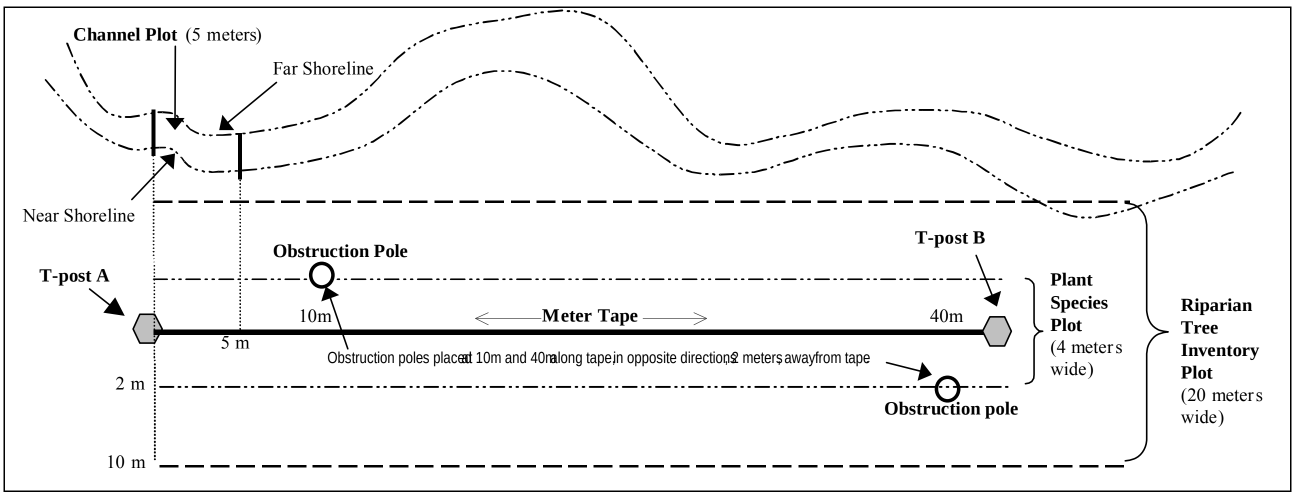
- Plant Species Plot (4-meter wide belt along transect)
  - At each meter along transect, record plant species in the appropriate height layer (herb, shrub, or tree).
  - Record location of all dominant species (greater than 20 percent cover) located within the plot.
  - List all species found within the plot.
  - Measure vertical vegetative cover density using obstruction poles (at 10 meters and 40 meters along transect).
  - Take landscape and close-up photographs at each end of transect.

- Riparian Tree Inventory Plot (20-meter wide belt along transect)
  - Record number of trees and seedlings by species, age and percent of dead trees, number of seedlings browsed by animals and damaged by beaver, distance of seedling from channel,

physiographic setting (shoreline, low terrace, mid-terrace, or high terrace) and hydrologic condition of seedling regeneration area, percent cover of competing vegetation, and competition with invasive species.
- Record tree condition indicators for up to four trees located closest to T-post A (crown diameter, live crown ratio, live crown density, crown die-back, browsed sprouts/total sprouts, and crown structure).

- Channel Plot (5-meters long and as wide as the channel – in the Riverine-Riparian System and Delta Habitat Area)
  - Record height and percent cover of live and dead emergent vegetation and depth of water.

FIGURE 2-25
EXAMPLE HABITAT DEVELOPMENT SURVEY SAMPLING SITE

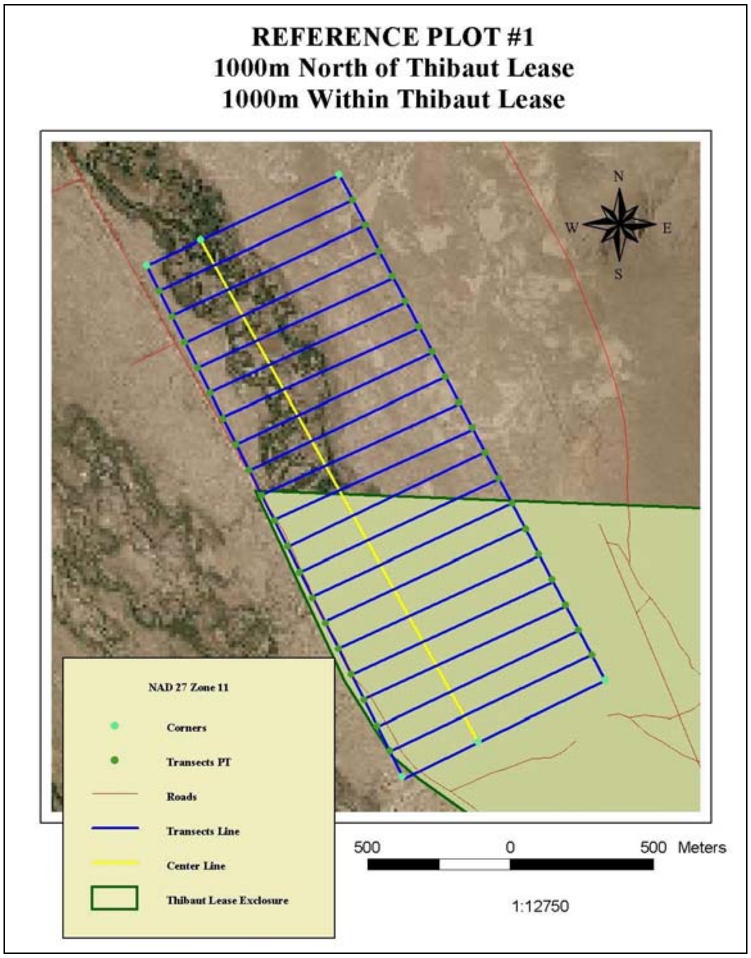


2.10.1.4 Fish Habitat Surveys

The objective of the fish habitat surveys is to measure aquatic habitat characteristics important to indicator fish species at representative reaches of the river. Fish habitat surveys will be conducted at five sampling plots along the Lower Owens River (two between the Intake and Mazourka Canyon Road; one between Mazourka Canyon Road and Islands; one between Islands and Lone Pine Station Road; and one between Lone Pine Station Road and Owens Lake). Fish habitat surveys will be conducted in September in years 3, 6, and 9.

Each fish habitat sampling plot is 2 kilometers in length, and transects have been established every 100 meters along the length of each plot (see Figure 2-26; 21 transects per sampling plot, excluding locations that are not accessible, for a total of approximately 100 transects).

FIGURE 2-26
EXAMPLE FISH HABITAT SURVEY SAMPLING PLOT



Along each transect line, the following fish habitat variables will be measured: channel width (at the top of bank or high water mark); wetted perimeter width; average and thalweg (deepest part of a stream) depths; substrate (boulder, rubble, gravel, and fines); canopy cover (amount of shading a stream receives from overhanging trees and shrubs); organic debris (amount of woody debris such as logs, root wads, and brush); and bank undercut (measurement of channel stability).

2.10.1.5 Riverine-Riparian Avian Census

A volunteer-based bird census will be conducted along the Lower Owens River at a total of 173 point count stations (12 transects have been established with eight to 15 points each; stations are a minimum of 250 meters apart). Point count stations will be censused annually (pending the availability of volunteers and funding for the coordination of volunteers) generally during the peak breeding season (late May to late June). The census will begin within 30 minutes after sunrise and be conducted for approximately 3 hours. At each point, birds detected (visually or by song/call) within 5 minutes are recorded. The distance of the bird from the observer (0 to 50 meters or greater than 50 meters) will also be recorded.

During the first census of the year, habitat characteristics within 50-meter radius plots around each point count station will be recorded to gather environmental data that can be related to bird numbers. Parameters to be recorded include dominant and secondary habitat type (Sawyer and Keeler-Wolf, 1995), percent cover by height category (herb, shrub, or tree), number of snags (standing dead trees) and logs, width of riparian zone, percent riparian vegetation, and adjacent land uses.

2.10.1.6 Wetland Avian Census (Blackrock Waterfowl Habitat and Delta Habitat Area)

A volunteer-based bird census will be conducted along established routes in the Blackrock Waterfowl Habitat Area and Delta Habitat Area to detect migrant shorebirds, breeding species, and migrating and wintering waterfowl species. In the Blackrock Waterfowl Habitat Area, a total of 45 point count stations have been established for the four management units: Drew (8 stations), Winterton (9 stations), Waggoner (13 stations), and Thibaut (15 stations). In the Delta Habitat Area, a total of 42 stations have been established (25 stations along the west branch and 17 stations along the east branch).

The census will be conducted annually (pending the availability of volunteers and funding for the coordination of volunteers) with an emphasis on spring and fall migration of wetland species. Birds detected (visually or by song/call) within 5 minutes are recorded at each point. In addition, the following parameters are also recorded:

- Distance of the bird from the observer (0 to 50, 50 to 150, or greater than 150 meters)
- Activity of the bird at initial detection (flying, foraging, preening, resting, nesting, brooding, escaping, singing, calling, and other)
- The type of habitat the bird was using at initial detection (mud flat, shallow open-water wetland, deep open-water wetland, emergent marsh, wet alkali meadow, dry alkali meadow, seasonal wetland, open herbaceous flooded, open herbaceous not flooded, closed herbaceous flooded, closed herbaceous not flooded, playa, playa flooded, alkali sink scrub, Great Basin scrub, or riparian)

2.10.1.7 Angling Census

An angling census will be conducted to monitor the game fish population in the River and Off-River Lakes and Ponds. Four to five volunteer fisherpersons will be assigned to each of the five fishing areas, and will, at most, conduct the fishing census twice in May and twice in September using the same technique each time. The four fishing areas on the River are: River Intake to Mazourka Canyon Road; Mazourka Canyon Road to Manzanar-Reward Road; Manzanar Reward Road to Lone Pine Station Road; and Lone Pine Station Road to Pump Station. The Off-River Lakes and Ponds (Upper Twin, Lower Twin, Billy, Coyote, and Goose Lakes) is the fifth fishing area. The angling census will be conducted annually (pending the availability of volunteers) for 6 years after project implementation. Six years is widely accepted to be the amount of time generally required for fish populations to reach a self-sustaining level (i.e., recruitment is approximately equal to mortality) (M. Hill, Ecosystem Sciences, pers. comm., 2003).

Each fisherperson will spend a designated amount of time on each census day, and document the daily fishing results on census forms provided. Each fisherperson will record the fisherperson identification number, area fished, number of fish caught, and species, health (good or poor) and length of each fish caught.

2.10.2 Flow Compliance Monitoring

In addition to monitoring for changes in habitat conditions, the following flow compliance monitoring will be conducted for the life of the project to ensure that the water releases are consistent with the MOU requirements:

- Baseflow compliance
  - Until a stable baseflow of approximately 40 cfs has been established throughout the river, flow data will be recorded hourly and collected weekly from continuous recorders at 14 temporary gaging stations and three permanent gaging stations (at River Intake, Keeler Bridge, and pump station).
  - Once the baseflow has stabilized, flow data will be recorded hourly and collected monthly from continuous recorders at a minimum of four permanent gaging stations.
- Seasonal habitat flow compliance
  - During the first release of seasonal habitat flows, flow data will be recorded hourly and collected weekly from continuous recorders at 14 temporary gaging stations and three permanent gaging stations (same as above).
  - During subsequent seasonal habitat flows, data will be recorded hourly and collected weekly from continuous recorders at a minimum of four permanent gaging stations.
  - For the first five years of seasonal habitat flow releases, an aerial survey will be conducted using a LADWP helicopter to observe and video or photograph seasonal habitat flows at peak flows (Riverine-Riparian System and Delta Habitat Area).
- Delta Habitat Area flow compliance
  - Flows released to the Delta from the pump station will be recorded hourly and collected biweekly from a continuous recorder.
  - During the first year of project implementation, outflow from the Delta will be recorded hourly and collected biweekly from continuous recorders at temporary gaging stations established at the ends of the east and west branches.
- Blackrock Waterfowl Habitat Area wetland compliance
  - Discharges from spillgates, flows at diversions, and staff gage elevations that serve as indicators of flooded area will be measured approximately weekly for the first year of project implementation. The frequency of measurement may be decreased after the first year.
- Off-River Lakes and Ponds compliance
  - Staff gage elevations will be measured approximately weekly for the first year of project implementation. The frequency of measurement may be decreased after the first year.

2.10.3 Analysis

Spatial and numerical data on vegetation and habitat characteristics collected by remote imagery (Habitat Mapping) and field sampling (Habitat Development Surveys and Fish Habitat Surveys) will be analyzed primarily by trend analysis and the Habitat Suitability Index (HSI) model. The spatial data collected by the habitat mapping will be processed using GIS software to derive landscape level habitat attributes such as size, shape, distribution, and connectivity of various habitat types. The field data from the Habitat

Development Survey and Fish Habitat Surveys will be used to evaluate the direction and magnitude of changes in habitat variables at individual sampling sites.

Trend analysis is used to assess change over time in systems where use of control sites is not possible or appropriate. Trend analysis is a common approach for assessing change in recovering biological systems. Since it is not possible to define recovery in terms of the value of a single parameter, various habitat variables measured by the LORP monitoring program will be analyzed using several statistical methods to identify the direction and magnitude of change over time. To illustrate trends at individual sites, values of habitat variables will be plotted by time. Site-specific habitat losses and gains as well as long-term overall net change of the riparian/wetland habitat in the LORP area will be tracked.

HSI models are used to predict the suitability of habitat for a species based on an assessment of habitat attributes (Buckmaster et. al., 1999) assumed to be important variables for determining the presence, distribution, and/or abundance of a species or guild (species similar in their habitat needs and response to habitat changes). A habitat variable (e.g., percent shrub cover) is converted into a suitability index (SI) scaled from 0 to 1, 1 being the assumed optimal condition (e.g., greater than 30 percent shrub cover is assumed to be 1 or optimal on the SI). The overall HSI value for a particular species is calculated by mathematically combining the suitability index values for multiple habitat variables, and represents the expected response of the species to the combination of habitat attributes. As monitoring proceeds and values of the habitat variables change over time, the change in habitat suitability for a species over time will be estimated by recalculating the HSI values.

2.10.4 Reporting

The County and LADWP will prepare an annual report that includes data collected during the habitat and flow compliance monitoring, results of analysis, and recommendations on the need for adaptive management actions. The annual report will be reviewed by the Inyo/Los Angeles Technical Group and will also be made available to the public. The Technical Group meetings are open to the public, and meeting agendas are provided to the public in advance of each meeting.

2.10.5 Adaptive Management

Adaptive management is the systematic acquisition and evaluation of reliable information to improve management over time by adapting and building upon previous experience. The adaptive management approach is designed for management of complex ecosystems that have many components and interactions and uncertainties. The intent of the adaptive management approach is to avoid isolation of specific components, which can lead to resolution of local or partial problems at the expense of long-term and overall outcomes. Adaptive management learns from experience by integrating science and decision-making, documents successes and mistakes, monitors and evaluates effectiveness of past actions and makes continuous course corrections (USDA Forest Service, 1999).

Under LORP, adaptive management will be used to integrate information obtained from both micro-scale and macro-scale monitoring and make adjustments to the initially proposed flow regimes and other management actions. In general, diversity of wildlife communities in riparian and wetland habitats increase as structural complexity, productivity, and species and age diversity of vegetation increase. In addition, landscape patterns such as habitat block size, shape, and connectivity are also important factors in establishing and maintaining diverse habitats. The proposed flow releases and other management actions are anticipated to increase the total area of riverine-riparian and wetland habitat areas, increase the size and connectivity of the individual habitat areas, and increase the structural complexity, productivity, and diversity of vegetation communities within individual habitat areas.

If insufficient increases in the following parameters are observed, this would indicate habitat trends that are inconsistent with project goals and could necessitate adaptive management actions:

- Development of middle and understory foliage
- Vertical structure with clear stratification
- Development of live herbaceous and residual biomass
- Plant species richness (combined with dominance by a few species such as exotics)
- Age structure complexity and vegetative and/or new regeneration
- Success rate of new and vegetative recruits
- Vigor and vitality coupled with poor reproductive potential and resiliency
- Development of the woody riparian canopy (width)
- Connectivity between and among river reaches, their tributaries and associated springs, seeps, and wetlands
- Development of stand size and fragmentation of interior habitat

A description of the currently identified adaptive management measures associated with each of the four elements of the LORP is provided in Tables 2-19, 2-20, 2-21, and 2-22. Each table: (1) identifies the adaptive management measure, (2) describes the measure, (3) describes the purpose of the measure, and (4) describes the general conditions (as observed through the monitoring program) that will trigger consideration of implementation of the measure. Over the course of the restoration process, currently identified adaptive management measures may be modified, and new measures may be developed as necessary.

The Technical Group, Standing Committee, and the governing boards of LADWP and the County will make the ultimate decision on implementing adaptive management actions after reviewing the annual report and any other relevant monitoring data.

Numeric objectives or performance criteria such as acreages of habitat types or values of measurable habitat parameters have not been established to assess the project's success or as triggers for adaptive management actions for several reasons. First, the habitat needs of specific species or guilds are known in general terms, but the optimal conditions are difficult to express in quantitative terms in most cases. Second, different species have different and often competing habitat needs. A change in a habitat variable that is desirable for one habitat indicator species may be undesirable or irrelevant to another habitat indicator species. Third, ecological systems are dynamic by nature, and biological conditions at one point in time often cannot predict or illustrate the unseen dynamics that create change in the system. Area-specific changes in habitat attributes from one year to another may become irrelevant when put in the context of the long-term net changes in the overall LORP area. Therefore, establishing numeric objectives or performance criteria for multiple species in the large, complex, and dynamic ecosystem of the LORP is not proposed.

TABLE 2-18
RELATIONSHIP BETWEEN MOU GOALS AND LORP MONITORING COMPONENTS

MOU Goals		LORP Monitoring Component
Overall Goal		
B	*The goal of the LORP is the establishment of a healthy, functioning Lower Owens River riverine-riparian ecosystem, and the establishment of healthy, functioning ecosystems in the other physical features of the LORP, for the benefit of biodiversity and Threatened and Endangered Species, while providing for the continuation of sustainable uses including recreation, livestock grazing, agriculture and other activities.*	• Rapid Assessment Surveys (Section 2.10.1.1) • Habitat Mapping (Section 2.10.1.2) • Habitat Development Surveys (Section 2.10.1.3) • Fish Habitat Surveys (Section 2.10.1.4) • Riverine-Riparian Avian Census (Section 2.10.1.5) • Wetland Avian Census (Section 2.10.1.6) • Angling Census (Section 2.10.1.7) • Rangeland Monitoring (Section 2.8.1.5)
B.1	*Establishment and maintenance of diverse riverine, riparian and wetland habitats in a healthy ecological condition. The LORP Action Plan identifies a list of "habitat indicator species" for each of the areas associated with the four physical features of the LORP. Within each of these areas, the goal is to create and maintain through flow and land management, to the extent feasible, diverse natural habitats consistent with the needs of the "habitat indicator species." These habitats will be as self-sustaining as possible.*	
B.2	*Compliance with state and federal laws (including regulations adopted pursuant to such laws) that protect Threatened and Endangered Species.*	
B.3	*Management consistent with applicable water quality laws, standards and objectives.*	• Baseflow Water Quality (Section 2.3.5.2) • Baseflow Fish Conditions (Section 2.3.5.2) • Seasonal Habitat Flow Water Quality (Section 2.3.5.4) • Seasonal Habitat Flow Fish Conditions (Section 2.3.5.4)
B.4	*Control of deleterious species whose presence within the Planning Area interferes with the achievement of the goals of the LORP. These control measures will be implemented jointly with other responsible agency programs.*	• Rapid Assessment Surveys (Section 2.10.1.1) • Habitat Development Surveys (Section 2.10.1.3)
B.5	*Management of livestock grazing and recreational use consistent with the other goals of the LORP.*	• Rapid Assessment Surveys (Section 2.10.1.1) • Rangeland Monitoring (Section 2.8.1.5)

TABLE 2-18 (continued)

	MOU Goals	LORP Monitoring Component
Riverine-Riparian System		
C.1.a.	*The goal for the Lower Owens River Riverine-Riparian System is to create and sustain healthy and diverse riparian and aquatic habitats, and a healthy warm water recreational fishery with healthy habitat for native fish species. Diverse natural habitats will be created and maintained through flow and land management , to the extent feasible, consistent with the needs of the "habitat indicator species" for the riverine-riparian system. These habitats will be as self-sustaining as possible.*	• Rapid Assessment Surveys (Section 2.10.1.1) • Habitat Mapping (Section 2.10.1.2) • Habitat Development Surveys (Section 2.10.1.3) • Fish Habitat Surveys (Section 2.10.1.4) • Riverine-Riparian Avian Census (Section 2.10.1.5) • Angling Census (Section 2.10.1.7)
C.1.b.i	*A base flow of approximately 40 cfs from at or near the Intake to the pumpback system to be maintained year round.*	• Baseflow Compliance (Section 2.10.2)
C.1.b.ii	*It is currently estimated that in years when the runoff in the Owens River watershed is forecasted to be average or above average, the amount of planned seasonal habitat flows will be approximately 200 cfs, unless the Parties agree upon an alternative habitat flow, with higher unplanned flows when runoff exceeds the capacity of the Los Angeles Aqueduct. (The runoff forecast for each year will be DWP's runoff year forecast for the Owens River Basin, which is based upon the results of its annual April 1 snow survey of the watershed.) In years when runoff is forecasted to be less than average, the habitat flows will be reduced from 200 cfs to as low as 40 cfs in general proportion to the forecasted runoff in the watershed.*	• Seasonal Habitat Flow Compliance (Section 2.10.2)
	The purpose of the habitat flow is the creation of a natural disturbance regime that produces a dynamic equilibrium for riparian habitat, the fishery, water storage, water quality, animal migration and biodiversity which results in resilient and productive ecological systems. To achieve and maintain riparian habitats in a healthy ecological condition, and establish a healthy warm water recreational fishery with habitat for native species, the plan will recommend habitat flows of sufficient frequency, duration and amount that will (1) minimize the amount of muck and other river bottom material that is transported out of the riverine-riparian system, but will cause this material to be redistributed on banks, floodplain and terraces within the riverine-riparian system and the Owens River delta for the benefit of the vegetation; (2) fulfill the wetting, seeding, and germination needs of riparian vegetation, particularly willow and	• Rapid Assessment Surveys (Section 2.10.1.1) • Habitat Mapping (Section 2.10.1.2) • Habitat Development Surveys (Section 2.10.1.3) • Seasonal Habitat Flow Compliance (Section 2.10.2) • Seasonal Habitat Flow Water Quality (Section 2.3.5.4) • Seasonal Habitat Flow Fish Conditions (Section 2.3.5.4)

TABLE 2-18 (continued)

	MOU Goals	LORP Monitoring Component
	cottonwood; (3) recharge the groundwater in the streambanks and the floodplain for the benefit of wetlands and the biotic community; (4) control tules and cattails to the extent possible; (5) enhance the fishery; (6) maintain water quality standards and objectives; and (7) enhance the river channel.	
C.1.b.iii	*A continuous flow in the river channel will be maintained to sustain fish during periods of temporary flow modifications.*	• Baseflow Compliance (Section 2.10.2) • Baseflow Water Quality (Section 2.3.5.2) • Baseflow Fish Conditions (Section 2.3.5.2) • Seasonal habitat Flow Compliance (Section 2.10.2) • Seasonal Habitat Flow Water Quality (Section 2.3.5.4) • Seasonal Habitat Flow Fish Conditions (Section 2.3.5.4)
C.1.c	*Appropriately placed gaging stations in sufficient numbers (to include at least 4 stations) to measure and manage the flow in the river channel will be established as identified in the LORP Plan. These stations will be sited so that flow can be managed in each of the hydrologically varying sections of the river channel in order to meet the goals and objectives of the LORP.*	• Baseflow Compliance (Section 2.10.2) • Seasonal Habitat Flow Compliance (Section 2.10.2)
Delta Habitat Area		
C.2	*The goal is to enhance and maintain approximately 325 acres of existing habitat consisting of riparian areas and ponds suitable for shorebirds, waterfowl and other animals and to establish and maintain new habitat consisting of riparian areas and ponds suitable for shorebirds, waterfowl and other animals within the Owens River Delta Habitat Area. Diverse natural habitats will be created and maintained through flow and land management, to the extent feasible, consistent with the needs of the "habitat indicator species" for the Owens River Delta Habitat Area. These habitats will be as self-sustaining as possible.*	• Rapid Assessment Surveys (Section 2.10.1.1) • Habitat Mapping (Section 2.10.1.2) • Habitat Development Surveys (Section 2.10.1.3) • Wetland Avian Census (Section 2.10.1.6)
	Subject to applicable court orders concerning the discharge of water onto the bed of Owens Lake, the quantity of water that will be released below the pumpback station for these purposes will be an annual average of approximately 6 to 9 cfs (not including water that is not captured by the station during periods of seasonal habitat flows).	• Delta Flow Compliance (Section 2.10.2)

TABLE 2-18 (continued)

MOU Goals		LORP Monitoring Component
Off-River Lakes and Ponds		
C.3	*The goal is to maintain and/or establish these off-river lakes and ponds to sustain diverse habitat for fisheries, waterfowl, shorebirds and other animals as described in the EIR. Diverse natural habitats will be created and maintained through flow and land management, to the extent feasible, consistent with the needs of the "habitat indicator species" for the Off-River Lakes and Ponds. These habitats will be as self-sustaining as possible.*	• Off-river Lakes and Ponds Compliance (Section 2.10.2) • Habitat Mapping (Section 2.10.1.2) • Angling Census (Section 2.10.1.7)
Blackrock Waterfowl Habitat Area		
C.4	*The goal is to maintain this waterfowl habitat area to provide the opportunity for the establishment of resident and migratory waterfowl populations as described in the EIR and to provide habitat for other native species. Diverse natural habitats will be created and maintained through flow and land management, to the extent feasible, consistent with the needs of the "habitat indicator species" for the Blackrock Waterfowl Habitat Area. These habitats will be as self-sustaining as possible.*	• Rapid Assessment Surveys (Section 2.10.1.1) • Habitat Mapping (Section 2.10.1.2) • Habitat Development Surveys (Section 2.10.1.3) • Wetland avian census (Section 2.10.1.6)
	Approximately 500 acres of the habitat area will be flooded at any given time in a year when the runoff to the Owens River watershed is forecasted to be average or above average. In years when the runoff is forecasted to be less than average, the water supply to the area will be reduced in general proportion to the forecasted runoff in the watershed.	• Blackrock Waterfowl Habitat Area Wetland Compliance (Section 2.10.2) • Rapid Assessment Surveys (Section 2.10.1.1) • Habitat Mapping (Section 2.10.1.2)

TABLE 2-19
RIVERINE-RIPARIAN SYSTEM ADAPTIVE MANAGEMENT MEASURES

Measure	Description	Purpose	Monitoring Trigger
Modify releases during establishment of baseflows	Release higher quality water from spillgates. Any such releases from spillgates will continue until (1) water quality at the monitoring station linked to the spillgate and in the river below the spillgate channel rises above the water quality thresholds, or (2) fish at the monitoring stations are not exhibiting signs of stress. If releases from one or more of these spillgates are required, flows to the river will be adjusted so that approximately 40-cfs are maintained.	Improve water quality and create freshwater refuges for fish, as needed, at three spillgate returns along the wet reach of the river.	See Table 2-9
Modify releases to maintain baseflows	Increase release rates from the River Intake and/or from spillgates to increase flow in the river to approximately 40 cfs.	Maintain a flow of approximately 40 cfs throughout the river.	Monitoring data indicate that a flow of approximately 40 cfs is not being maintained along the length of the river, based on data collected at one or more of the temporary and/or permanent monitoring stations.
Release higher quality water from spillgates during the first three releases of seasonal habitat flows	During the first three releases of a seasonal habitat flow, if necessary, release higher quality water from spillgates. Any such releases from spillgates will continue until (1) the water quality has improved above the water quality thresholds, or (2) the fish are not exhibiting signs of stress.	Improve water quality and create freshwater refuges for fish, as needed, at three spillgate returns along the wet reach of the river.	See Table 2-9
Modify the timing of seasonal habitat flows	Adjust timing of seasonal habitat flows to maximize seed dispersal and germination and avoid seeding period of exotic species.	Better achieve habitat goals.	Monitoring data indicate that seasonal habitat flows are being released outside of the peak time of seed development and/or flows need to be adjusted to account for variable seed development between upper and lower river reaches. A determination that the habitat goals are not being achieved will be based upon monitoring data that show that habitats are not achieving desired trend in habitat characteristics that relate to understory structure and composition and recruitment that are important to the "habitat indicator species," special status wildlife species, and plants of concern to Native Americans.
Modify the ramping pattern of seasonal habitat flows	Adjust the peak flow and/or length of time during which seasonal habitat flows are released.	Better achieve habitat goals. Conserve water if habitat goals won't be compromised.	Habitat goals are not being achieved because the flow pattern and duration are not optimal. A determination that the habitat goals are not being achieved will be based upon monitoring data that show riparian plants are not being recruited (within the first 5 years) or sustained through time (within the 15-year monitoring period) in areas subject to out-of-channel flooding from seasonal habitat flows.
Modify schedules for maintenance and	Adjust timing of maintenance activities or mechanical intervention activities.	Minimize interference with bird nesting or	Maintenance and/or mechanical intervention activities are interfering with bird nesting, or migration, plant seeding, etc. Interference will be

TABLE 2-19 (continued)

Measure	Description	Purpose	Monitoring Trigger
mechanical intervention activities		migration, plant seeding, etc.	avoided by scheduling maintenance during non- critical periods.
Plant native vegetation species	Encourage the establishment of vegetation at specific sites.	Augment natural revegetation processes where necessary.	Natural revegetation is not occurring to the extent expected even after adjustments of seasonal habitat flows and/or adjustments to grazing management.
Disperse native plant seeds during seasonal habitat flows	Disperse seeds of native vegetation into the river during seasonal habitat flows and/or into areas that will be inundated by seasonal habitat flows.	Augment natural revegetation processes where necessary.	Natural revegetation is not occurring to the extent expected.
Remove tules	Maintain stream flow by controlling tules.	Mechanically remove tules from the stream channel.	Tule growth is hindering stream flow or achievement of habitat goals.
Modify beaver and beaver dam control activities	Increase ongoing efforts to control beavers and/or to remove beaver dams	Mechanically remove beaver dams and/or trap beavers	Beaver activity is hindering achievement of habitat goals. A determination that beaver activity is hindering the achievement of habitat goals will be based upon monitoring data that show flooding due to beaver dams is causing the death of tree species and/or preventing the growth or development of new trees in suitable riparian areas.
Modify fencing, or addition of new fencing, for riparian and upland pastures	Install new fencing, move an existing fence alignment, or remove fencing to obtain desired cattle distribution and control.	Better manage livestock grazing	Existing livestock grazing strategies are hindering achievement of habitat goals, based upon monitoring data that show recruitment or growth of desired vegetation is prevented or inhibited due to current grazing strategies, requiring a grazing management change.
Modify utilization rates and timing within riparian and upland pastures	Alter utilization rates employed to manage livestock grazing and/or alter timing of livestock grazing	Better achieve habitat goals by improving riparian vegetation recruitment and growth	Existing livestock grazing strategies are hindering achievement of habitat goals, based upon monitoring data that show recruitment or growth of desired vegetation is prevented or inhibited due to current grazing strategies, requiring a grazing management change.
Install grazing exclosures	Add new grazing exclosures or remove exclosures.	Better protect areas of sensitive, threatened or endangered species, and/or promote site specific recovery	Livestock grazing may potentially affect sensitive, threatened or endangered plants. A determination that livestock grazing could affect sensitive, threatened or endangered plants will be based upon monitoring data that shows grazing is either facilitating or preventing the health and protection of T&E plant populations, which determines the necessity for exclosures.
Modify livestock management following wildfire	Temporarily eliminate livestock grazing, reduce utilization rates and/or change timing of grazing following a wildfire.	Promote recovery of habitat following a wildfire.	Wildfire affects a portion of the project area and the site is not recovering adequately.

TABLE 2-20
DELTA HABITAT AREA ADAPTIVE MANAGEMENT MEASURES

Measure	Description	Purpose	Monitoring Trigger
Modify baseflow release of in the years after the first year following project implementation	Adjust the amount of baseflow released at the pump station (while maintaining a flow within the 6 to 9 cfs annual average requirements of the MOU) to better achieve the goals for the Delta.	Better achieve the goals for the delta, and conserve water if possible within the MOU goals.	(1) A decrease of 10 percent or more during any 3-year period (i.e., the present year and the previous two years) from the "Delta conditions" (total acreage of vegetated wetlands plus water as defined above) as estimated from aerial or satellite imagery or other appropriate methods (see also Section 2.10.1). (2) A 20 percent or greater reduction in habitat suitability index (areal extent and habitat quality; see Section 2.10.3) as measured at 5-year intervals after the commencement of releases of baseflows to the Delta. (3) A reduction in baseflows to the Delta will be considered if monitoring indicates: 1) an increase of 10 percent or more in area during any 3-year period from the "Delta conditions", and 2) an increase of 20 percent or more in habitat suitability index as measured at 5-year intervals.
Modify magnitude of pulse flows	Adjust amount of pulse flow released at pump station (within the 6 to 9 cfs annual average required by the MOU)	Better achieve habitat goals, and conserve water if possible within the MOU goals.	
Modify duration and/or timing of pulse flows	Adjust the length of time during which a pulse flow is released from the pump station (within the 6 to 9 cfs annual average required by the MOU)	Better achieve habitat goals.	
Berm/excavate the river channel upstream of the Delta	Increase the channel capacity of the river upstream of the delta via excavation or raising the western banks.	Better achieve habitat goals	Observations indicate that a portion of either the pulse flows or the seasonal habitat flows released to the Delta from the pump station are not reaching the primary Delta habitat area because the flows are escaping the river channel upstream of the primary habitat area. As a result, monitoring data indicate that habitat goals are not being achieved because the flows reaching the primary habitat area are insufficient.
Plant native vegetation species	Plant native vegetation to encourage the establishment of vegetation at specific sites	Augment natural revegetation processes where necessary	Natural revegetation is not occurring to the extent expected even after adjustments of baseflows and pulse flows and/or adjustments to grazing management. A determination that sufficient natural revegetation is not occurring will be based upon monitoring data that show suitable sites support less than half of the vegetation on similar, adjacent sites.
Disperse native plant species seeds during seasonal habitat flows	Disperse seeds of native vegetation into the river during seasonal habitat flows and/or into areas that will be inundated by seasonal habitat flows	Augment natural revegetation processes where necessary	Natural revegetation is not occurring to the extent expected. A determination that sufficient natural revegetation is not occurring will be based upon monitoring data that show suitable sites support less than half of the vegetation on similar, adjacent sites.
Remove tules	Control tules to maintain stream flow	Mechanically remove tules	Tule growth is hindering stream flow or achievement of habitat goals.
Remove beavers and beaver dams	Control beavers and/or to remove beaver dams	Mechanically remove beaver dams and/or trap beavers	Beaver activity is hindering achievement of habitat goals. A determination that beaver activity is hindering the achievement of habitat goals will be based upon monitoring data that show excessive flooding is inhibiting the growth or development of vegetation.
Modify fencing, or addition of new fencing, for riparian and upland pastures	Install new fencing, move an existing fence alignment, or remove fencing to obtain desired cattle distribution and control	Better manage livestock grazing	Existing livestock grazing strategies are hindering achievement of habitat goals. based upon monitoring data that show recruitment or growth of desired vegetation is prevented or inhibited due to current grazing strategies, requiring a grazing management change.

TABLE 2-20 (continued)

Measure	Description	Purpose	Monitoring Trigger
Modify utilization rates and timing within riparian and upland pastures	Alter utilization rates employed to manage livestock grazing and/or alter timing of livestock grazing	Better achieve habitat goals by improving riparian vegetation recruitment and growth	Existing livestock grazing strategies are hindering achievement of habitat goals. based upon monitoring data that show recruitment or growth of desired vegetation is prevented or inhibited due to current grazing strategies, requiring a grazing management change.
Install of grazing exclosures	Add new grazing exclosures or remove exclosures.	Better protect areas of sensitive, threatened or endangered species, and/or promote site specific recovery	Livestock grazing may potentially affecting sensitive, threatened or endangered plants. A determination that livestock grazing could adversely affect sensitive, threatened or endangered plants will be based upon monitoring data that shows grazing is either facilitating or preventing the health and protection of T&E plant populations, which determines the necessity for exclosures.
Modify livestock management following wildfire	Temporarily eliminate livestock grazing, reduce utilization rates and/or change timing of grazing following a wildfire	Promote recovery of habitat following a wildfire	Wildfire affects a portion of the project area.

TABLE 2-21
BLACKROCK WATERFOWL HABITAT AREA ADAPTIVE MANAGEMENT MEASURES

Measure	Description	Purpose	Monitoring Trigger
Modify timing and/or duration of wet/dry cycles	Alter the drying and wetting cycle for the management units	Better achieve the goals this element of the project	The drying and wetting cycle can be altered as necessary if monitoring indicates shorter or longer cycles are better for management of the wetlands.
Controlled burning	Burn areas of the Blackrock area	Improve plant diversity and reduce monocultures	Monitoring data indicate plant diversity is low and a monoculture of cattails and bulrushes is developing.
Modification of beaver and beaver dam control activities	Increase efforts to control beavers and/or to remove beaver dams	Mechanically remove beaver dams and/or trap beavers	Beaver activity is hindering achievement of habitat goals. A determination that beaver activity is hindering the achievement of habitat goals will be based upon monitoring data that show excessive flooding is inhibiting the growth or development of vegetation.
Modify fencing, or addition of new fencing, for riparian and upland pastures	Install new fencing, move an existing fence alignment, or remove fencing to obtain desired cattle distribution and control	Better manage livestock grazing	Existing livestock grazing strategies are hindering achievement of habitat goals. Based upon monitoring data that show recruitment or growth of desired vegetation is prevented or inhibited due to current grazing strategies, requiring a grazing management change.
Modify utilization rates and timing within riparian and upland pastures	Alter utilization rates employed to manage livestock grazing and/or alter timing of livestock grazing	Better achieve habitat goals by improving riparian vegetation recruitment and growth	Existing livestock grazing strategies are hindering achievement of habitat goals. Based upon monitoring data that show recruitment or growth of desired vegetation is prevented or inhibited due to current grazing strategies, requiring a grazing management change.
Install grazing exclosures	Add new grazing exclosures or remove exclosures	Better protect areas of sensitive, threatened or endangered species, and/or promote site specific recovery	Livestock grazing may potentially affect sensitive, threatened or endangered plants. A determination that livestock grazing could adversely affect sensitive, threatened or endangered plants will be based upon monitoring data that shows grazing is either facilitating or preventing the health and protection of T&E plant populations, which determines the necessity for exclosures.
Modify livestock management following wildfire	Temporarily eliminate livestock grazing, reduce utilization rates and/or change timing of grazing following a wildfire	Promote recovery of habitat following a wildfire	Wildfire affects a portion of the project area and the site is not recovering adequately

TABLE 2-22
OFF-RIVER LAKES AND PONDS & GRAZING ADAPTIVE MANAGEMENT MEASURES

Measure	Description	Purpose	Monitoring Trigger
Modify releases to maintain lakes	Alter amount of water supplied to lakes	Better maintain lake levels	Staff gages measurements show that lake levels are not being maintained at target levels.
Modify fencing, or addition of new fencing	Install new fencing, move an existing fence alignment, or remove fencing to obtain desired cattle distribution and control	Better manage livestock grazing	Existing livestock grazing strategies are hindering achievement of habitat goals. Based upon monitoring data that show recruitment or growth of desired vegetation is prevented or inhibited due to current grazing strategies, requiring a grazing management change.
Modify utilization rates and timing within pastures	Alter utilization rates employed to manage livestock grazing and/or alter timing of livestock grazing	Better achieve habitat goals by improving riparian vegetation recruitment and growth	Existing livestock grazing strategies are hindering achievement of habitat goals. Based upon monitoring data that show recruitment or growth of desired vegetation is prevented or inhibited due to current grazing strategies, requiring a grazing management change.
Install grazing exclosures	Add new grazing exclosures or remove exclosures	Better protect areas of sensitive, threatened or endangered species, and/or promote site specific recovery	Livestock grazing may potentially affect sensitive, threatened or endangered plants. A determination that livestock grazing could adversely affect sensitive, threatened or endangered plants will be based upon monitoring data that shows grazing is either facilitating or preventing the health and protection of T&E plant populations, which determines the necessity for exclosures the potential for loss of T&E plant species.
Modify livestock management following wildfire	Temporarily eliminate livestock grazing, reduce utilization rates and/or change timing of grazing following a wildfire	Promote recovery of habitat following a wildfire	Wildfire affects a portion of the project area and the site is not recovering adequately

3.0 OVERVIEW OF IMPACT ASSESSMENT

3.1 PURPOSE AND FOCUS OF THE EIR/EIS

The proposed project consists of numerous actions to enhance environmental conditions within the LORP planning area (see Figure 1-1). It is a complex project because: it occurs over a large geographic area, involves many different activities, will require many years to reach its objectives, potentially requires adjustments in project activities over time, and involves the often imprecise science of ecosystem restoration. Restoration has been rarely attempted on such a large scale and with such a broad set of objectives.

Although the LORP is designed to improve environmental conditions, implementation of such an ambitious project may also involve incidental and unintended adverse impacts, many of them temporary, to some of the natural resources that the project will otherwise benefit. Overall, however, the Lead and Responsible Agencies believe that the project will result in environmental benefits to the natural resources of the Lower Owens Valley.

The objective of the EIR/EIS is to evaluate the impacts of the proposed LORP in order to allow LADWP, the County, and EPA to make informed decisions about the final design and implementation of the project, and the myriad of details associated with initiating a large project. The results of the environmental review process will assist LADWP and the County in implementing the LORP in the most environmentally sound manner through the adoption of alternatives and mitigation measures that avoid or reduce significant incidental and unintended impacts.

The purpose of the EIR/EIS is not to describe or quantify the environmental benefits of the LORP. The overall benefits of the LORP were originally identified in the MOU, and then documented in detail in the draft LORP Plan and associated Technical Memoranda prepared by the LORP consultant, Ecosystem Sciences, Inc., of Boise, Idaho.

The EIR/EIS does not evaluate the LORP's compliance with the 1991 Agreement or MOU provisions – compliance is determined by the MOU parties and the courts. The role of the EIR/EIS is also not to critique the LORP design, as it is presented in the MOU.

The LORP is a mitigation measure for impacts identified in the 1991 EIR. The courts have determined that this mitigation is adequate for the purposes of the 1991 EIR. CEQA requires that mitigation measures be feasible and effective, and that they be fully implemented. In the EIR/EIS, potential obstacles that could hinder the successful implementation of the LORP as a mitigation measure are identified.

3.2 IMPACT ASSESSMENT APPROACH

The complete project description is contained in Section 2.0; the impact assessment was conducted in the following manner:

(a) The assessment is organized by the major LORP elements because they differ greatly -- they occur in different geographic areas or project sites and involve many unique environmental considerations. Hence, there are separate impact chapters for the Riverine-Riparian System, Delta Habitat Area, Blackrock Waterfowl Habitat Area, Off-River Lakes and Ponds, and Land Management Plan (see Sections 4.0 to 9.0). While the impacts of these elements are addressed individually, the cumulative effect of their concurrent implementation is also presented (see Section 12.0).

(b) Each of the above LORP elements would affect a different array of environmental resources. Hence, the scope of the impact assessment for each element is slightly different from other elements.

(c) Certain impacts are associated with the implementation of the LORP as a whole (such as public health and safety and recreation), and are addressed as such (Section 10.0), rather than being addressed for individual LORP elements.

(d) Environmental resources and issue areas that would not be affected by the LORP, or would only be affected in a negligible manner, were identified early in the impact assessment process and were not considered further. These resources and issue areas are identified in Section 3.5 for the purpose of fully disclosing potential impacts.

(e) The focus of the impact assessment was on identifying significant impacts, as defined using both CEQA and NEPA. Whenever possible, specific thresholds of significance were used, particularly those based on (1) the definitions of "significance" in the *CEQA Guidelines* (Sections 15064, 15065) and *CEQA Statute* (Public Resource Code 21088; and (2) the thresholds used in the *CEQA Guidelines Environmental Checklist*.

(f) Two primary types of impacts were identified: (1) direct adverse impacts due to actions associated with implementation of the LORP; and (2) indirect, incidental, or unintended adverse impacts.

(g) The significance of individual impacts was classified as shown below.

Class I Impacts. Unavoidable significant impacts. The impacts cannot be avoided if the project is implemented, and cannot be mitigated to a level of insignificance. For these impacts, LADWP (as the CEQA lead agency) must adopt a “Statement of Overriding Considerations” under Section 15092(b) of the *CEQA Guidelines* if the project is approved. This statement is a finding that the project should be implemented even though it will cause significant impacts to the environment. Inyo County must issue the same finding when it takes action on the project as the CEQA Responsible Agency. EPA, as the federal lead agency under NEPA, must identify mitigation measures in the EIS but is not required to implement them. However, EPA must explain in their Record of Decision (ROD) why these impacts are acceptable in light of the project benefits.

Class II Impacts. Significant environmental impacts that can be mitigated to a less than significant level. The EIR/EIS identifies mitigation measures that will have that effect. LADWP (as the CEQA lead agency) must adopt those mitigation measures if the project is approved. LADWP must make “findings” under Section 15091(a) of the *CEQA Guidelines* that the project as mitigated will not have a significant effect on the environment. Inyo County must issue the same findings when it takes action on the project as the CEQA Responsible Agency. EPA must identify in the ROD which mitigation measures are included in its approval, and explain in the ROD why impacts are acceptable.

Class III Impacts. Environmental impacts that are considered adverse but less than significant. Mitigation measures may be identified to further reduce adverse impacts but the lead agencies are not required to adopt them.

Class IV Impacts. Beneficial impacts.

(h) CEQA requires that the lead agency identify feasible measures for all significant impacts (Class I and Class II), if available, that would mitigate those impacts to a less than significant level. These measures must be adopted by the lead agency if they are considered feasible. Mitigation measures for less than significant impacts are voluntary under CEQA. Under NEPA, feasible mitigation measures for all impacts must be identified whether they are significant or not. The federal lead agency need not adopt the mitigation measures identified in an EIS, but should identify all relevant, reasonable mitigation measures that could alleviate the environmental effects of a proposed action. Accordingly, in the Draft EIR/EIS, mitigation measures were identified as CEQA mitigation or NEPA mitigation. During the preparation of the Final EIR/EIS, LADWP determined that, with the exception of Mitigation Measure P-2 (as numbered in the Draft EIR/EIS), all mitigation measures that were identified in the Draft EIR/EIS to further reduce Class III impacts (i.e., voluntary mitigation) will be adopted by LADWP. It should also be noted that Mitigation Measures AQ-1 and AQ-2 were revised since the publication of the Draft EIR/EIS and will be adopted by LADWP as revised and presented in the Final EIR/EIS. Table S-1 presents all mitigation measures that will be adopted by LADWP.

3.3 KEY CEQA REQUIREMENTS AND CONSIDERATIONS

Section 15151 of the CEQA Guidelines state that "*An EIR should be prepared with a sufficient degree of analysis to provide decision-makers with information which enables them to make a decision which intelligently takes account of environmental consequences. An evaluation of the environmental effects of a proposed project need not be exhaustive, but the sufficiency of an EIR is to be reviewed in the light of what is reasonably feasible. Disagreement among experts does not make an EIR inadequate, but the EIR should summarize the main points of disagreement among the experts. The courts have looked not for perfection but for adequacy, completeness, and a good faith effort at full disclosure.*"

The emphasis of an EIR is to be an informational document which informs public agency decision-makers and the public generally of the significant environmental effects of a project, identifies possible ways to minimize the significant effects, and describes reasonable alternatives to the project. It must focus on the significant effects on the environment, which should be discussed with emphasis in proportion to their severity and probability of occurrence. Effects that are insignificant and unlikely to occur need not be discussed in an EIR (Section 15143).

The CEQA Guidelines note that a lead agency need not engage in speculative analysis if there is insufficient information to make an informed impact assessment (Section 15145).

CEQA Guidelines Section 15131 states that economic or social information may be included in an EIR or may be presented in whatever form the agency desires. The Guidelines further state: "*Economic or social effects of a project shall not be treated as significant effects on the environment. An EIR may trace a chain of cause and effect from a proposed decision on a project through anticipated economic or social changes resulting from the project to physical changes caused in turn by the economic or social changes. The intermediate economic or social changes need not be analyzed in any detail greater than necessary to trace the chain of cause and effect. The focus of the analysis shall be on the physical changes.*" However, the Guidelines state that economic or social effects of a project may be used to determine the significance of physical changes caused by the project.

3.4 KEY NEPA REQUIREMENTS AND CONSIDERATIONS

NEPA and its implementing regulations (40 CFR 1500-1508) govern preparation of an EIS and describe what must be included in the analysis. The process "*is intended to help public officials make decisions that are based on understanding of environmental consequences, and take actions that protect, restore, and enhance the environment.*" (40 CFR 1500.1(c)). NEPA encourages joint EIR/EIS documentation. Similarly to the requirements for CEQA, NEPA regulations state that an EIS "*shall provide full and fair discussion of significant environmental impacts and shall inform decision makers and the public of the reasonable alternatives which would avoid or minimize adverse impacts or enhance the quality of the human environment…. An environmental impact statement is more than a disclosure document. It shall be used by Federal officials in conjunction with other relevant material to plan actions and make decisions,*" including funding decisions (40 CFR 1502.1).

The analysis of environmental impacts must include "*any adverse environmental effects which cannot be avoided should the proposal be implemented, the relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity, and any irreversible or irretrievable commitments of resources which would be involved in the proposal should it be implemented…*" It must include discussions of: direct, indirect and cumulative effects; possible conflicts between the proposal and the objectives of Federal, regional, State, local and Tribal land use plans, policies and controls; energy and natural resource requirements; urban quality, historic and cultural resources; and mitigation measures (40 CFR 1502.16, 1508.8). Direct effects are caused by the action and occur at the same time and place, while indirect effects are later in time or farther removed in distance, and may include growth-inducing effects and other effects related to project-induced changes (40 CFR 1508.8). The analysis must include ecological, aesthetic, historic, cultural, economic, social, or health effects. Effects may also be both beneficial and detrimental (40 CFR 1508.8). Cumulative effects are those that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or action undertakes them. They can result from individually minor but collectively significant actions taking place over a period of time (40 CFR 1508.7).

The alternatives analysis is the core of the analysis, and "*should present the environmental impacts of the proposal and alternatives in comparative form, thus sharply defining the issues and providing a clear basis for choice among options by the decisionmaker and the public*" (40 CFR 1502.14).

The analysis must ensure professional and scientific integrity, and identify the methodologies used (40 CFR 1502.24). The agency is required to "*make every effort to disclose and discuss at appropriate points in the draft statement all major points of view on the environmental impacts of the alternatives.*" Federal agencies must coordinate and consult with other federal agencies, to ensure consistency with, for example, the National Historic Preservation Act, the Endangered Species Act, the Clean Water Act, and other environmental review laws and executive orders. In addition, the EIS must list all federal permits, licenses, and other entitlements, which must be obtained (40 CFR 1502.25).

The EIS must identify all the indirect effects that are known, and make a good faith effort to explain the effects that are not known but are "reasonably foreseeable." (40 CFR 1508.8(b)) "Reasonably foreseeable" impacts includes those which have catastrophic consequences, even if their probability of occurrence is low, provided that the analysis is not based on pure conjecture, and is within the rule of reason (40 CFR 102.22). In addition, the EIS must note when there is incomplete, uncertain, or unavailable information. If the incomplete information relevant to reasonably foreseeable significant impacts is essential to a reasoned choice among alternatives and the overall costs of obtaining it are not exorbitant, the agency shall include that information in the EIS. However, if this information cannot be obtained because the overall costs of obtaining it are exorbitant or the means to obtain it are not known, the EIS shall: (1) note that such information is incomplete or unavailable; (2) discuss the relevance of the incomplete or unavailable information to evaluating significant impacts; (3) provide a summary of existing credible scientific evidence which is relevant to evaluating the significant impacts; and (4) evaluate such impacts based upon approaches generally accepted in the scientific community.

All relevant, reasonable mitigation measures that could improve the project are to be identified. Mitigation measures discussed in an EIS must cover the range of impacts of the proposal. Mitigation measures must be considered even for impacts that by themselves would not be considered “significant.” Mitigation measures must be identified even if they are outside the jurisdiction of the lead agency, and thus would not become a commitment of the lead agency (40 CFR 1502). This serves to alert agencies that can implement these extra measures, and may encourage them to do so. However, the probability of the mitigation measures being implemented must also be discussed.

3.5 ISSUE AREAS NOT CONSIDERED IN THE EIR/EIS

The lead agencies have determined that the proposed project would not result in any direct impacts to the following resources and/or issue areas, and as such, they are not addressed in the EIR/EIS:

- Traffic
- Noise
- Public Services, including police, fire, sewer, schools, emergency services
- Aesthetics
- Hazardous Materials

4.0 RIVERINE-RIPARIAN SYSTEM

4.1 MOU GOALS

Baseflows and Seasonal Habitat Flows

With regard to the riverine-riparian component of the LORP, the MOU provides that a continuous flow of 40 cfs will be maintained from the River Intake to a pump system located near the river delta at Owens Lake. The MOU provides that any water in the river that is above the amount required in the MOU for release to the Owens River Delta may be captured by the pump station. The specified flow regime in the MOU is as follows:

> (*i) A baseflow of approximately 40 cfs from at or near the Intake to the pumpback system to be maintained year-round.*
>
> *(ii) A seasonal habitat flow. It is currently estimated that in years when the runoff in the Owens River watershed is forecasted to be average or above average, the amount of planned seasonal habitat flows would be approximately 200 cfs, unless the Parties agree upon an alternative habitat flow, with higher unplanned flows when runoff exceeds the capacity of the Los Angeles Aqueduct. (The runoff forecast for each year would be DWP's runoff year forecast for the Owens River Basin, which is based upon the results of its annual April 1 snow survey of the watershed.) In years when runoff is forecasted to be less than average, the habitat flows would be reduced from 200 cfs to as low as 40 cfs in general proportion to the forecasted runoff in the watershed….*
>
> *(iii) A continuous flow in the river channel will be maintained to sustain fish during periods of temporary flow modifications."*

The baseflow of approximately 40 cfs from the River Intake to the pump station will be maintained year-round. Initially, the baseflow of 40 cfs will be verified by measurements at the temporary stream gages described in Section 2.3.5.2. Once the baseflow has been established, the 40-cfs baseflow will be verified at a minimum of four permanent stream gages located along the river, as specified in the MOU. The permanent gauging sites will be established before monitoring at the temporary monitoring sites is discontinued.

Annual seasonal habitat flows are intended to create a natural disturbance to establish and maintain native riparian vegetation and channel morphology. The MOU states the following purpose of the seasonal habitat flows (also called "riparian" flows):

> "To achieve and maintain riparian habitats in a healthy ecological condition, and establish a healthy warm water recreational fishery with habitat for native species, the plan would recommend habitat flows of sufficient frequency, duration and amount that would (1) minimize the amount of muck and other river bottom material that is transported out of the riverine-riparian system, but would cause this material to be redistributed on banks, floodplain and terraces within the riverine-riparian system and the Owens River delta for the benefit of the vegetation; (2) fulfill the wetting, seeding, and germination needs of riparian vegetation, particularly willow and cottonwood; (3) recharge the groundwater in the streambanks and the floodplain for the benefit of wetlands and the biotic community; (4) control tules and cattails to the extent possible; (5) enhance the fishery; (6) maintain water quality standards and objectives; and (7) enhance the river channel."

Habitat Indicator Species

The MOU states that: "*The goal for the Lower Owens River Riverine-Riparian System is to create and sustain healthy and diverse riparian and aquatic habitats, and a healthy warm water recreational fishery with healthy habitat for native fish species. Diverse natural habitats will be created and maintained through flow and land management, to the extent feasible, consistent with the needs of the 'habitat indicator species' for the riverine-riparian system.*" The habitat indicator species for the river are listed in Table 2-5. They include non-native game fish and a variety of native resident and migratory riparian and water birds and the Owens Valley vole.

In addition, the MOU includes the following goals that apply to the riverine-riparian component of the LORP:

1. LORP management should be consistent with applicable water quality laws, standards, and regulations.
2. Create and maintain healthy and diverse riverine, riparian, and wetland habitats through flow and land management, to the extent feasible, consistent with the needs of the "habitat indicator species" for the river. These habitats will be as self-sustaining as possible.
3. Create and sustain a healthy warmwater recreational fishery with healthy habitat suitable for native fish.
4. Comply with state and federal laws that protect Threatened and Endangered species.
5. Control deleterious species whose presence within the LORP area interferes with the achievement of the goals of the LORP. These control measures will be implemented jointly with other responsible agency programs.
6. Manage livestock grazing and recreational use consistent with the other goals of the LORP.

4.2 PROPOSED PROJECT

The proposed schedule for establishing the 40-cfs baseflow and release of seasonal habitat flows is described in detail in Section 2.3.5. The proposed 40-cfs baseflow will be established in two phases once LADWP has completed the channel clearing work, the modification of the River Intake structure, and installation of temporary flow measuring stations and several culverts. The first seasonal habitat flow will be released in the first winter following the completion of the pump station construction, and its peak flow will be 200 cfs regardless of the forecasted runoff. Subsequent seasonal habitat flows will be released in May or June, and the magnitude will depend on the forecasted runoff for the Owens Valley.

4.3 SURFACE WATER HYDROLOGY

4.3.1 Existing Conditions

The natural hydrology of the Owens River has been highly altered over the past 100 years due to various diversions. Initial diversion began in the late 1800s for agriculture when several hundred miles of canals were constructed to convey river water to adjacent farmlands. Irrigated agriculture peaked in the 1920s. In 1913, LADWP began diverting most of the river flow to the Los Angeles Aqueduct at the River Intake, which is located between Big Pine and Independence. LADWP uses Tinemaha Reservoir, which is upstream of the River Intake, to regulate flows into the Aqueduct and to store flows from the river during Aqueduct maintenance. Groundwater pumping began in the 1930s, and increased in the 1970s. Groundwater pumped above the River Intake is conveyed to the river prior to entering the Los Angeles Aqueduct; below the Intake, pumped groundwater is delivered to the Aqueduct.

Diversions at the River Intake

At the present time, flows in the river are diverted entirely to the Aqueduct at the River Intake. As a result, flows are absent in the river channel from the River Intake to about 5 Culverts northeast of Independence. Below the 5 Culverts area, flows in the river are primarily due to water released from the Aqueduct through spillgates and naturally occurring discharge from alluvial groundwater. The average annual quantity of water in the river between Tinemaha Reservoir and the River Intake is about 335,000 acre-feet.

Inflows to the Owens River Below the River Intake

The key inflows to the Lower Owens River under existing conditions include releases from spillgates along the Aqueduct for the Lower Owens River Rewatering Project as well as natural runoff. Initiated in 1986 by LADWP and Inyo County, the Lower Owens River Rewatering Project was one of 25 Enhancement/Mitigation Projects implemented between 1984 and 1990. Under the project, 18,000 acre-feet per year was to be released from the Blackrock spillgate to maintain a continuous flow in the Lower Owens River from the Blackrock area to the Owens River Delta. The objective of the project was to improve habitat for waterfowl, shorebirds, and fish in the river corridor and at the Delta. Water is released through various spillgates along the Aqueduct for recreational purposes to support the following lakes: Upper and Lower Twin Lakes, Goose Lake, Thibaut Ponds, and Billy Lake.

The initial releases under the Lower Owens River Rewatering Project were up to 18,000 acre-feet per year, or approximately 25 cfs on an annual basis. However, due to the drought of the late 1980s, significant water losses in the upper reach below the River Intake, and because of restrictions on groundwater pumping for the Rewatering Project under the Agreement, the releases were reduced to about 12,000 acre-feet per year and were initiated further south, beginning at the Independence spillgate. Since 1990, releases for the project have been maintained at about 12,000 acre-feet per year (equivalent to about 17 cfs). This project is still being implemented, but will be replaced by the LORP.

The spillgates include Blackrock, Independence, Locust, and Georges (see Table 4-1, Figure 2-1a-c). The Dean and Russell spillgates are used solely to maintain pastures and supply stockwater; flows from these spillgates (which are typically less than 1 cfs) do not reach the river. The Alabama spillgate is not used to maintain lakes or pasture. It is primarily used for sediment flushing and to discharge water when the Aqueduct must be maintained.

The median monthly flow rates from the key spillgates along the river from 1986-2001 are shown on Chart 4-1. This period of record was used because LADWP began releases from these spillgates in 1986 as part of the Lower Owens River Rewatering Project, described above. Peak releases of 5 to 12 cfs occur in June through September to support irrigated pasture as well as the current rewatering project. Winter releases are generally about 2 cfs or less. Blackrock spillgate generally exhibits the highest monthly flows.

The combined average annual discharge from the key spillgates from 1987 to 2001 has ranged from about 12,000 acre-feet to over 18,000 acre-feet, as shown on Chart 4-2. Spillgate discharges in 1986-87 were high due to high runoff from a very wet winter. The average annual discharges during 1986-2001 in all but the Blackrock spillgate are relatively constant from year to year.

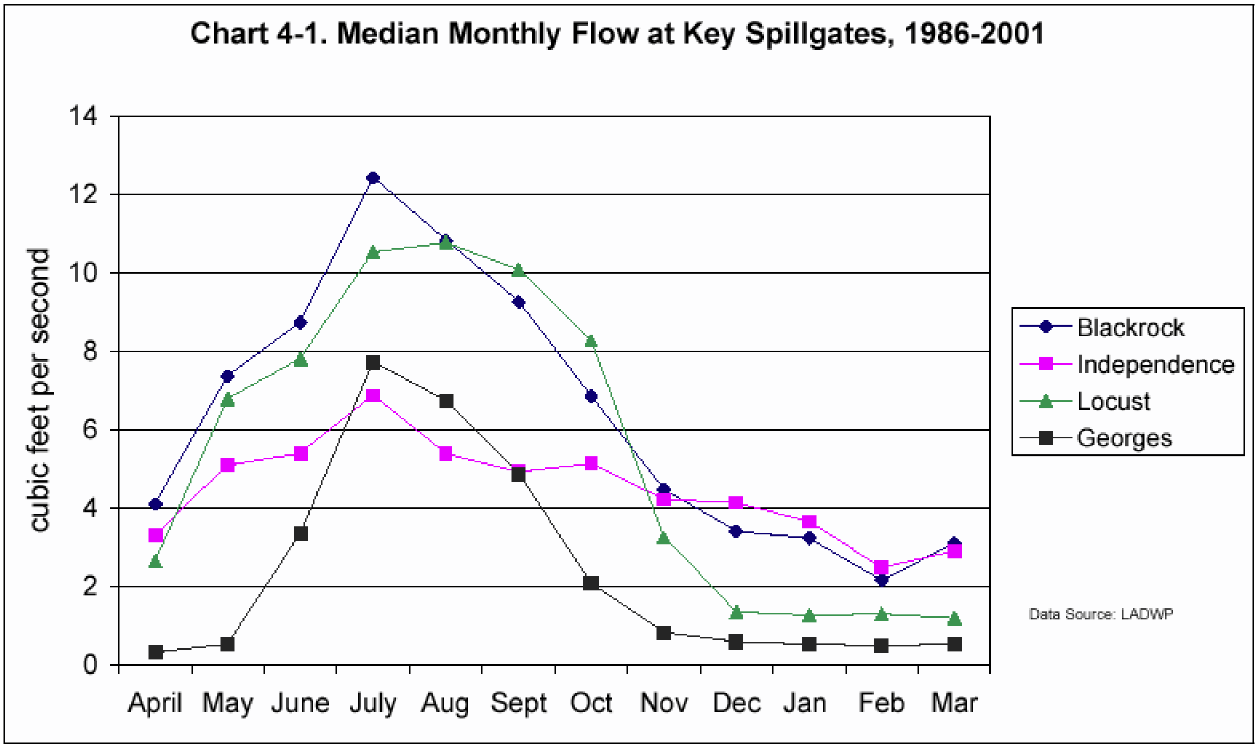


Chart 4-1. Median Monthly Flow at Key Spillgates, 1986-2001
cubic feet per second
14
12
10
8
6
4
2
0
April
May
June
July
Aug
Sept
Oct
Nov
Dec
Jan
Feb
Mar
Blackrock
Independence
Locust
Georges
Data Source: LADWP

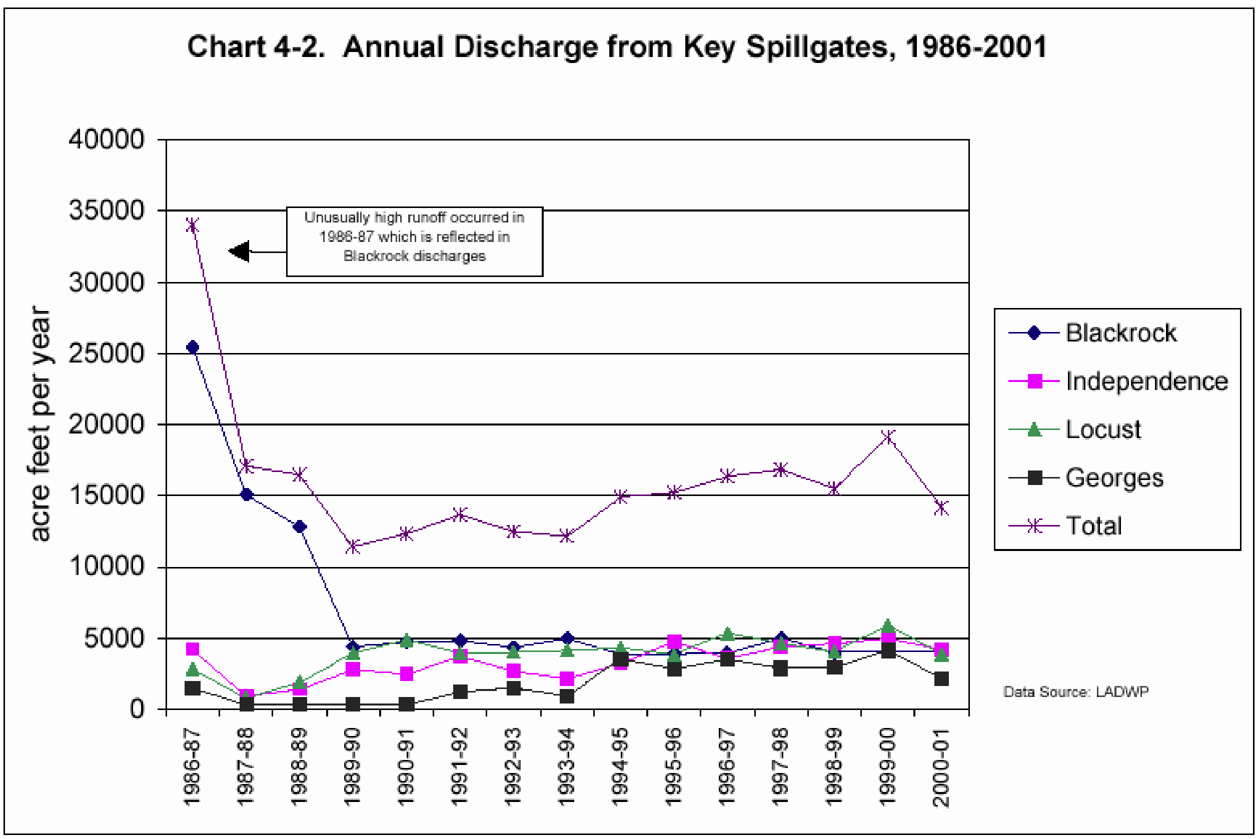


Chart 4-2. Annual Discharge from Key Spillgates, 1986-2001
acre feet per year
40000
35000
30000
25000
20000
15000
10000
5000
0
Unusually high runoff occurred in 1986-87 which is reflected in Blackrock discharges
1986-87
1987-88
1988-89
1989-90
1990-91
1991-92
1992-93
1993-94
1994-95
1995-96
1996-97
1997-98
1998-99
1999-00
2000-01
Blackrock
Independence
Locust
Georges
Total
Data Source: LADWP

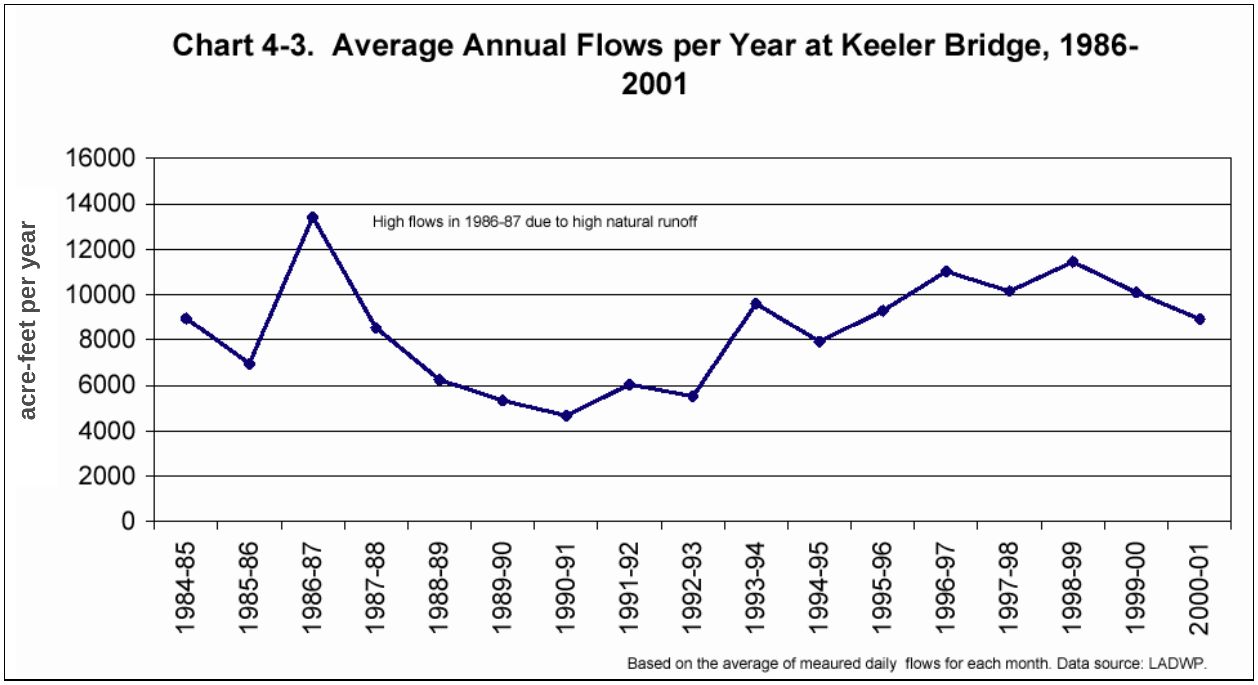


Chart 4-3. Average Annual Flows per Year at Keeler Bridge, 1986-2001
acre-feet per year
16000
14000
12000
10000
8000
6000
4000
2000
0
High flows in 1986-87 due to high natural runoff
1984-85
1985-86
1986-87
1987-88
1988-89
1989-90
1990-91
1991-92
1992-93
1993-94
1994-95
1995-96
1996-97
1997-98
1998-99
1999-00
2000-01
Based on the average of meaured daily flows for each month. Data source: LADWP.

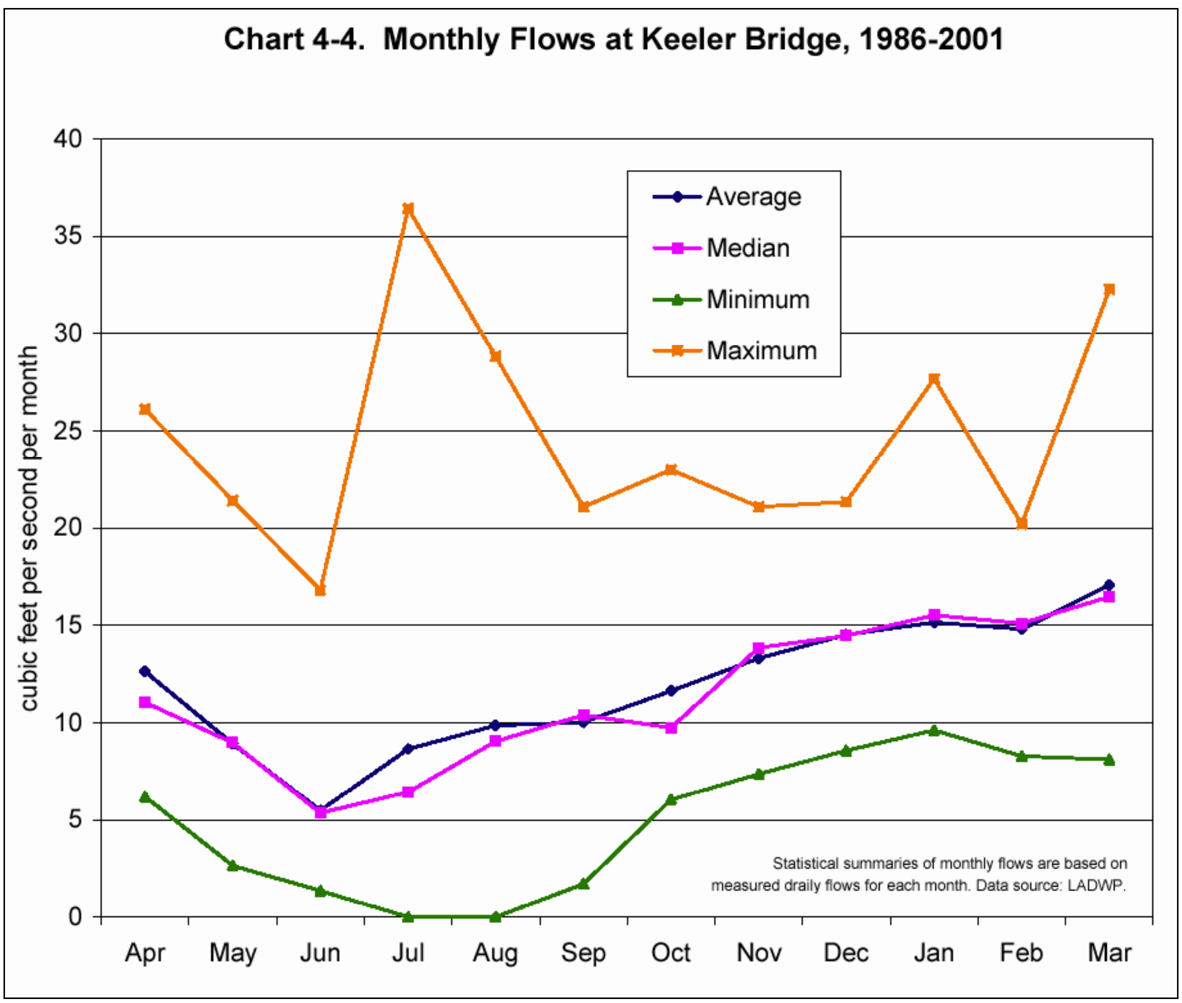


Chart 4-4. Monthly Flows at Keeler Bridge, 1986-2001
cubic feet per second per month
40
35
30
25
20
15
10
5
0
Average
Median
Minimum
Maximum
Statistical summaries of monthly flows are based on
measured draily flows for each month. Data source: LADWP.
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Mar

Measured Flows at Keeler Bridge

The only stream gage on the Lower Owens River is located near the Keeler Bridge. LADWP measures daily flows at the station, then compiles the records for average flows each month (herein called "average monthly flows") and for the entire year ("average annual flows"). Average annual discharge at Keeler Bridge for the period 1986-2001 is shown on Chart 4-3. Average monthly flows in the river from 1986 to 2001 ranged from about 5 to 17 cfs, as shown on Chart 4-4. The average annual flow over this time period was 11.8 cfs.

TABLE 4-1
SUMMARY OF KEY SPILLGATES CONTRIBUTING TO FLOW IN THE RIVER

Spillgate [see Figures 2-1a-e for locations]	Purposes of Releases	Current Release Regime (avg monthly flow unless otherwise noted)
Blackrock Spillgate	Water for livestock on Twin Lakes and Blackrock leases using Blackrock, Winterton, and Waggoner, maintain water in Twin Lakes and Goose Lakes; release excessive flows in the Aqueduct due to high inflows.	6.4 cfs (1986-2001 avg), year-round
Thibaut Spillgate	Irrigation for pastures on Thibaut Lease and to maintain Thibaut Ponds; water for livestock; spreading water in above average runoff years.	1 to 2 cfs (1986-2001 avg), year-round
Independence Spillgate	Water to maintain Billy Lake and to support fish and riparian habitat in the river; release excessive flows in the Aqueduct due to high inflows; Aqueduct maintenance; spreading water in above average runoff years.	4.7 cfs (1986-2001 avg), year-round
Locust Spillgate	Water for livestock on Blackrock lease in Locust Ditch and Steven's Ditch; release excessive flows in the Aqueduct due to high inflows ; Aqueduct maintenance; spreading water in above average runoff years.	5.4 cfs (1986-2001 avg) year-round
Georges Spillgate	Water for livestock on Blackrock lease in Steven's Ditch and Georges Ditch; irrigation for pasture; releases for fish and riparian habitat; release excessive flows in the Aqueduct due to high inflows; Aqueduct maintenance; spreading water in above average runoff years.	2.1 cfs (1986-2001 avg) year-round
Alabama Spillgate	Aqueduct maintenance; release excessive flows in the Aqueduct due to inflows from runoff; spreading water in above average runoff years.	Approximately 200 cfs for 2 hours, 4-6 times per year

Flows at Keeler Bridge are derived from releases from upstream spillgates that reach the river, runoff from precipitation and snow melt, and groundwater seepage. The latter consists of discharge from the shallow alluvial groundwater in the valley that becomes surface flow in the river between Mazourka Canyon Road and Keeler Bridge. An important source of recharge to the shallow groundwater is likely to be water released from spillgates. Hence, some water released from spillgates that does not reach the river probably still contributes to surface flow at Keeler Bridge due to groundwater discharge to the river.

Hutchinson (1986) estimated groundwater baseflows at Keeler Bridge prior to the Lower Owens River Rewatering Project (including recharge from spillgate releases) to be about 4 cfs in average years. Flows above this amount would be due to direct releases to the river from upstream spillgates and runoff from precipitation. Hence, it appears that of the approximately 12 cfs average flows at Keeler Bridge, about 4 cfs is attributed to groundwater baseflows and about 8 cfs is due to releases from spillgates (as surface water) and natural runoff. Irrigation and stockwater practices may contribute to groundwater baseflows.

The average monthly flows at Keeler Bridge in recent years (1986-2001) range from about 5 to 17 cfs, with the peak flows occurring in the winter and the minimum flows in the summer (Chart 4-4). On average, minimum and maximum flows range from as low as 5 cfs during the summer up to 17 cfs in winter. Daily flow measurements are made on a continuous recorder at the Keeler Bridge and are adjusted to account for obstructions in flow. This portion of the river supports numerous beaver, which build dams downstream of the bridge and cause elevated water levels at the bridge where the weir is located. When the weir is submerged, the hydrographer estimates the flow using a float stick. Hence, LADWP's estimates of discharge take into account the confounding effects of elevated water levels at the weir due to beaver dams.

River Channel Dimensions

The dimensions of the river channel within the project area vary considerably. The average width and depth of the primary channel are about 115 feet and 8.7 feet, respectively. However, certain reaches are much wider (up to 300 feet) or narrower (about 40 feet). The depth may reach 15 feet in certain locations. Above Mazourka Canyon Road, the channel has little vegetation. Below this point, where the river channel receives baseflows and runoff from spillgate releases, the channel is clogged with dense cattail and bulrush marsh, and contains intermittent small ponds created by beaver.

4.3.2 Potential Impacts – Surface Water Hydrology

The primary adverse hydrologic impact of concern associated with the release of flows to the river under the LORP is the potential for overbank flooding, bank erosion, channel degradation, or sediment deposition that could affect public infrastructure or private property. The potential for these impacts to occur is evaluated below based on hydraulic modeling and by observations during a 1993 field experiment in the river.

Hydraulic Modeling Analysis

Hydraulic modeling of the Lower Owens River was conducted by Don Chapman Consultants (1993) to predict water surface elevations, velocities, and new floodplains for various flows along the LORP project reach. The modeling was performed using the HEC-2 computer model designed by the Hydrologic Engineering Center of the USACE and based on 25 channel cross sections surveyed in the field. Modeling runs were conducted for the following discharges from the River Intake: 15, 30, 50, 80, 100, and 200 cfs. Modeling scenarios included current conditions with dense vegetation in the river channel and fine sediments on the bottom, and future conditions with no in-channel vegetation and a sandy bottom. The model was calibrated during the 1993 experimental re-watering of the river. The model did not estimate potential losses from the river due to evaporation, transpiration, and percolation.

Elevations of many cross sections were estimated from USGS topographic maps due to the lack of a consistent elevation datum along the project reach. Bridges and culverts along the project reach were not included in the analyses. As such, the results of the modeling are considered approximations for comparing between varying discharge levels, not precise predictions of future flow velocities, water surface elevations, or floodplain limits.

Two modeling scenarios were addressed. The first modeling run included the entire 62-mile long project reach and assumed that the existing high level of in-channel vegetation would remain. The second modeling analysis was performed for a shorter reach of the river and included two channel conditions: current dense in-channel vegetation and open channel with little vegetation. The latter condition is anticipated to occur after several years of high seasonal habitat flows.

In addition to the above modeling, Don Chapman Consultants (1993) also conducted sediment transport modeling of the LORP reach using the HEC-6 model (also designed by the USACE) to estimate the extent of channel bed elevation changes due to the seasonal habitat flows.

HEC-2 model predictions for average flow velocities under existing and future conditions are presented in Table 4-2. As reflected in the modeling results, the low overall gradient of the river and the presence of dense in-channel vegetation impede flows. Average water depth is predicted to increase about 1.5 feet under the new baseflows, and about 4 feet with the seasonal habitat flows. The average width of the wetted channel is predicted to increase by 30 feet under the new baseflows, and nearly double to about 85 feet under the maximum seasonal habitat flows of 200 cfs.

TABLE 4-2
SUMMARY OF WATER SURFACE ELEVATION MODELING

Average Values	Simulated Flows Under Current Conditions (Estimated at 2-5 cfs)	Simulated Baseflows under Future Conditions (50 cfs)*		Simulated Seasonal Habitat Flows under Future Conditions (200 cfs maximum release)**	
		New Value	Percent Increase	New Value	Percent Increase
Velocities (feet per second)	0.33	0.55	67percent	0.98	197 percent
Water Depth (feet)	3.08	4.50	46 percent	7.32	138 percent
Flow Width (feet)	47	75	60 percent	85	81 percent

Source: Don Chapman Consultants, 1993. Assumed no change in current in-channel vegetation conditions and no channel losses. A 62-mile long reach was modeled. The model does not account for evapotranspiration or percolation.
* 50 cfs was used in the study, before a 40-cfs baseflow was selected. Hence, values for the 50-cfs flows are approximations for a 40-cfs baseflow condition.
**Seasonal habitat flows will be released at the Intake and will be reduced over the modeled flow due to evaporation, transpiration and percolation.

It is important to note, however, that the modeling was performed for a range of flows between 10 cfs and 200 cfs before the 40-cfs baseflow and 200-cfs seasonal habitat flows were selected. The model results shown below are considered to be the most representative of a 40-cfs baseflow. However, these results are likely to be higher than actual conditions, because the project baseflow will be less than what was modeled, the maximum seasonal habitat flows will not be achieved throughout the river, and the model does not account for evaporation, transpiration, and percolation.

Seasonal habitat flows may or may not remove cattail and bulrush marsh vegetation from the river channel over time (see below). In the event that channel vegetation (and therefore, channel roughness) is reduced, there would be substantial increases in velocities associated with the baseflows and seasonal habitat flows, as shown in Table 4-3. Flow velocities could exceed 1 (foot per second) fps for baseflows once the channel has been cleared of marsh vegetation, more than five times greater than with the in-channel vegetation (which exists in the currently wetted reach). Flow velocities with a cleared channel during the seasonal habitat flows would increase to almost 3 fps. Water depth and width of the wetted channel would not increase as much with a cleared channel because there would be less “backwater” effect due to high channel roughness.

TABLE 4-3
EFFECT OF IN-CHANNEL VEGETATION ON HYDRAULICS

Average Values	Simulated Flows Under Current Conditions (Estimated at 2-5 cfs)	Simulated Baseflows under Future Conditions (50 cfs)*		Simulated Seasonal Habitat Flows under Future Conditions (200 cfs maximum release)**	
		New Value	Percent Increase	New Value	Percent Increase
Hydraulic Conditions with Dense In-Channel Vegetation					
Velocities (feet per second)	0.27	0.38	41 percent	0.69	156 percent
Water Depth (feet)	2.37	4.02	70 percent	7.45	214 percent
Flow Width (feet)	63	87	38 percent	142	125 percent
Hydraulic Conditions without Dense In-Channel Vegetation					
Velocities (feet per second)	1.21	1.68	38 percent	2.66	119 percent
Water Depth (feet)	2.26	2.75	3 percent	3.77	66 percent
Flow Width (feet)	52	64	23 percent	82	58 percent

Source: Don Chapman Consultants, 1993. The values for existing conditions vary slightly from Table 4-2 because the above analysis only used a small portion of the river, while the data from Table 4-2 are based on modeling the entire river.
* 50 cfs was used in the study, before a 40-cfs baseflow was selected. Hence, values for the 50-cfs flows are approximations for a 40-cfs baseflow condition.
** Seasonal habitat flows will be released at the Intake and will be reduced over the modeled flow due to evaporation, transpiration and percolation.

The effects of baseflows and seasonal habitat flows on channel bed elevations are shown in Table 4-4. As anticipated, the predicted velocities with dense, in-channel vegetation are too low to cause substantial scouring. Overall, the baseflows are predicted to lower the channel bed by a very small amount (0.24 feet, on average). The modeling showed that minor scouring may also occur at the lowest discharge modeled, 15 cfs. The depth of scouring may double if the channel is cleared of vegetation, but will remain low (averaging 0.45 feet). The 200-cfs seasonal habitat flows are predicted to cause greater overall channel degradation, particularly if in-stream vegetation has been removed. Areas of substantial channel degradation may occur under the seasonal habitat flow (e.g., up to 5 to 10 feet); however, these areas of maximum degradation are expected to be localized.

TABLE 4-4
PREDICTED CHANNEL BED ELEVATION CHANGES

Channel Bed Changes (feet)	Future Conditions with Dense In-Channel Vegetation		Future Conditions without In-Channel Vegetation	
	Baseflows (~30 cfs)	Seasonal Habitat Flows (200 cfs)	Baseflows (~30 cfs)	Seasonal Habitat Flows (200 cfs)
Average Channel Bed Change	-0.24	-0.70	-0.45	-1.54
Maximum Channel Bed Scour	-1.91	-5.00	-4.12	-9.90
Maximum Channel Bed Deposition	+0.24	+0.60	+0.29	+0.63

Source: Don Chapman Consultants, 1993.

Flow Velocities Observed in 1993 Field Experiment

In July-August 1993, Ecosystem Sciences conducted an experimental study to calibrate flow and habitat models to identify desired flows for the river channel. Ecosystem Sciences used these data to develop recommendations for a baseflow and seasonal habitat flows to the river. Over a period of 38 days, water was released into the river channel at the Intake. The initial discharge from the River Intake was approximately 20 cfs and was rapidly increased to 155 cfs. Flow measurements were collected at various downstream sites during the study. Average flow velocities during 39-cfs and 91-cfs flows at a measuring station located just south of Mazourka Canyon Road are shown in Table 4-5. Based on the relationship observed between discharge and velocities, Inyo County staff estimated that average flow velocity at the Mazourka Canyon Road station would be about 2.4 fps with a 200-cfs discharge in the river at that location (Randy Jackson, pers. comm.).

TABLE 4-5
OBSERVED FLOW VELOCITIES AT MAZOURKA CANYON ROAD DURING 1993 FIELD EXPERIMENT

Discharge (cfs)	Measured Flow Velocity (feet per second)
39	1.29
91	1.62

The observed flow velocities at Mazourka Canyon Road were similar to average values estimated by the hydraulic modeling shown in Table 4-3 for a channel without dense vegetation. The channel at the Mazourka Canyon Road station was relatively free of in-channel vegetation.

Effect of Flow Velocities on Tules and Beaver Dams

The magnitude of seasonal habitat flows was not defined with the specific objective of creating velocities high enough to scour tules and/or dislodge beaver dams. Tule suppression will primarily be a result of increased inundation and shading (from growth of riparian trees) along with an increase in flow velocity. Beaver dam control will primarily be mechanical (see Section 2.3.7).

Ecosystem Sciences Technical Memorandum #9 cites a study on hydrodynamic control of emergent aquatic plants (cattails and bulrushes, called “tules” here) in the Owens River Valley – by Groeneveld (1994). The memorandum reproduces from that study a mathematical relation between depth, velocity, and tule stem diameter, which attempts to predict whether certain flows would dislodge tules.

Substituting values of 1 meter for depth and 0.025 meters (one inch) for stem diameter yields a velocity of 0.32 meters per second, or approximately 1 fps to remove tules. Results of the HEC-2 modeling by Don Chapman Consultants (1993) indicate that average velocities for both the 40-cfs baseflows and the 200-cfs seasonal habitat flows in a channel with dense vegetation would not exceed this value. However, observations of flow velocities at the Mazourka Canyon Road station during the 1993 field experiment were greater than 1 fps under both baseflow conditions, and when the discharge from the River Intake was 155 cfs (Jackson, 1994a). Hence, there is potential for some localized scouring of tules with the proposed flow regime, based on the available data.

There are no available data to analyze the flows necessary to remove beaver dams. Jackson (1994a) reported that the experimental flows of 1993 removed one dam. The maximum discharge during the experimental period was 155 cfs. Therefore, higher flows of longer duration during the proposed seasonal habitat flows could remove or breach some beaver dams along the river, which would lower water surface elevations behind them.

Summary of Hydraulic Impacts

The hydraulic modeling and observations of flows during the 1993 field experiment suggest the following effects of baseflows and seasonal habitat flows:

- Once dense in-channel vegetation is removed, the increase in water depth and width of the wetted channel would be modest under the baseflows, which would be contained within the current active channel. Most of the seasonal habitat flows would also be contained within the active channel, except in localized reaches where the flows may break out of the channel due to low banks or obstructive vegetation.
- The predicted and observed velocities under the baseflows and seasonal habitat flows are not likely to cause bank erosion. However, the velocities may be sufficient to remove limited amounts of cattails and bulrushes in localized areas.
- If cattail and bulrush marsh vegetation is removed from the channel, flow velocities and channel bed scouring will increase. However, the predicted velocities are still relatively low and not considered erosive.
- Predicted velocities under the seasonal habitat flows appear to be sufficient to remove some beaver dams, or breach the dams, but not high enough to remove all dams.

Based on the modeling analysis, the proposed new flows in the Lower Owens River are not expected to cause significant bank erosion, channel degradation, or sediment deposition. However, there is potential for localized overbank flooding that could affect several public roads and lease roads that cross the river (e.g., Mazourka Canyon Road, Manzanar-Reward Road, and Keeler Bridge). This impact could occur if floating debris clogs the culverts and bridges at these crossings, primarily under the seasonal habitat flows. If flow under these roads is obstructed, overbank flooding could affect the roads. **This impact is considered potentially significant, but mitigable (Class II).** Flooding can be mitigated by monitoring these crossings during seasonal habitat flows and removing debris as necessary (see Mitigation Measure H-1 below).

Upstream Hydraulic Impacts

The water levels and release regime in Tinemaha Reservoir upstream of the River Intake would not be modified to achieve the releases from the River Intake. Water is released from this regulating reservoir to the river, where it is conveyed to the Aqueduct Intake. Water surface elevations in the river upstream of the intake typically vary up to 5 feet over the course of a month. Under the proposed project, 40 cfs would be continuously released to the river at the same time that water is diverted into the Aqueduct Intake for export. This combined operation is not expected to change the range of water surface elevations in the river upstream of the two intakes, nor in Tinemaha Reservoir (B. Tillemans, LADWP, pers. comm.). Similarly, releases of up to 200 cfs for short-term seasonal habitat flows each year are also not expected to lower the river upstream of the Intake below its typical operational range.

Sediment is currently removed on a periodic basis from the river upstream of the Aqueduct and River Intake structures in order to maintain a suitable channel invert elevation for these gates. The diversion of water to the river under the LORP would not affect the frequency or magnitude of this ongoing operation.

4.3.3 Mitigation Measures

H-1 During seasonal habitat flows, Inyo County shall monitor culverts and bridges on County roads along the river and LADWP shall monitor culverts on other roads to determine the potential for debris plugs to form at road crossings. Obstructive debris will be removed as necessary to minimize flooding the roads.

4.4 WATER QUALITY

4.4.1 Background

The Lower Owens River Project will establish permanent flows in the river channel that differ from the existing conditions. Previous experiments to manipulate flows in the river suggest that degraded water quality could be significant during the initial years of project implementation. This section describes the regulatory framework relative to water quality in which the project will be implemented, the existing conditions as measured during a series of data collection efforts, and the potential effects to water quality that could occur in response to the introduction of higher flows in the river.

Regulatory Framework and Beneficial Uses

The primary responsibility for the protection of water quality in California resides with the State Water Resources Control Board (State Board) and its nine Regional Water Quality Control Boards. The State Board sets statewide policy for the implementation of state and federal laws and regulations. The Regional Boards adopt and implement Water Quality Control Plans (Basin Plans).

The LORP occurs in the jurisdiction of the Lahontan Regional Water Quality Control Board (Regional Board). The Basin Plan for the region sets forth water quality standards for surface and ground waters of the region, which include: (1) designated beneficial uses of water; and (2) narrative and quantitative water quality objectives. The Regional Board seeks to maintain the water quality objectives through its planning and permitting authorities to protect designated beneficial uses. The Lower Owens River below the River Intake has been classified in the Basin Plan as an "ephemeral stream." Other waterbody classifications applicable to the Lower Owens River include perennial stream, wetlands, lakes, seeps/springs, wet meadow, and floodplain. Designated beneficial uses for the Lower Owens River from the Basin Plan are as follows:

- Agricultural Supply
- Cold Freshwater Habitat
- Preservation of Biological Habitats of Special Significance
- Commercial and Sportfishing
- Freshwater Replenishment

- Groundwater Recharge
- Municipal and Domestic Water Supply
- Warm Freshwater Habitat
- Spawning, Reproduction, and Development
- Rare, Threatened, and Endangered
- Water Contact Recreation
- Non-Contact Water Recreation
- Wildlife Habitat

The water quality objectives that apply to the Lower Owens River are listed in Table 4-6. They are primarily narrative objectives.

TABLE 4-6
WATER QUALITY OBJECTIVES THAT APPLY TO THE LOWER OWENS RIVER

Parameter or Constituent	Water Quality Objective
Ammonia	Varies depending on temperature and pH
Coliform bacteria	Log mean 20 count/100 ml over 30-day period, no more than 10 percent of 30-day samples shall exceed 40 count/100 ml
Biostimulatory substances	Concentrations shall not promote aquatic growth that is a nuisance or adversely affect beneficial uses
Chemical constituents	Title 22 Maximum Contaminant Level (MCL)
Chlorine	Median 0.002 mg/l (daily values over 6-month period) or maximum of 0.003 mg/l
Dissolved oxygen	Shall not be depressed more than 10 percent, nor reduced to less than 80 percent saturation. Specific limits for COLD and WARM water designations over 7- and 1-day periods are described in Basin Plan.
Floating materials	Amounts must not cause nuisance or adversely affect beneficial uses
Oil and grease	Amounts must not create film, cause nuisance, or adversely affect beneficial uses
Non-degradation of aquatic communities and populations	Must not create undesirable or nuisance aquatic life, or that cause adverse effects on plants and animal. Wetlands must be protected from impairments.
Pesticides	Amounts must not exceed lowest detectable limits, and not bioaccumulate in sediments or aquatic life
pH	Changes in normal range must not exceed 0.5 units (COLD and WARM)
Radioactivity	Amounts must not be present in deleterious concentrations
Sediment	Amounts shall not cause nuisance or adversely affect beneficial uses
Settleable materials	Amounts shall not cause nuisance or adversely affect beneficial uses
Suspended materials	Amounts shall not cause nuisance or adversely affect beneficial uses
Taste and odor	Amounts shall not be in concentrations that cause undesirable taste and odors
Temperature	Receiving water temperature shall not altered such that beneficial uses are adversely affected
Toxicity	Waters must be free of toxic substances
Turbidity	Amounts shall not cause nuisance or adversely affect beneficial uses. Increases shall not exceed natural levels by more than 10 percent

Source: Regional Board, 1994.

The State Board has adopted a Nondegradation Objective based on Resolution 68-16. Under this objective, whenever the existing water quality is better than that needed to protect all existing and probable future beneficial uses, the existing high quality shall be maintained until or unless it has been demonstrated to the State that any change in water quality would be consistent with the maximum benefit of the people of the State, and would not unreasonably affect present and probable future beneficial uses of such water.

In a letter to LADWP dated May 19, 1998, the Regional Board staff indicated the following positions relative to the current waterbody classification and designations of beneficial uses:

- After implementation of the rewatering of the lower river under the LORP, the Regional Board would consider a potential modification of the waterbody classification as an ephemeral stream.
- The designation of the Municipal and Domestic Supply beneficial use would remain unchanged with the LORP because there is potential for municipal water use in the future as river water quality improves with time, and because water from the river would be reintroduced to the Aqueduct by the pump station.
- Upon implementation of the LORP, the Regional Board would ask the California Department of Fish and Game if the current designation of Cold Freshwater Habitat for fish is appropriate, in light of the LORP objectives of enhancing the warmwater fishery of the river.
- Following completion of the LORP, the Regional Board may consider adjusting the narrative DO objective

Impaired Waters and TMDL

Section 303(d) of the federal Clean Water Act requires states to identify surface water bodies which are not attaining water quality standards and are not expected to do so even with the use of technology-based effluent limitations and other legally required pollution controls such as Best Management Practices. Waters may be listed for more than one pollutant. For each listed water body/pollutant combination, states must develop a Total Maximum Daily Load, or TMDL, to ensure attainment of standards. The most recent Section 303(d) list, including priority ranking for TMDL development, was completed in 2002 and approved by USEPA in July 2003.

The Owens River (including reaches within the LORP area) is included in the current 303(d) list with "habitat alteration" as the pollutant/stressor (Regional Board, 2003). The potential sources of this impairment are listed as agriculture and hydromodification. Arsenic was included in the previous 303(d) list (Regional Board, 1999), but was excluded from the current list. Arsenic in the Owens River comes from natural (volcanic and geothermal) sources. The Owens Lake was included in the previous 303(d) list for salinity, total dissolved solids, and chlorides, but was excluded from the current 303(d) list. The salts and trace elements present in its brine at Owens Lake come from natural sources.

Under the current 303(d) list, the priority for TMDL development for Owens River and Owens Lake is listed as low, with a note indicating that the river may be placed on a separate list not needing TMDLs due to pending changes in federal regulations (Regional Board, 2003). The schedule for completion of TMDLs has not been established.

4.4.2 Existing Conditions

Water Quality Data Sources

Water quality in the Lower Owens River was examined by several studies and monitoring efforts conducted by LADWP and the Inyo County Water Department. The following reports and data were used as the basis for the evaluation of existing and potential future water quality conditions described in this section.

1. *Lower Owens River Planning Study: Transient Water Quality in the Lower Owens River during the Planning Study Flow Releases in July and August of 1993* (Jackson, 1994a). Water quality parameters in grab samples were measured on an almost daily basis during the 38-day long 1993 flow study at nine sites along the river. Five water quality parameters were measured: dissolved oxygen (DO), turbidity, pH, electrical conductivity and temperature.

2. *LADWP Water Quality Data from 1993 Field Experiment.* LADWP personnel collected water samples for hydrogen sulfide, ammonia, and other constituents on August 5, 1993, while flows were being decreased in the river.

3. *Lower Owens River Planning Study: Water Quality in the Lower Owens River Enhancement/ Mitigation Project, May 1995 through June 199*6 (Jackson, 1996). In this study, water quality measurements were collected from six river sites near and upstream of Keeler Bridge and at three spillgates. Measurements were collected weekly during most of 1995, then biweekly during 1996. At each site, grab samples were analyzed for dissolved oxygen, turbidity, pH, electrical conductivity and temperature. A total of 1,312 measurements were made.

4. *Lower Owens River Planning Study: Water Quality in Selected Off-River Lakes and One On-River Pond in the Lower Owens River Enhancement/Mitigation Project, July 1996 through June 1997* (Jackson, 1997). In addition to providing water quality data for the off-river lakes and ponds within the project area, this report includes river water quality data from Lone Pine Pond.

5. *1999 Comprehensive Water Quality Sampling (Jackson, 1999, unpublished data).* In 1999, Inyo County continued its water quality sampling with a more comprehensive analysis of water quality parameters in the river. Samples were collected from eight locations along the river and at Goose Lake. The samples were analyzed for 123 constituents and water quality parameters, including various minerals, compounds, physical properties, and organic compounds. Basic water quality parameters were measured in the field. Samples were collected and measurements were made in March 1999 and August 1999.

Characterization of Existing Water Quality

The primary conclusions about existing water quality in the river under pre-project management practices based on the above referenced water quality studies are summarized below. Results of the 1995-96 water quality sampling by Inyo County are presented in Table 4-7.

- Water quality in the Aqueduct was good, as shown by measurements by Jackson (1994a) during the 1993 field experiment. DO concentrations were moderately high (mean = 6.4 mg/l, range of 4.2 to 7.2 mg/l). DO concentrations above 5 mg/l are desirable for the protection of aquatic life. Temperatures ranged from 67 to 75 degrees F, and pH values ranged from 7.2 to 8.5. Dissolved solids were low as measured by electroconductivity (range of 0.22 to 0.33 milliohms/cm, or estimated 140 to 211 mg/l total dissolved solids by Jackson [1994a] using the equations of Bohn [1985]).

- DO levels were about 7.5 to 8.5 mg/l in water released to the river from the various spillgates along the Aqueduct.

- In general, DO levels in the Lower Owens River decrease with distance downstream from the River Intake. In 1995-96, DO levels, which were measured in the wet reach of the river, decreased to below

5 mg/l at all of the monitoring sites at some time during the year, but were above 2 mg/l most of the time. Concentrations below 1 mg/l are generally lethal to fish. The DO water quality objective from the Regional Board's Basin Plan that applies to the river consists of three elements: 6.5 mg/l for 30-day mean, 5 mg/l for a 7-day mean, and 4.0 mg/l for a 1-day mean. Based on individual measurements, the DO levels in the river do not meet these objectives on a regular basis.

- Turbidity is caused by suspended matter such as clays and organic matter, soluble colored organic compounds, and algae. In general, turbidity levels decreased from Mazourka Canyon Road to the pump station site. Over the course of a year, turbidity levels were higher in the spring and lower in the summer and fall. High turbidity levels were present in the Aqueduct and in the Owens River upstream of the River Intake, due in part to the higher flows that keep material suspended. High turbidity levels also occurred in water released from the spillgates, reflecting the high turbidity levels in the Aqueduct. Turbidity levels were lower in the river below the River Intake due to low flow velocities, which allow suspended material to settle.

- The pH of the river in 1995-96 was about 8, which is typical of natural waters and suitable for aquatic life. The pH in the Aqueduct was slightly higher than in the river.

- Electrical conductivity is related to the concentration of dissolved solids, and can be used to estimate total dissolved solids (TDS). The TDS levels in the river upstream of the River Intake and in the Aqueduct were less than 200 mg/l. TDS concentrations increased with distance along the river. TDS is higher in the winter. TDS levels drop in the summer.

- Mean water temperatures in 1995-96 remained nearly constant with distance downstream or decreased slightly along the river.

TABLE 4-7
SUMMARY OF WATER QUALITY DATA FROM THE LOWER OWENS RIVER AND KEY SPILLGATES, 1995-96

Sampling Location	Mean Value During 1995-96 Study (No. of samples: 10-46 per location)									
	Dissolved Oxygen (mg/l)			Tur-bidity (NTU)	pH	Elec. Cond. (*m*ohms/cm)	Total Dissolved Solids (mg/l)	Temperature (F)		
	Max	Min	Avg					Max	Min	Avg
Mazourka Cyn Rd	10.2	4.5	7.3	3.2	8.2	0.28	178	72	36	57
Reinhackle Springs	8.5	2.5	5.5	2.7	7.9	0.33	212	72	36	60
Lone Pine Ponds	6.2	1.2	3.9	2.3	7.9	0.61	392	72	36	57
Lone Pine Station	6.2	0.5	3.6	2.9	7.9	0.63	401	74	37	57
Keeler Bridge	7.2	1.6	4.4	3.1	8.1	0.66	421	73	37	58
Pump Station	7.5	1.5	5.1	2.0	8.4	0.94	603	70	34	50
Independence Spillgate	9.8	6.0	7.6	12.2	8.5	0.20	125	73	46	63
Locust Spillgate	9.0	5.7	7.8	14.9	8.4	0.20	129	71	40	60
Georges Spillgate	9.5	7.4	8.6	12.8	8.4	0.19	119	69	42	58

Source: Jackson, 1996, Inyo County Water Department. Interested reader is directed to that report for more information.

Key water quality results from the 1999 field sampling (Inyo County, unpublished data; Item 5 above) are shown on Chart 4-5 and summarized below. The sampling dates in the winter and summer of 1999 were February 23, 1999 and August 2, 1999, respectively.

- Dissolved oxygen levels were higher in the winter, as noted in 1995-96. Summer levels were below 4 mg/l, which is below the Basin Plan water quality objective.

- Turbidity was low in the river, except at the Independence spillgate, confirming that water from the Aqueduct has high turbidity, which declines after diversion to the river.

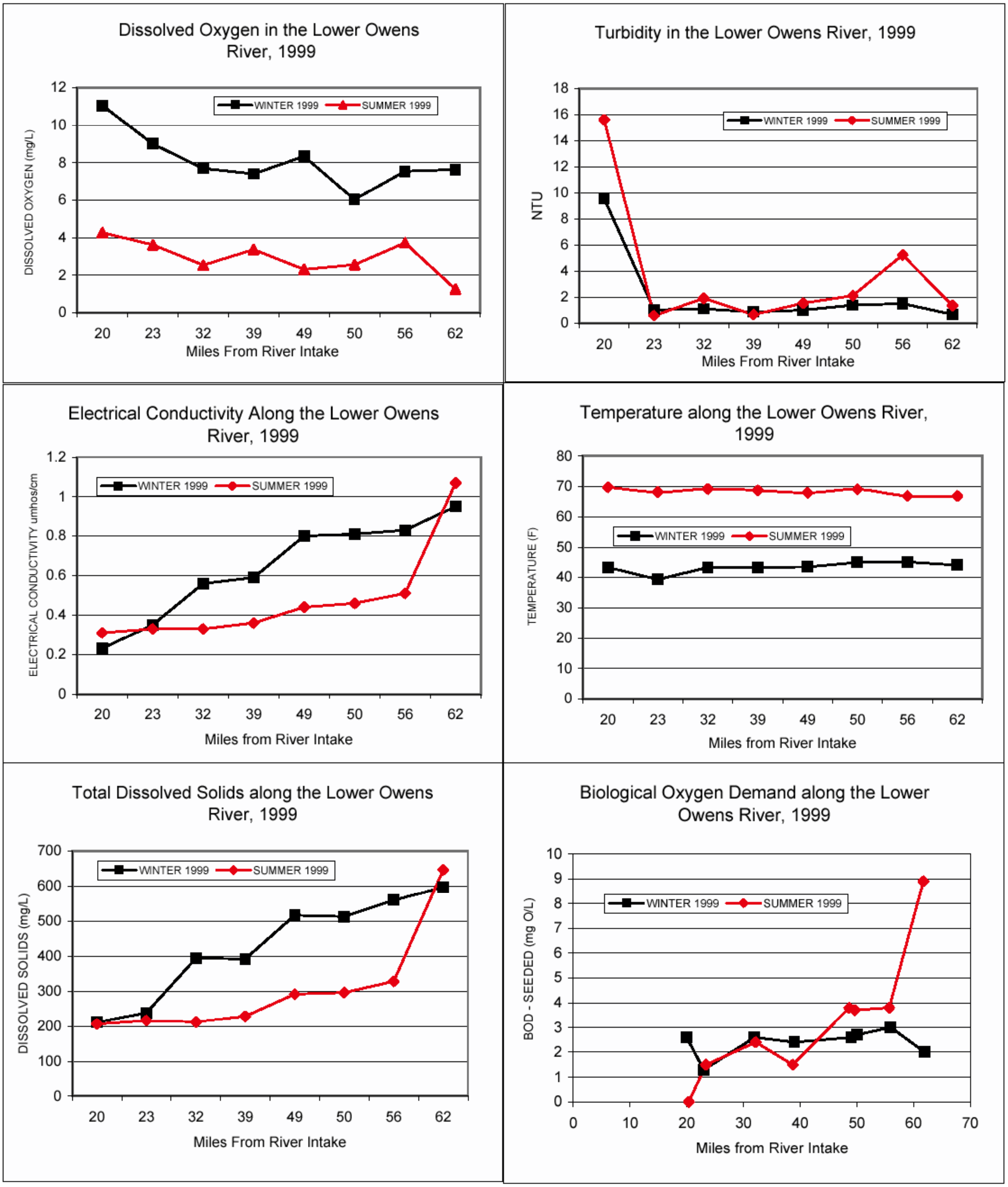
- Electrical conductivity and total dissolved solids increased along the river, consistent with the 1995-96 results.

- Temperature was constant along the river, but there was a significant difference between summer and winter temperatures. Water temperatures were most suitable for warmwater fish, with summer temperatures of 68 degrees F in the summer and 41 degrees F in the winter

- Biochemical oxygen demand (BOD) is a measure of the amount of biodegradable organic matter in waters that is available for microbial decomposition, a process which depletes oxygen. Hence, a high BOD signifies conditions in which DO levels would decrease due to the presence of organic compounds such as animal waste or plant detritus. BOD_5 levels in 1999 were generally low and consistent along the entire river, and showed little difference between the summer and winter except at two sampling sites. BOD ranged from 1 to 9 mg/l in the wet reach of the river.

In summary, the water quality data for the Lower Owens River indicate that existing DO levels fluctuate greatly (1 to 11 mg/l) and are often below Basin Plan water quality objective levels and near deleterious levels for aquatic life. DO levels generally decrease in the summer and with distance along the river. TDS are relatively high compared to natural runoff and water in the Aqueduct. TDS concentrations increase along the river. Temperatures vary greatly between seasons, and are suitable for warmwater fish. Turbidity levels are low compared to the Aqueduct. These conditions are typical of warmwater streams. In the past, the Regional Board has characterized warmwater fisheries habitat (designated as “WARM”) as being less sensitive to environmental changes than cold freshwater fish habitat, and with greater fluctuations in temperature, dissolved oxygen, pH, and turbidity.

The comprehensive sampling in 1999 by Inyo County included a large number of minerals, chemical pollutants, and organic compounds. Elevated levels of the following parameters were observed: manganese, chloride (winter only), fluoride, and orthophosphates. The results did not indicate water quality problems related to coliform bacteria, pesticides, ammonia, total nitrogen, sulfates, and various organic compounds. No exceedances of quantitative Basin Plan water quality objectives were found, with the exception of DO.



Data Source: Inyo County

Chart 4-5. Water Quality Along the Lower Owens River, 1999

Channel Organic Sediments or Muck

The river channel in the wetted portion of the river from near Mazourka Canyon Road to the pump station site contains significant deposits of organic sediments or muck. These anaerobic deposits are comprised of plant detritus, cattle manure, and inorganic sediments. In an active river, they would be subject to scouring and decomposition. However, flows in the Lower Owens River are very slow, facilitating an accumulation of muck. In 1988, Inyo County conducted field surveys along a 32-mile long reach from Mazourka Canyon Road to Keeler Bridge to measure the volume of muck in the channel at over 40 locations.

The County believes BOD values measured in sediments during a sampling event in December 1988 by the County to be the best available data. At that time, 15 samples were collected at various locations along the river. BOD values ranged from 1,100 to 21,000 mg/kg. Ignoring the highest and lowest values, the mean BOD value is 6,910 mg/kg.

These data (Inyo County, unpublished data) were used to estimate average depth, width, and volume of muck, as shown below in Table 4-8.

TABLE 4-8
SUMMARY OF MUCK MEASUREMENTS AT 40 SAMPLING LOCATIONS ON THE LOWER OWENS RIVER

Average Width	Maximum Width	Average Depth	Average Max. Depth	Maximum Depth
37 feet	72 feet	0.42 feet	2.13 feet	4.0 feet

Source: Inyo County Water Dept.

Based on these measurements, the total estimated quantity of muck from Mazourka Canyon Road to Keeler Bridge was 103,700 cubic yards (Inyo County, unpublished data). The estimated quantity from Keeler Bridge to the pump station site (a distance of about 6 miles), utilizing the same average depth and width of upstream reaches, is 19,400 cubic yards. Hence, the total estimated channel sediment quantity along the river downstream of Mazourka Canyon Road is 123,100 cubic yards.

In December 1999, Inyo County collected several organic sediment samples for laboratory analysis (Jackson 1999). Each sediment sample was analyzed for total organic carbon (TOC), sulfides, ammonia as nitrogen, arsenic, lead, silver, zinc, mercury, tannin and lignin, volatile dissolved solids, dissolved methane, and total suspended solids. The channel sediments can be classified as silty clay to silty loam with less than 10 percent organic matter.

A summary of chemical analysis of the channel sediment is provided below in Table 4-9 and key findings are listed below:

- TOC values ranged from 550 mg/kg at Mazourka Canyon Road to 7,660 mg/kg at Keeler Bridge.

- Sulfides were not detected in the sample collected from the Blackrock Ditch sampling site, but were detected elsewhere at concentrations that ranged from 27 mg/kg at Mazourka Canyon Road to 119 mg/kg at the pump station site.

- Concentrations of ammonia measured as nitrogen ranged from 2 mg/kg at Mazourka Canyon Road to 38 mg/kg at the Lone Pine Ponds. A general trend of increasing levels along the river was observed.
- Lead, silver, and mercury were not detected in the sediment samples collected.
- Zinc was detected in some sediment samples at low concentrations.
- Tannin and lignin, derived from plant organic matter, were detected in each sediment sample at concentrations ranging from 3.2 µg/g at Mazourka Canyon Road to 29 µg/g at both Lone Pine Station Road and the Lone Pine Ponds.
- Volatile dissolved solids (VDS) were detected in each sediment sample from 1.5 percent at the Mazourka Canyon Road to 30.2 percent at Lone Pine Ponds. Generally, VDS increased downstream.
- Arsenic was detected in all the sediment samples with a maximum concentration of 6.8 mg/kg from samples at Blackrock Ditch. Arsenic is a naturally occurring constituent in the river derived from geothermal sources in the headwaters.
- Dissolved methane was detected in all sediment samples with the exception of samples at Blackrock Ditch. Dissolved methane concentrations ranged from 76 µg/kg at Manzanar Reward Road to 18,000 µg/kg at Lone Pine Ponds. Dissolved methane increased from Manzanar Reward Road to Lone Pine Ponds, then dropped significantly for Keeler Bridge (380 µg/kg) and the pump station site (140 µg/kg).

TABLE 4-9
CHEMICAL CHARACTERISTICS OF MUCK SAMPLES ALONG THE RIVER, 1999

Sampling Location	Total Organic Carbon (TOC)	Sulfides	Ammonia as Nitrogen	Arsenic	Zinc	Tannin and Lignin	Volatile Dissolved Solids	Dissolved Methane
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	µg/g	percent	µg/kg
Blackrock Ditch	1,200	ND	3	6.8	11	12	1.7	ND
Mazourka Cyn Rd	550	27	2	1	6.0	3.2	1.5	1,700
Manzanar-Reward	4,810	91	5	4.6	7.5	17	4.0	76
Reinhackle Springs	4,540	65	21	4	ND	15	11.4	91
Lone Pine Station Rd	5,060	39	13	3	5.7	29	19.7	3,900
Lone Pine Ponds	4,050	28	38	2	ND	29	30.2	18,000
Keeler Bridge	7,660	91	11	4	6.6	17	19.28	380
Pump Station Site	6,260	119	14	2	7.0	10	21.1	140

Source: Jackson,1999. Lead, silver, and mercury were not detected in any samples.

4.4.3 Potential Impacts – Water Quality

4.4.3.1 Water Quality Degradation Due to New Flows

The primary water quality concern related to rewatering the Lower Owens River is the potential for project baseflows and seasonal habitat flows to degrade water quality in the current wet reach of the river downstream of Mazourka Canyon Road. The degradation of water quality is expected to primarily relate to lowered DO and increased levels of arsenic, turbidity, total suspended solids, hydrogen sulfide, and ammonia.

This section describes the potential effects to water quality that could result from the release of flows as proposed under the LORP. The assessment of effects is based on observations of various water quality parameters made during the 1993 experimental release study. These observations are useful for predicting what conditions are likely to reoccur when project flows are initiated in the Lower Owens River.

Water Quality during Planning Study Releases (1993)

Between July 6 and August 12, 1993, Inyo County and LADWP (with the approval of California Department of Fish and Game) conducted an experimental study to develop predictions of fish and wildlife habitat that would be created in response to various flows. In addition, Inyo County and LADWP collected water quality and flow measurements at nine gaging stations (Jackson, 1994a). Over a period of about 38 days, water was released into the river channel, primarily from the River Intake and Alabama spillgates.

Water was released initially from the River Intake, and subsequently from five spillgates located downstream. The initial flow was approximately 20 cfs and was rapidly increased to 155 cfs (day 15). The flows were subsequently reduced, until the normal summer flow regime (of 1 to 5 cfs at Keeler Bridge) was reestablished 40 days after the initial release. Typical hydrographs for two of the sampling stations are shown on Charts 4-6 to 4-9, indicating a rapid ramping to the peak flows, followed by a rapid then steady decrease.

Five water quality parameters were measured on a near-daily basis: DO, turbidity, pH, electrical conductivity and temperature (Jackson, 1994a). The range and mean values for the five parameters are shown in Table 4-10 for the nine gaging stations. Measurements of DO and temperature at two of the gaging stations are shown on Charts 4-6 to 4-9.

TABLE 4-10
WATER QUALITY ALONG THE LOWER OWENS RIVER DURING THE 1993 EXPERIMENTAL RELEASES

Sampling Site and Miles from Intake	Mean Values (range in parentheses)				
	Dissolved Oxygen (mg/l)	Turbidity (NTU)	pH	Elec. Cond. (*m*ohms /cm)	Temperature (F)
River Intake 0 mi	6.4 (4.2-7.4)	19 (7.6-44)	7.7 (7.2-8.5)	0.28 (.22-.33)	71 (67-75)
East of Goose Lake 11. 4 mi	6.1 (4.2-8.7)	1.9 (1.1-4.8)	7.7 (7.1-8.4)	0.37 (.23-.66)	75 (64-83)
Five Culverts 17.3 mi	2.6 (0.8-5.6)	1.5 (0.8-4.7)	7.3 (7.1-7.6)	0.38 (.29-.75)	72 (64-79)
Mazourka Cyn Rd 23.4 mi	3.0 (1.6-6.3)	1.4 (0.6-2.7)	7.2 (6.8-7.6)	0.39 (.27-.54)	71 (64-79)
Manzanar-Reward Rd 32.2 mi	2.8 (0.4-6.4)	1.3 (0.7-2.9)	7.1 (6.7-7.4)	0.41 (.35-.55)	71 (65-77)
Reinhackle Spring 38.7 mi	2.3 (0.3-5.9)	2.0 (0.1-11)	7.2 (6.8-7.4)	0.43 (.29-.50)	71 (65-76)
Lone Pine Ponds 48.8 mi	1.1 (0.2-5.8)	9.8 (1.2-31)	7.2 (6.5-7.4)	0.63 (.48-.84)	72 (66-76)
Lone Pine Narrow Gauge Rd, 49.7 mi	1.3 (0.2-4.8)	12.0 (1-39)	7.2 (6.8-7.6)	0.63 (.49-.91)	71 (64-75)
Keeler Bridge 55.7 mi	2.1 (0.3-6.5)	2.4 (1-5.6)	7.2 (7.1-7.5)	0.68 (.52-.96)	71 (66-80)

Source: Jackson,1994a. Interested readers should consult Jackson (1994a) for standard deviations.

The mean turbidity at the sampling sites was generally 2.0 NTUs or less except in the lower reaches below Lone Pine Ponds where it varied from 9.8 to 12.0 and at the River Intake. The pH values were between 7.1 and 7.7 over the entire river reach. Mean daily temperature was about 71 degrees F (slightly higher than the August 1999 field sampling), and was very consistent among sampling sites. Electrical conductivity (EC) increased with distance along the river during the study. EC was used to estimate the concentration of total dissolved solids (TDS). The data indicate that maximum TDS concentrations were less than 600 mg/L throughout the river reach. Average TDS concentrations were over 400 mg/L at Keeler Bridge, about 400 mg/L at Lone Pine and less than 300 mg/L upstream of Reinhackle Spring.

The DO levels at Mazourka Canyon Road were between 2 to 3 mg/l when flows reached about 50 cfs, but never dropped lower even with flows up to 90 cfs (Chart 4-6). DO levels dropped below 2 mg/l briefly, after peak flows had dropped back down below 35 cfs, near day 30, then increased over the next 20 days. At Keeler Bridge, DO levels decreased with increased flow rate (Chart 4-8). However, when flows were greater than 60 cfs, the DO concentration dropped to below 1 mg/L, and remained low through the experimental releases, increasing toward the end of the study period, as flows decreased.

In addition to measuring the five water quality parameters, on August 5, 1993 (day 31 of the study), LADWP and Inyo County collected samples when the lower portion of the river was flowing at about 40 cfs. These samples were analyzed for hydrogen sulfide, ammonia, and suspended solids. The key results are as follows:

- The concentration of hydrogen sulfide measured in the river below Mazourka Canyon Road exceeded concentrations considered lethal to bluegill (LADWP, unpublished data). Hydrogen sulfide is extremely toxic to fish. For example, the 96-hour LC_{50} for adult bluegill at 67- 68 degrees F is 0.045

mg/l (as quoted in Jackson, 1994a). Total hydrogen sulfide concentrations measured on August 5, 1993, ranged from 0.18 to 0.65 mg/l (Jackson, 1994a).

- Ammonia is also toxic to fish. The concentrations of total ammonia and un-ionized ammonia were measured on August 5, 1993 of the field experiment, when flows were about 40 cfs (Jackson, 1994a). The measured values were below EPA thresholds for coldwater fish. However, Jackson (1994a) speculates that higher unionized ammonia levels that were not detected in the sampling may have been present at high flows during the 1993 study.

Based on the observed water quality, it is clear that the flows released to the river during the 1993 experimental flow study were the cause of degraded water quality and subsequent fish kills that occurred in the river downstream from Mazourka Canyon Road. DO and hydrogen sulfide in this reach of the river were at levels toxic to the fishery. Given the existence of toxic material in the organic streambed sediments, it is possible that the observed water quality effects resulted from the interaction of the study flows with the sediments. Although the precise mechanisms by which the flow study caused the fish kills and the hydraulic thresholds that triggered the water quality degradation are unknown, it is likely that, when project flows are initiated in the future, such conditions could reoccur.

It should be noted that the 1993 field experiment was of short duration, which did not allow sufficient time to stabilize flows or water quality. Hence, the potential for water quality conditions to improve under more stable flows was not evaluated. It is possible that the poor water quality conditions observed in 1993 could have improved after several weeks of stabilized flows. However, because the flow study did not last long enough to allow the improvement of water quality with higher river flows, it is not possible to predict how long water quality effects would occur under the project flows.

The predictions of water quality impacts based on the 1993 field experiment do not take into account ambient air and water temperatures. The 1993 field experiment was conducted in mid-summer when high temperatures could have exacerbated the increase in BOD and off-gassing from the organic sediments. Releases in the winter could inhibit these reactions and thus reduce the magnitude of the water quality impacts.

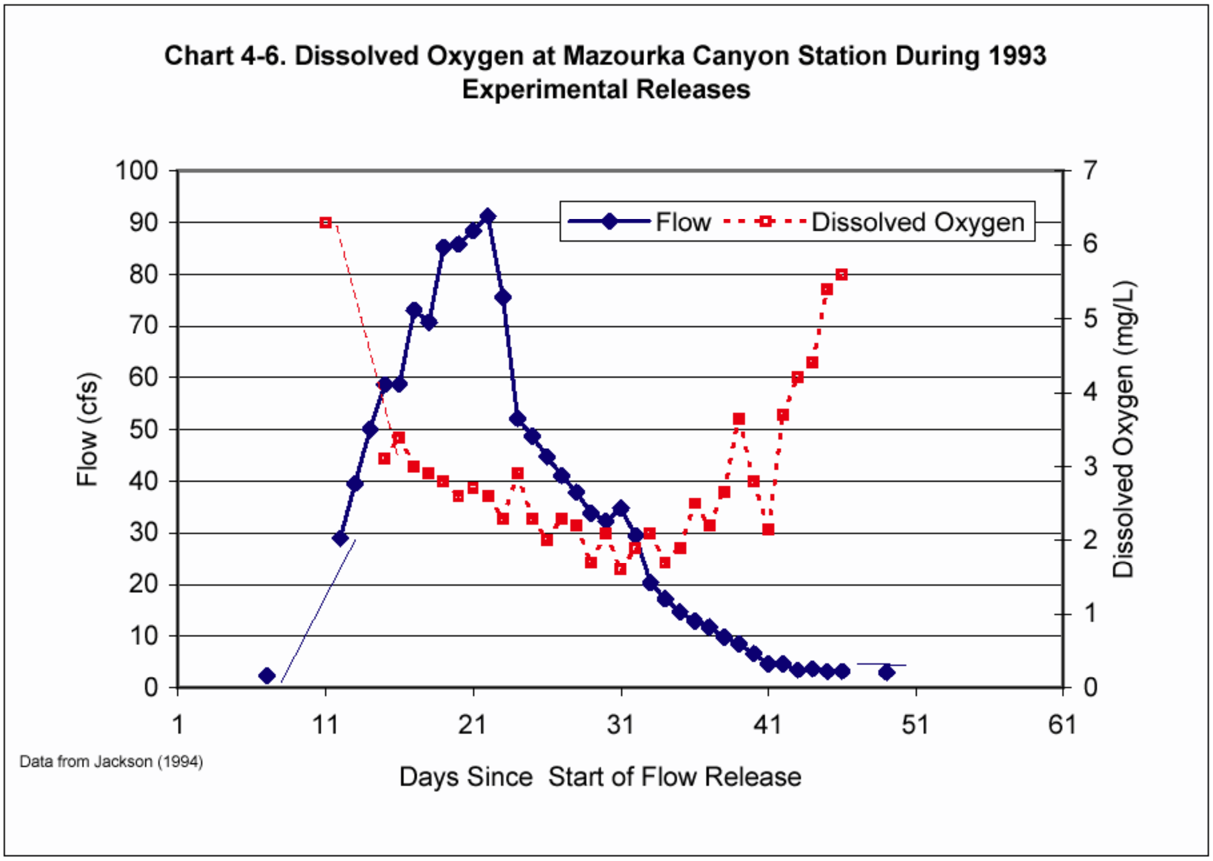


Chart 4-6. Dissolved Oxygen at Mazourka Canyon Station During 1993 Experimental Releases
Flow
Dissolved Oxygen
Flow (cfs)
Dissolved Oxygen (mg/L)
100
90
80
70
60
50
40
30
20
10
0
7
6
5
4
3
2
1
0
1
11
21
31
41
51
61
Data from Jackson (1994)
Days Since Start of Flow Release

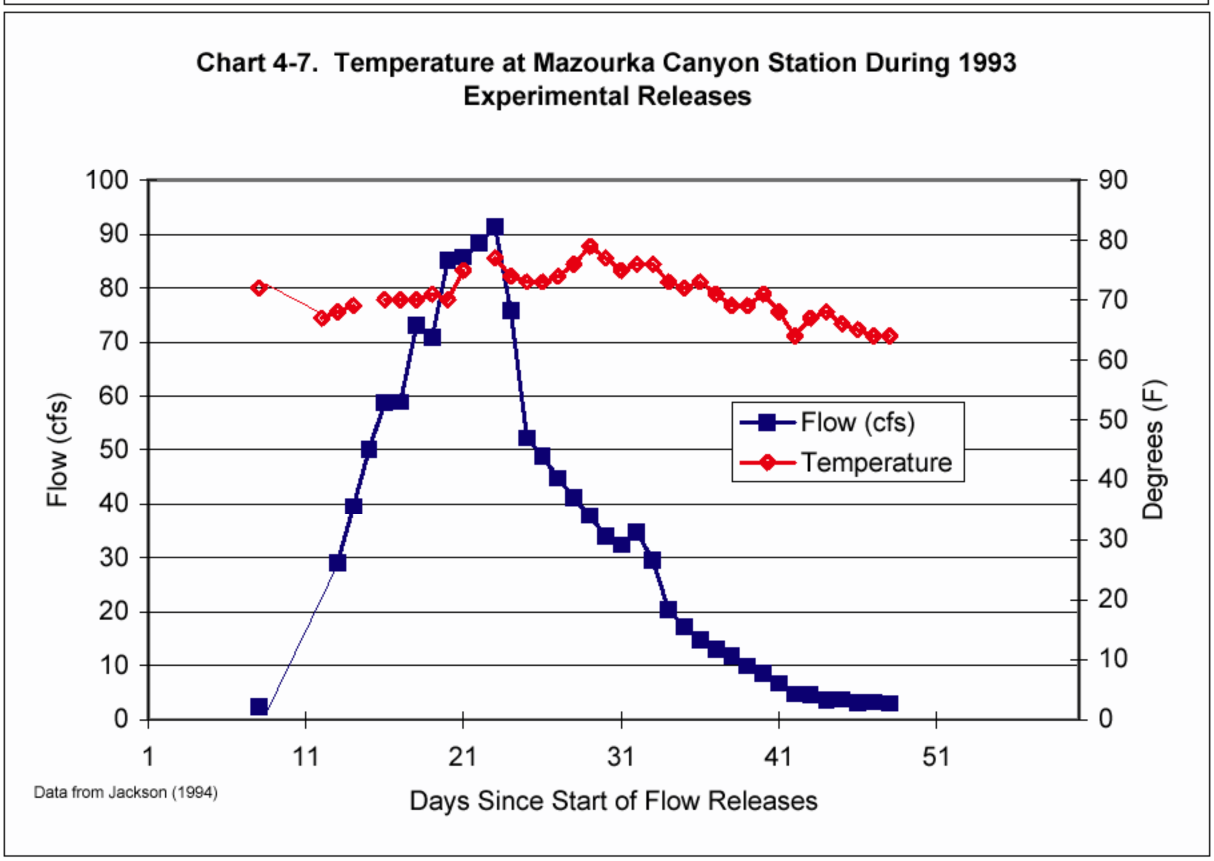


Chart 4-7. Temperature at Mazourka Canyon Station During 1993 Experimental Releases
Flow (cfs)
Temperature
Flow (cfs)
Degrees (F)
100
90
80
70
60
50
40
30
20
10
0
90
80
70
60
50
40
30
20
10
0
1
11
21
31
41
51
Data from Jackson (1994)
Days Since Start of Flow Releases

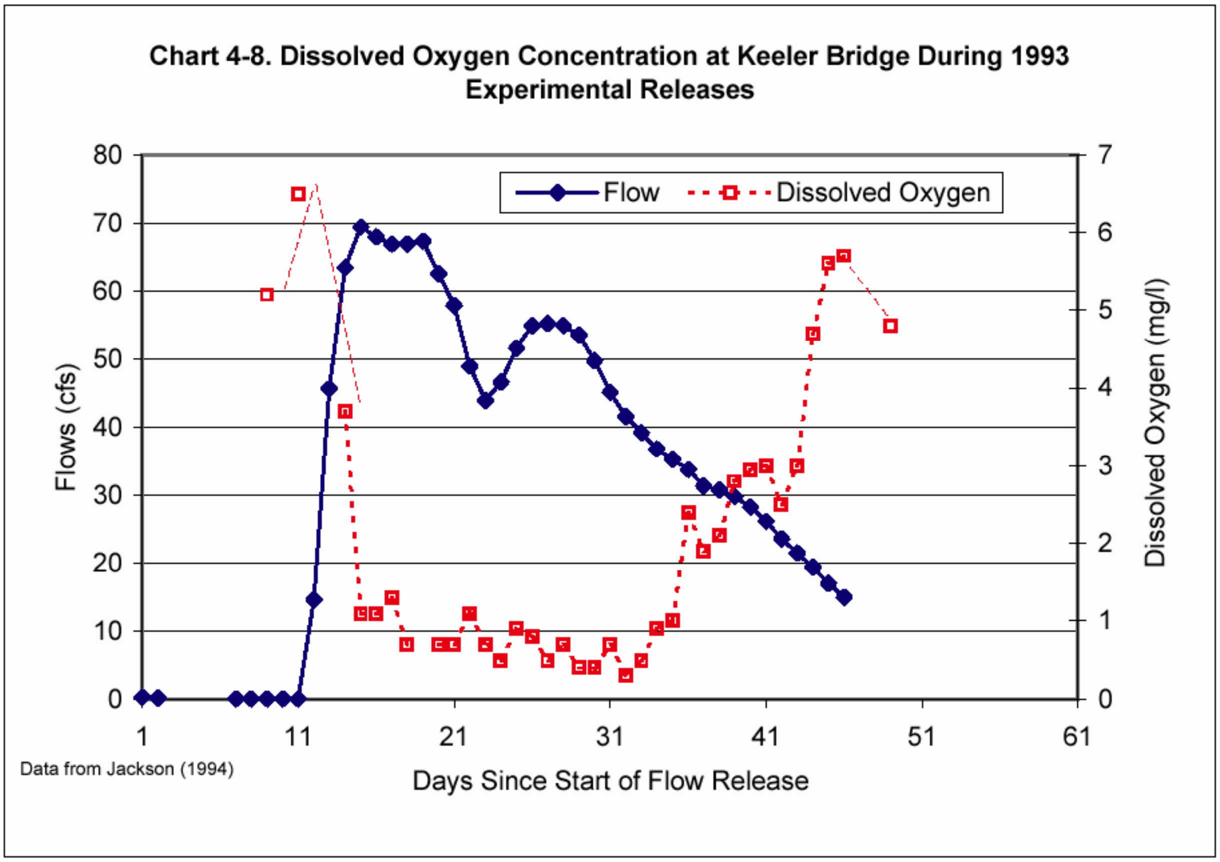


Chart 4-8. Dissolved Oxygen Concentration at Keeler Bridge During 1993 Experimental Releases
Flow
Dissolved Oxygen
Flows (cfs)
Dissolved Oxygen (mg/l)
Days Since Start of Flow Release
Data from Jackson (1994)
0
10
20
30
40
50
60
70
80
0
1
2
3
4
5
6
7
1
11
21
31
41
51
61

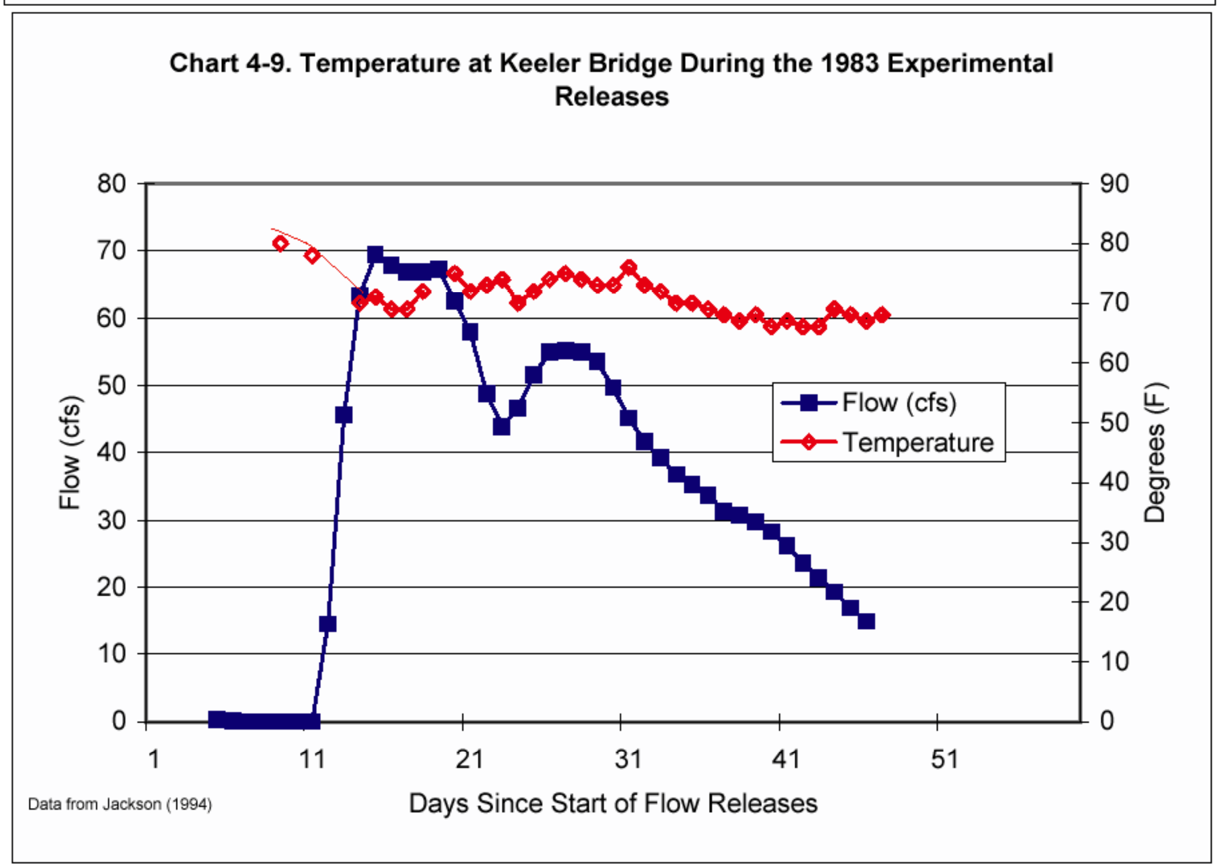


Chart 4-9. Temperature at Keeler Bridge During the 1983 Experimental Releases
Flow (cfs)
Temperature
Flow (cfs)
Degrees (F)
Days Since Start of Flow Releases
Data from Jackson (1994)
0
10
20
30
40
50
60
70
80
90
1
11
21
31
41
51

Other Water Quality Observations – Aqueduct Cleaning

LADWP released water from the Alabama spillgates from August 15 to 27, 2001 while the Aqueduct was being cleaned. No flow measurements were made, but LADWP staff estimates that the flow rates from the spillgates reached about 24 cfs within several days. Water quality measurements were taken at the Alabama spillgates, Lone Pine Ponds, Lone Pine Station Road, Keeler Bridge, and below Keeler Bridge. Constituents measured included temperature, dissolved oxygen, electrical conductivity, turbidity, and pH (LADWP, unpublished data).

Dissolved oxygen concentrations were substantially higher in water released from the Aqueduct at the Alabama spillgates than in the Lower Owens River stations. DO levels were 7 mg/l and higher at the Alabama spillgates compared to along the river, where DO levels were 1 to 4 mg/l, with most measurements less than 2 mg/l. The releases from the Alabama spillgates on August 15, 2001 took several days to reach Keeler Bridge. The increased flows in the river apparently did not affect DO levels, as there was no overall decrease in DO concentrations along the river due to the new flows. Electrical conductivity levels exhibited a similar pattern: very low values in water from the Aqueduct compared to higher values in the river, with no trend in increasing conductivity with the release of water to the river. Turbidity levels in Aqueduct water and in the river were similar and very low (2 to 3 NTUs) throughout the release period and did not exhibit an increase as flows reached the downstream stations.

Other Water Quality Observations - Impacts from Beaver Dam Removal

On August 2, 2001, LADWP, Inyo County, and CDFG removed six beaver dams along the Owens River between the Alabama spillgates and Lone Pine Station Road. The dams were removed using a claw-like device suspended from a helicopter, which lifted the centers of the dams and deposited the materials in nearby upland areas. Jackson (2001) made measurements of the following water quality parameters above and below the dam removal sites immediately before and after the action: temperature, dissolved oxygen, electrical conductivity, and turbidity.

Flows of up to 7 cfs were induced by the breaching of the dams. Small turbid plumes were created downstream of the beaver dams during removal if open water was present. The plumes terminated within 150 feet of the dam removal site (Jackson, 2001). Jackson (2001) reported that taking samples from the river channel caused more turbidity than the dam removal.

Jackson (2001) reports that there was no noticeable decrease in dissolved oxygen during the dam removal process. In fact, the increased flows from breaching a dam often increased dissolved oxygen levels below the dams, apparently due to aeration of the water. Jackson (2001) also reports that there were no significant changes in electrical conductivity due to dam breaching. These data indicate that the method of dam removal employed in August 2001 and the increased flows of up to 7 cfs had only a negligible effect on water quality.

Water Quality Modeling

Based on the results of the 1993 flow study, water quality conditions in the river under the 40-cfs baseflow were predicted using the QUAL2E model (Technical Memorandum #7, Ecosystem Sciences, no date). The model provided predictions for eleven water quality parameters at eight reaches along the River. Predicted values of parameters related to fish health were: 2.5 to 6.1 mg/L for DO; 71 to 80 °F for temperature; and 0 to 0.04 mg/L for ammonia as nitrogen. Predicted DO values for several reaches were below 5 mg/L, which is the 1-day minimum threshold for warmwater fish species in early life stages. Predicted ammonia concentrations were well below levels toxic to fish. Hydrogen sulfide was not one of the parameters predicted by the model.

The 1993 flow study represented worst case conditions for dissolved oxygen since it was conducted in the summer and the increased flows mobilized organic materials from the channel bottom and the floodplain. While the results of the QUAL2E model also represent worst case predictions in some respect, the use of the model as a predictive tool for changes in water quality conditions under LORP is limited since the 1993 flow study did not reflect equilibrium conditions.

Impact Conclusions

Based on the available data and analytic tools, it appears that the proposed 40-cfs baseflow and seasonal habitat flows could degrade water quality and adversely affect fish due to the depletion of oxygen and the possible increase in hydrogen sulfide and ammonia. These impacts are only expected to occur along the wetted reach of the river where the organic sediment deposits are present, affecting about 37 channel miles of the 62-mile length of the river. It is anticipated that water quality conditions will improve under the 40-cfs baseflow over time, but may be subject to periodic disturbance by the seasonal habitat flows of up to 200 cfs. The time required to stabilize water quality under the baseflow and seasonal habitat flows is unknown. Based on the analysis presented herein, it is speculated that the impacts would diminish with time and continual flows in the river. Eventually, water quality conditions in the river are expected to improve over current conditions. Over the long-term, increased water availability should improve overall conditions for realizing an increase in beneficial use of the water (mainly increased habitat).

As described in Section 2.3.5.3, the first seasonal habitat flow will be released in the winter (i.e., when temperatures are lower) to reduce the potential for substantial decreases in dissolved oxygen and adverse effects on fish health. However, the effectiveness of the first seasonal habitat flow to reduce water quality impacts during subsequent seasonal habitat flows (scheduled to occur in May/June) is uncertain. In addition, there is still a potential for significant water quality impacts to occur during the establishment of the 40-cfs baseflow.

Additionally, the proposed spillgate releases (see Sections 2.3.5.2 and 2.3.5.4) are designed to provide fish with refuge areas of higher quality water (higher DO, lower turbidity) at the confluences of spillgate channels with the river channel. Spillgate releases are not intended to improve water quality throughout the river. The spillgate releases will not be of velocities high enough to cause additional stirring of organic sediments. In addition, the ditches downstream of the spillgates are maintained and do not contain substantial amounts of organic sediments. Therefore, spillgate releases are not expected to further depress DO as a result of sediment disturbance.

The proposed baseflow and seasonal habitat flows could cause water quality degradation along the Lower Owens River from Mazourka Canyon Road to the pump station site. **This impact is considered significant and unavoidable (Class I).** The poor water quality conditions would adversely affect the following beneficial uses: Cold Freshwater Habitat, Warm Freshwater Habitat, Commercial and Sportfishing, Non-Contact Water Recreation, Wildlife Habitat. Water quality conditions could result in fish kills. The following water quality objectives may not be met during this period: Biostimulatory Substances, Chemical Constituents, Dissolved Oxygen, Floating Materials, Non-Degradation of Aquatic Communities and Populations, Sediment, Settleable Materials, Suspended Materials, Taste and Odor, Temperature, and Turbidity. There is potential for toxic substances to be released to the water in deleterious amounts – in particular, naturally-occurring hydrogen sulfide and ammonia. The impacts associated with a slower release of flows to the river are discussed in Section 11.3.

Based on recommendations by the Regional Board (NOP letter dated February 24, 2000), stilling ponds were evaluated as a potential mitigation measure for reducing short-term water quality impacts. However, this measure was determined to be infeasible as described below:

- The use of stilling ponds to capture and settle out sediments could reduce the turbidity effects of initial flow releases. However, this strategy is considered infeasible since it would reduce the ability of seasonal habitat flows to spread channel sediments onto the floodplains. The spreading of sediments onto the floodplains is necessary for riparian habitat development, and is an objective of seasonal habitat flows stated in the MOU.

4.4.3.2 Water Quality Impacts from Channel Clearing and Tule Removal

As described in Section 2.3.6, LADWP will remove channel sediments and vegetation in the river channel immediately downstream of the River Intake prior to the initial release of water. The physical disturbance to these sediments may cause water quality impacts when the initial releases are made because there will be loose sediments and vegetative debris. However, channel sediments in this currently dry reach of the river consist primarily of unconsolidated sand and contain less organic matter than in the currently wetted reaches below Mazourka Canyon Road. Therefore, water quality impacts in this reach during initial releases are expected to be short-term and localized compared to the currently wetted reaches. **Hence, this water quality impact is considered less than significant (Class III).**

As described in Section 2.3.9, the LORP does not include mechanical removal of sediments once the river is flowing. In addition, limited stands of cattail and bulrush will be removed only on rare occasions and only if they are causing significant flow constrictions along the river or at culverts, or if they significantly impede the goals of the LORP (see Section 2.10).

The removal of cattail and bulrush stands could cause localized water quality impacts. Mechanical removal of cattail and bulrush stands would involve the use of a Gradall® or clamshell bucket working in the wetted channel. The physical excavation of the vegetation, including the root mass, would cause increased turbidity and suspended sediments at and downstream of the work areas. In addition, it is likely that the excavated sediments associated with the root mass could increase biochemical oxygen demand, reduce dissolved oxygen concentrations, and increase concentrations of undesirable constituents such as ammonia and sulfur compounds. The water quality impacts are expected to be temporary and localized, similar to those observed during beaver dam removal (see above). Water quality conditions are expected to improve within hours as suspended sediments settle to the channel bottom and/or are mixed with better quality water downstream. **The short-term and localized degradation of water quality associated with a cattail and bulrush removal operation is considered an adverse, but not significant impact (Class III).** LADWP would employ standard best management practices under a CDFG 1602 Streambed Alteration Agreement to further reduce this impact.

4.4.4 Mitigation Measures

No mitigation measures are considered feasible to reduce or avoid the significant temporary water quality impacts associated with the initial release regime for the 40-cfs baseflow and seasonal habitat flows.

Mitigation measures to reduce impacts to fish are described in Section 4.6.3. Three alternative release regimes are described in Section 11.3.

4.5 WETLANDS AND RIPARIAN HABITAT

4.5.1 Existing Conditions

The following description of vegetation along the river was prepared by White Horse Associates. Vegetation types in the Lower Owens River corridor were mapped by White Horse Associates from 1:12,000 scale aerial photos dated July 1992 and reported by Ecosystems Sciences (1997). White Horse Associates is currently re-mapping the same area from digital orthophotos dated September 2000. Major vegetation types identified in the earlier study were coupled with preliminary field descriptions of vegetative, soil and hydrologic character from the latter study. Vegetation and miscellaneous types adapted from the former study are presented below and generally ordered from wet to dry. The wetland status of vegetation types was surmised from descriptions of vegetation, soil and hydrology in areas representative of each type.

Marsh/wet alkali meadow: This complex map unit consists of extensive marsh and wet alkali meadow vegetation types that occur on the wetted floodplain of the Lower Owens River. Dominant plant species in marsh include common cattail (*Typha latifolia*), southern cattail (*Typha domingus*), tule bulrush (*Scirpus acutus*), and common reed (*Phragmites australis*). Widely scattered tree willows (*Salix goodingii* and *S. laevigata*.) are often included. Dominant plants in wet alkali meadow include common threesquare (*Scirpus pungens*), annual sunflower (*Helianthus annuus*), Baltic rush (*Juncus balticus*), saltgrass (*Distichlis spicata*) and clustered field sedge (*Carex praegracilis*). Hydric vegetation is present in both marsh and wet alkali meadow. Marsh is typically permanently flooded to saturated; wet alkali meadow is typically saturated at or near the surface. Wetland hydrology and soil are evident. These vegetation types are classified as wetlands, and are categorized as transmontane alkali marsh and rush/sedge Holland types.

Riparian forest: This vegetation type occurs mostly within the wet floodplain and, less extensively, on banks immediately adjacent to the wet floodplain. The tree canopy is dominated by black willow (*Salix goodingii*) and/or red willow (*Salix laevigata*). Scattered Fremont cottonwood (*Populus fremontii*), saltcedar (*Tamarix ramosissima*), and Russian olive (*Elaeangus angustifolia*) may be present. On wet floodplain a marsh understory is typically present and trees are decadent; water regimes are permanently flooded to saturated and hydric soils are evident. Along elevated streambanks understories are similar to alkali meadow, groundwater is typically less than 2 feet deep and hydric soils may be evident. These communities are classified as wetlands. Given existing hydrologic conditions and the absence of streambars, tree willows are not currently reproducing. In the course of 10 days of field study, not one tree willow seedling was found, except along the dry sandy streambed in the upper reach. Riparian forest is included in the Modoc-Great Basin cottonwood/willow and Mojave riparian forest Holland types.

Alkali meadow: This vegetation type occurs on floodplain and low terrace of the Lower Owens River corridor. The dominant plant species is saltgrass, sometimes complimented by alkali sacaton (*Sporobolus aeroides*) and beardless wild rye (*Leymus triticoides*). Scattered rubber rabbitbrush (*Chrysothamnus nauseosus*) and Nevada saltbush (*Atriplex lentiformis*) may be present, especially on low terraces. The alluvial groundwater level for alkali meadow that occurs on floodplains is typically less than 2 feet below the surface and hydric soils are evident – these alkali meadow types are wetland. The groundwater level for alkali meadow that occur on low terraces is typically greater than 3 feet deep and indices of hydric soil are not evident – these are uplands. Alkali meadow on low terraces is mostly alkali scrub/meadow that has burned recently. In a current study of vegetation types along the Lower Owens River corridor, about a third of the alkali meadow occurred on floodplain and was considered wetland and the remaining two-thirds was considered upland. This corresponds with the alkali meadow Holland type.

Alkali scrub meadow: This vegetation type occurs on low terraces along the Lower Owens River. A low shrub overstory is typically dominated by rubber rabbitbrush and Nevada saltbush. Saltgrass and alkali sacaton are prominent in the understory, typically with greater than 50 percent total cover. The alluvial groundwater level is typically 3 feet or deeper. Hydric soils are not evident. This is an upland vegetation type. Burning converts alkali scrub/meadow to the non-wetland alkali meadow type. This corresponds with the rabbitbrush meadow and Nevada saltbush meadow Holland types.

Saltcedar scrub: This vegetation type occurs mostly on high terraces, but also occurs along the floodplain and low terraces in the upper reach that is dry. Saltcedar is the dominant overstory. The understory is sparse. Wetland hydrology and hydric soil are not evident. These are upland types. This corresponds with the tamarix scrub Holland type.

Alkali scrub: This vegetation type occurs on high terraces and fans along the Lower Owens River. A low shrub overstory is typically dominated by greasewood (*Sarcobatus vermiculatus*), rubber rabbitbrush, and/or Nevada saltbush, in both mixed and pure stands. The understory is very sparse. Groundwater is typically 5 feet or deeper. Hydric soils are not evident. Alkali scrub is an upland. This corresponds with the greasewood scrub, rabbitbrush scrub and Nevada saltbush scrub Holland types.

4.5.2 Potential Impacts – Vegetation

<u>Anticipated Conversions in Vegetation Types</u>

Ecosystem Sciences (unpublished data, October 2001) conducted an analysis of the expected change in vegetation types due to the increased baseflows and seasonal habitat flows in the river. In the study, future vegetation types along the Lower Owens River were predicted based on: (1) HEC-2 hydrologic analyses; (2) existing landform and vegetation types mapped from 1993 aerial photos; and (3) elevations estimated along cross-channel transects. Based on these investigations, the distribution of vegetation types was predicted in the area that will be affected by the 40 cfs baseflow and 200 cfs seasonal habitat flows. The 200 cfs modeling was conducted based on the premise that 200 cfs would be achieved along the entire river reach, so the extent of overbank flooding is likely to be less under the proposed project.

The acreages of existing vegetation types along the river are shown in Table 4-11. The table shows the vegetation types in general progression from wet to dry. The predicted habitat conversions that would occur over time due to the 40 cfs baseflows and 200 cfs seasonal habitat flows are also shown. The results of Ecosystem Sciences (unpublished data, October 2001) are summarized below.

- Existing herbaceous wetland vegetation types (marsh/wet alkali meadow, and alkali meadow) would increase substantially due to greater availability of water from flooding and lateral diffusion. The area of herbaceous wetland was predicted to increase from 559 acres to 2,631 acres.
- New riparian forest would be created as willows and cottonwood colonize barren streambars, mostly in the dry reach above Mazourka Canyon Road and, less extensively, existing wetlands and riparian habitats along the wet reach of the river to the south. It was estimated that an additional 854 acres of riparian forest will be created over time. However, given the extensive existing and future flooding and the absence of streambars necessary for establishing new riparian forest in the Lower Owens River, these estimates may be optimistic. These would be considered wetlands under the Holland classification system. If hydric soils and wetland hydrology and vegetation are present, they would also be considered wetlands under the Corps of Engineers' wetland definition.

- Alkali scrub meadow totaling 2,343 acres is predicted to be converted to various wetland and riparian vegetation types due to altered hydrologic conditions along the river. This would be the largest single habitat conversion due to the rewatering of the river.

The vegetation goal for the Riverine-Riparian System from the MOU is to "…*create and sustain healthy and diverse riparian and aquatic habitats*…" To meet the requirements of the MOU, the habitats must be as self-sustaining as possible. Increased flows in the Lower Owens River are expected to increase the productivity of wetland and riparian vegetation types, and cause type conversions. The new flows are expected to increase plant productivity due to greater moisture availability. In addition, natural disturbance from the seasonal habitat flows will promote natural reproduction and recruitment, as well as facilitate natural vegetation succession through physical disturbances that encourage species colonization and cause turnover of nutrients and carbon. Hence, a "healthier" riparian system is anticipated, as required under the MOU.

Over time, the rewatering of the river is predicted to convert about 2,343 acres of alkali scrub/meadow (an upland vegetation) and 531 acres of alkali meadow (upland phase) to various wetland and riparian vegetation types due to inundation effects and altered hydrologic conditions along the river. In considering the significance of the conversion of the approximately 3,000 acres of upland vegetation to wetland and riparian vegetation types, LADWP considered the following:

- Within the context of the total acreage of upland vegetation in Owens Valley, the upland acreage to be converted under LORP is a relatively small percentage of the total area. The total acreage of alkali meadow (upland phase) and alkali scrub/meadow type vegetation in the Owens Valley is estimated to be approximately 96,000 acres, or 42 percent of the total area mapped (approximately 227,000 acres) (mapping based on the vegetation inventory in the Green Book (LADWP and Inyo County, 1990)). The loss of a total of 2,874 acres of upland alkali meadow and alkali scrub/meadow type vegetation in the LORP area represents approximately 3 percent of the total acreage present in the Valley.

- Due to changes in hydrologic conditions, implementation of LORP has the potential to increase areas of upland vegetation along the river corridor adjacent to the new riparian areas. Additionally, land management changes proposed under LORP are expected to have an overall beneficial impact on upland habitats. The acreage of this increase/enhancement has not been quantified.

- Riparian and wetland areas created under LORP are expected to have greater habitat values than the existing upland areas that will be converted.

- Other activities are currently ongoing that have the aim of improving upland habitat areas in the Valley. LADWP is implementing upland revegetation projects on 1,300 acres of abandoned agricultural land as part of mitigation identified in the 1991 EIR.

- The conversion would restore native riparian habitats that existed prior to 1913 when diversion of the river into the Aqueduct began.

Therefore, the conversion of almost 3,000 acres of upland vegetation is considered an adverse, but less than significant impact (Class III). The LORP cannot be accomplished without this conversion. The increase of approximately 3,000 acres of wetland and riparian vegetation types along the river **is considered a beneficial impact (Class IV) and desirable outcome of the LORP.**

Vegetation Removal Due to River Channel Clearing

As described in Section 2.3.6, prior to the Phase 1 releases, LADWP will mechanically remove sediments and marsh vegetation from 10,800 feet of the currently dry river channel downstream of the River Intake. A 15-foot wide swath will be excavated within the middle of the existing 40-50 foot wide channel to allow 40 cfs to pass. This action would result in the removal of 3.7 acres of emergent freshwater marsh currently dominated by cattails. **This impact is considered an adverse, but not significant impact (Class III)** because new emergent wetlands will be created over time along the entire Lower Owens River in response to the rewatering, including along the margins of the wetted channel along this reach.

TABLE 4-11
EXISTING AND PREDICTED VEGETATION TYPES ALONG THE RIVER

Vegetation Type	Existing Area		Predicted Future Area		Predicted Change	
	Acres	Percent	Acres	Percent	Acres	Percent
Open water*	629	10.8	640	11.0	11	0.2
Marsh/wet alkali meadow**	293	5.0	1,175	20.2	882	15.1
Riparian forest**	744	12.8	1,598	27.4	854	14.7
Alkali meadow**	266	4.6	1,456	25.0	1,190	20.4
(Total vegetated wetlands)**	1,303	22.4	4,229	72.6	2,926	50.2
Total vegetated wetlands and open water (waters of the US) =	**1,932**	**33.2**	**4,869**	**83.6**	**2,937**	**50.4**
Alkali meadow (upland phase)	531	9.1	0	0.0	-531	-9.1
Alkali scrub/meadow	2,461	42.2	118	2.0	-2,343	-40.2
Saltcedar scrub	178	3.1	166	2.8	-12	-0.2
Alkali scrub	713	12.2	662	11.4	-51	-0.9
Total uplands =	**3,883**	**66.6**	**946**	**16.2**	**-2,937**	**-50.4**
Misc. features (roads, levees) =	**11**	**0.2**	**11**	**0.2**	**0**	**0.0**
TOTAL =	**5,826**	**100.0**	**5,826**	**100.0**	**--**	**--**

Unpublished data from Ecosystem Sciences.
* Open water represents "waters of the United States" under Section 404 of the Clean Water Act, but is not considered "wetlands."
** These vegetation types are usually considered vegetated wetlands under Section 404 of the Clean Water Act if hydric soils and wetland hydrology and vegetation are present.

The channel clearing work would occur from the top of the west bank of the river using a tracked excavator. Both banks will remain undisturbed. Excavated material will be placed directly into dump trucks, and then hauled to a permanent sediment stockpile area adjacent to the River Intake. A temporary 20-foot wide haul road will be established on the top of the west bank for the excavator and trucks. It will be created by driving over the existing vegetation in flat areas, and by minor grading where the terrain is uneven. Several temporary roads will be created perpendicular to the main haul road to provide access to an existing dirt road along the Aqueduct. Establishment of these roads would result in the short-term disturbance of about 8 acres of desert sink scrub. **This impact is considered significant, but mitigable**

(Class II). It would be mitigated by restoring the roads to pre-construction grades and vegetative conditions, per Mitigation Measure R-1.

Noxious Plant Species and Saltcedar

Supplying water to the river could potentially increase the distribution and abundance of perennial pepperweed and other noxious plants, and stimulate the growth of saltcedar, which is a non-native invasive plant that is spreading rapidly in the Owens Valley. The potential for the growth of saltcedar and other noxious plants is fully described in Section 10.4.

Potential Increase in Mosquitoes

The LORP will results in new open water and marsh habitats along the river. These new habitats would provide more opportunities for mosquitoes to breed, which could result in increased nuisance and public health threats to communities and residents near these areas, and to the people engaged in outdoor recreation. The potential for the increase in mosquitoes is fully described in Section 10.3.1.

4.5.3 Mitigation Measures

R-1 Temporary access roads used to clear the river channel shall be seeded with native or naturalized grasses and shrubs common to the valley, as available, after completion of the desilting operation to facilitate restoration of vegetative cover and species compatible with the surrounding vegetation. The colonization by non-native aggressive or noxious weeds shall be inhibited by weed control for 3 years after construction.

4.6 GAME AND NATIVE FISH

4.6.1 Existing Conditions

The following characterization of the native and game fish of the Owens Valley and LORP project area was developed by Garcia and Associates for the EIR/EIS (GANDA, 2000).

Native Fish

Summarized below is a description and qualitative account of the distribution and abundance, habitat preferences and general life-history of the four fish species endemic to the Owens Basin.

Owens Pupfish

The Owens pupfish was federally listed as endangered on March 11, 1967 and was listed as an endangered species by the State of California on June 27, 1971. Owens pupfish are small, deep-bodied fish, approximately 2.5 in. total length (USFWS, 1998). During the breeding season, males and females can be easily distinguished from each other by coloration. Females are dusky, olive green with several dark vertical bars aligned in a row along the sides, and males are bright blue (USFWS, 1998). Owens pupfish can produce multiple generations per year and feed mostly on aquatic insects (Mire, 1993; J. Mire, pers. comm. 2000). Populations studied by Sada and Deacon (1994) demonstrate that adults frequently occupy deeper water than juveniles, but all life stages utilize the variety of microhabitats available.

Mire (1993) conducted extensive research on Owens pupfish demography in intensively managed research ponds, and her data indicate little seasonal variation in population size. However, population numbers may undergo wide variations outside of controlled habitats (USFWS, 1998).

Owens pupfish once occupied aquatic habitats throughout the Owens Valley, preferring the margins of marshes, shallow sloughs and desert springs bordering the Owens River. They were not reported from Owens Lake (Miller and Pister, 1971; USFWS, 1998). The pupfish populations rapidly declined due to the introduction of non-native, predatory fish (e.g., bass) that out-competed the native species, and when native aquatic habitats were altered by groundwater pumping and water diversions from the Owens River and its tributaries. Owens pupfish were believed to be extinct from 1942 (Miller, 1969) until July of 1964, when a single population of approximately 200 fish was discovered in Fish Slough (Miller and Pister, 1971). All extant populations have been propagated from this remnant stock.

Within the LORP area, an isolated, self-sustaining population of Owens pupfish exists near Well 368 in the Blackrock lease (see Section 9.2.1.2; Ecosystem Sciences, 1999; Malengo, 2000). This population was introduced to the outflow of the well in 1986 (Malengo, 2000). Other self-sustaining populations in close proximity to the LORP occur in refuges at Mule Spring and Warm Springs. Populations in the Owens Valley Native Fish Sanctuary in Fish Slough appear to have been extirpated by bass predation (Malengo, 2000). Adjacent to the Native Fish Sanctuary, there are populations below BLM Springs and at Marvin's Marsh (Parmenter, 1999). The pupfish in these locations are physically separated from the main channel (S. Parmenter, pers. comm., 2000). All known populations of pupfish are established in areas isolated from non-native predatory fish (i.e., bass).

Owens Tui Chub

The Owens tui chub was federally listed as endangered on August 5, 1985 (50 FR 31592) and by the State of California on January 10, 1974 (USFWS, 1998). Owens tui chub average about 4 to 5 inches in total length (BioSystems, 1994), although some individuals may reach a total length of 12 inches (USFWS, 1998). Coloration varies from dusky olive above, with a blue or creamy white belly, and copper or gold along the sides of the body (BioSystems, 1994). Owens tui chub can be separated from the similar Lahontan tui chub by several anatomical features, including the number of anal fin rays, gill raker counts of 10 to 14, and 52 to 58 lateral line scales (Miller, 1973). Breeding habits of the Owens tui chub are not well known, although spawning is likely to take place during the spring, with females laying their eggs in shallow water over beds of vegetation. McEwan (1990) observed that Owens tui chub prefer pool habitats with low current velocities and dense aquatic vegetation that provide adequate cover and habitat for insect food items.

Owens tui chub were historically distributed throughout the Owens River basin, including Owens Lake (USFWS, 1998). Currently, few populations of genetically-pure Owens tui chub are thought to exist, and occur only where suitable habitat is isolated from non-native fishes (particularly Lahontan tui chub and predatory fish) (USFWS, 1998). No known populations exist within the LORP area.

The introduction of non-native fish species and water diversion for agricultural and municipal use have been the principal factors negatively affecting Owens tui chub (BioSystems, 1994; USFWS, 1998). In addition, hybridization with Lahontan tui chub is a serious threat to the genetic integrity of this species.

Owens Speckled Dace

Owens speckled dace is a California Species of Special Concern. Owens speckled dace reach a total length of approximately 4 inches. This species feeds on insects throughout the water column and spawns in the spring over gravel substrates (D. Sada, pers. comm. 2000). Owens speckled dace appear to be habitat generalists, and population numbers may undergo dramatic seasonal fluctuations (D. Sada, pers. comm. 2000).

Owens speckled dace historically occupied springs and streams (including the Owens River and Fish Slough) throughout the Owens Valley, Long Valley, and Benton Valley, and springs at Little Lake (Sada 1989). Predation by non-native fishes and habitat alteration by impoundment and disruption of valley-floor spring discharge by groundwater pumping caused the Owens speckled dace to disappear from most of its historical range (Sada, 1989; D. Sada, pers. comm. 2000). There are no known populations of Owens speckled dace within the LORP area (D. Sada, pers. comm. 2000).

Owens Sucker

The Owens sucker is a California Species of Special Concern. The Owens sucker may reach a length of 18 inches (Sigler and Sigler, 1987). It is colored slate gray on the back, fades to faint blue reflections laterally (particularly on breeding males), then to a dusky white belly. Owens suckers have a subterminal mouth, thick caudal peduncle, large head and long snout, and large scales (USFWS, 1998). It is closely related to the Tahoe sucker *(C. tahoensis)*, a widely distributed species in the Lahontan basin of northeastern California and northern Nevada. This is the only fish native to the area that can successfully compete with introduced species.

Little quantitative information exists on Owens sucker habitat requirements, life history, abundance, or current distribution. Information on the biology and ecology of Tahoe sucker is generally used to describe the life history requirements of the Owens sucker. Owens suckers probably spawn from May through July within the river and, like Tahoe suckers, they probably require gravel substrates in fluvial habitats for spawning (Moyle, 1976). Owens suckers are omnivorous and consume invertebrates, vegetation, and detritus from the substrate. Dienstadt et al. (1985; 1986) reported that Owens suckers in fluvial habitats were most common in runs located where riffles are small and scarce. In lakes, larval and juvenile Owens suckers occupy shallow littoral habitats (Miller, 1973).

Owens suckers were widely distributed throughout the Owens Basin and generally closely match historic distributions of other native fishes. Owens suckers have been recorded from Crowley and Convict Lakes in the upper Owens River drainage, and in Owens Valley from Bishop Creek, Rock Creek, irrigation canals near Bishop, and the Owens River through Pleasant Valley (MacMillen et al. 1996). No known populations of Owens suckers are found in the LORP area (D. Sada, pers. comm. 2000).

Non-Native Fish

Water developments in the Owens Valley, including some prior to and since the City of Los Angeles' completion in 1913 of the Aqueduct that diverts the Owens River, altered the aquatic habitats within the valley. Shortly after completion of the Aqueduct, the river below the Intake had become a dry channel, with the exception of a few isolated spring holes (P. Pister, pers. comm. 2000). During the 1960s, several lakes adjacent to the river were enhanced to provide recreational opportunities (P. Pister, pers. comm. 2000). These were enhanced through a verbal agreement between LADWP and CDFG. A recreational warmwater fishery was established in these off-channel lakes and ponds, dating from at least the 1960s. These lakes were fed, through an elaborate connection of ditches, by water from the Blackrock and Thibaut spillgates. LADWP has continued these releases through voluntary releases prior to any formal agreements, and under the Lower Owens River Rewatering Project, which was initiated in 1986.

Water from these lakes found its way into the river channel, primarily through the Billy Lake return. Warmwater fish introduced by CDFG for angling were distributed throughout the off-channel lakes and ditches and into the river below the Billy Lake return. CDFG no longer stocks these off-channel lakes.

Mosquitofish were probably introduced for mosquito control. The present conditions in the river include a wetted channel from the Billy Lake return to the Delta.

The wet reach of the Lower Owens River is colonized by beaver, which are an exotic species introduced to the valley. The Lower Owens River is highly suitable for beaver due to its low gradient, low flows, and mild winters. The dominant aquatic habitats within the river channel are beaver ponds and marsh-type areas. Beaver ponds are typically 6 to 7 feet deep and up to several hundred feet long. In addition to the beaver ponds, there are many other aquatic areas in the channel that harbor non-native fish. Tules are common in most areas of the channel with flowing or standing water, usually forming dense, impenetrable stands in the wetted channel.

The current aquatic habitats within the river channel have been colonized by introduced fish that originated from the off-channel lakes and ponds and the Aqueduct. Information on the distribution and abundance of the current species within the LORP has been gathered from several sources, including Parmenter (1989), Hill et al. (1998), Ecosystem Sciences (1999), Lone Pine Warmwater Fishing Association (2000), and GANDA (2000a; 2000b).

Information on the fish community has also been collected subsequent to fish kills observed during flow releases from the Aqueduct in August 1989 (Parmenter, 1989) and in 1993 (Hill et al. 1998). In early August 1989, the Aqueduct was drained as an emergency response when sediment plugged the Aqueduct due to flooding along Olancha Creek. Approximately 1 week afterwards, a fish kill was reported in the Lower Owens River (Parmenter, 1989). CDFG monitored mortality near the Alabama Gates and observed moribund largemouth bass, bluegill, brown bullhead, carp, and crayfish in recently flooded grass-bottomed depressions and floating in the channel.

During the 1993 controlled flow study, substantial fish kills occurred in the river channel from Mazourka Canyon Road to just south of Keeler Bridge (Hill et al. 1998; Jackson, 1994). The fish killed included both game (largemouth and smallmouth bass, bluegill, and catfish) and non-game species (carp, suckers, chubs) (Hill et al. 1998).

The Owens River upstream of the Aqueduct Intake is also dominated by non-native game fish (C. Milliron, pers. comm., 2000). Brown trout are the dominant species in terms of numbers and mass in the upper reach of the Owens River below Pleasant Valley Reservoir, with populations as high as 7,000 fish/mile (Deinstadt and Parmenter, 1997).

Eight non-native fish species are confirmed in the Lower Owens River based on a review of the above information and discussions with fishery biologists (Table 4-12). These species include: largemouth bass *(Micropterus salmoides),* smallmouth bass *(Micropterus dolomieui),* bluegill *(Lepomis macrochirus),* carp *(Cyprinius carpio),* brown trout *(Salmo trutta),* channel catfish (*Ichtalurus punctatus),* brown bullhead *(Ictalurus nebulosus)*, and mosquitofish *(Gambusia affinis).* The chubs and suckers reported from the fish kills probably washed in from the intake and/or Aqueduct, as there are no known populations of these fish within the LORP area. The following is a summary account of the available information on occurrence, behavior, habitat preferences and relative abundance of non-native fish that occur in the wet reach of the river. A qualitative indication of their relative abundance is also given in Table 4-12.

- **Largemouth Bass.** Largemouth bass are relatively abundant throughout the river channel habitats from the Billy Lake return south to the delta. This species prefers areas with low velocities. Largemouth bass typically reach sexual maturity at 2 to 3 years and spawn from April through June. Nests are constructed in sand, gravel, and debris-littered bottoms at depths of 3 to 6 feet. The eggs and larvae remain at the nest for 7 to 13 days. The young fish feed primarily on zooplankton until they reach a length of 4 inches. Adult largemouth bass are predatory and consume fish and macroinvertebrates, particularly crayfish.

TABLE 4-12
FISH IN THE WETTED REACH OF THE RIVER AND THE OFF-RIVER LAKES AND PONDS

Species (all non-native except as noted)	Relative Abundance
Largemouth bass	H
Smallmouth bass	L
Bluegill	H
Carp	H
Brown trout	L
Channel catfish	M
Brown bullhead	M
Mosquitofish	H
Sucker* (native)	U
Chubs* (native)	U
U = Species presence and/or abundance unknown L = Species in low abundance M = Species in moderate abundance H = Species in high abundance	
* The only reference to suckers and chubs in the river is from Hill *et al.* (1998). Garcia and Associates assumes chubs were most likely Lahontan tui-chubs and not Owens tui-chubs. It is unknown what species of sucker was present. Suckers probably entered the river habitat from the spillways where they are known to occur in the Aqueduct.	

- **Smallmouth Bass**. Smallmouth bass are relatively uncommon in the river. During snorkeling surveys conducted by Ecosystem Sciences, very few individual smallmouth bass were observed in the river below the Intake (Hill et al., 1998). Current conditions (e.g., beaver ponds) in the river favor largemouth bass. Smallmouth are more of a riverine species. Smallmouth bass are predatory and consume fish and macroinvertebrates, particularly crayfish.

- **Bluegill**. This species is established throughout the river channel, including beaver ponds. Bluegill are highly opportunistic feeders, ingesting insects, snails and small fish. They have a wide physiological tolerance and can survive in shallow water with surprisingly low oxygen content (1 mg/L) and can reproduce under a wide variety of environmental conditions (Moyle, 1976). Spawning takes place throughout the spring and summer, and females are capable of producing up to 50,000 eggs, depending on size (Sigler and Sigler, 1987).

- **Carp**. This species is common throughout the watered reaches of the river within the LORP. The carp is a deep-bodied fish, usually olive-green to gold on the back, becoming yellow on the belly. The mouth has a pair of barbels on each side. Carp have a long dorsal fin and variable scaling patterns. Carp are relatively long lived, fast-growing fish. Carp are omnivorous and opportunistic feeders that primarily consume aquatic invertebrates, mostly insects. The carp spawn in spring, in water temperatures ranging from 58 to 67 F. Spawning takes place in warm, shallow, often weedy areas. The slightly adhesive eggs stick to debris or plants or occasionally sink in the bottom substrate. The spawning period may last from early May to late August. Large females (10 pounds) can lay over 100,000 eggs. Carp are adapted to a wide range of habitats including rivers, ponds and lakes. They often have a profound affect on aquatic ecology by removing macrophytes and increasing turbidity.

- **Brown trout.** This is not a common fish in the river. This species probably finds its way into the river through spillgates. Brown trout are well-established in the Owens River above the Intake (Deinstadt and Parmenter, 1997). The brown trout's back is olive to greenish brown in coloration. Rather large dark spots appear upon the back and sides but are not developed on the caudal fin. Reddish spots that have pale borders are profuse over the upper part of the body. Scott and Crossman (1973) report that brown trout eat a variety of organisms, including aquatic and terrestrial insects, crayfish, mollusks, salamanders, frogs, rodents, and fish. Brown trout spawn during the fall, typically from late October to December. Brown trout spawn in riffle areas, and the eggs are deposited in redds. Depending on size, a female lays from 200 to more than 6,000 eggs. The average age at maturity is 2 to 3 years, with males often maturing earlier than females. Factors that currently limit this species' distribution include the quality and availability of riverine habitats.

- **Channel Catfish.** Channel catfish are found throughout the LORP in low to moderate abundance. Channel catfish can be distinguished from the Brown bullhead by its long anal fin and deeply forked tail. The body is pale bluish-olive above and bluish-white below. Spots may be present over much or none of the body. Channel catfish are omnivores, consuming a wide variety of food materials, including organic debris, crayfish, snails, fish and plant material (Sigler and Sigler, 1987). Spawning takes place in spring or early summer in semi-dark nests in undercut logs and banks. Female lay as many as 34,500 eggs (Sigler and Sigler, 1987). This species has a wide tolerance for environmental conditions and can live in waters with oxygen concentrations as low as 1 to 2 mg/L and temperatures of 36-38°C (Moyle, 1976).

- **Brown Bullhead.** This species is found within the river within the LORP in low to moderate abundance. It is yellowish-brown above and heavily mottled on the sides with a yellow or, at times, white ventral surface (Sigler and Sigler, 1987). Brown bullhead reach approximately 15 inches and are omnivorous, consuming insect larvae, crustaceans, snails, crayfish and small fish (Sigler and Sigler, 1987). The brown bullhead spawns in spring in a saucer-shaped nest and deposits up to 10,000 adhesive eggs. Brown bullheads are capable of living in stagnant waters and shallow ponds and have a wide physiological tolerance (Sigler and Sigler, 1987).

- **Mosquitofish.** This fish is common throughout the river within the LORP. Mosquitofish have been stocked throughout the world for mosquito control. This species is brown to olive on top with a silvery shine, darkest on the head and back and lightest on the belly. The scales are outlined by black pigment. Females reach a larger size than males, 2.5 and 1.75 inches, respectively. Males reach sexual maturity in 4 to 6 weeks (Sigler and Sigler, 1987). Mosquitofish feed on various insects in addition to mosquito larvae. Aggressive behavior by mosquitofish has been cited as a negative factor influencing Owens pupfish populations (J. Mire, pers. comm., 2000).

4.6.2 Potential Impacts – Game and Native Fish

<u>Fish Kills due to Initial Releases (Short-Term Impacts)</u>

Based on the analysis of water quality impacts in Section 4.4.3, it was concluded that the proposed 40-cfs baseflow could cause substantial, though temporary, degradation of water quality downstream of Mazourka Canyon Road. The poor water quality could adversely affect fish due to the depletion of oxygen, and possible increase in hydrogen sulfide, and ammonia. Seasonal habitat flows of up to 200 cfs could also cause water quality degradation, possibly more than under 40 cfs flows. However, the fishery is expected to recover once water quality conditions improve.

The water quality impacts and resulting fish kill are only expected to occur along the river downstream of Mazourka Canyon Road where the organic sediments are present. The reach upstream of Mazourka Canyon Road would be available for fish to use as refugia during adverse water quality conditions. Additional refuge areas will be provided as part of the project (Sections 2.3.5.2 and 2.3.5.4) by releasing higher quality water from up to three spillgates. However, since the spillgate releases are miles apart, they will provide refuge areas to only a limited percentage of affected fishes.

The potential degradation of water quality during the initial releases represents a significant and unmitigable impact (Class I) that could cause substantial fish kills along the river downstream of Mazourka Canyon Road during the initial years of the project, until water quality conditions improve.

However, a warmwater fishery exists today, which suggests that the fishery has recovered from the fish kills in 1993. For these reasons, the lead and responsible agencies do not believe that the warmwater fishery along the Lower Owens River would be destroyed due to water quality degradation from the new flows. However, in the worst-case scenario, the fishery along the river may be subject to a substantial reduction, and it could take many years for the game fishery to recover to pre-project conditions.

To facilitate recovery if natural re-colonization does not occur after water quality conditions improve, LADWP would implement and fund a fish recovery program in cooperation with the California Department of Fish and Game, as described in Mitigation Measure F-1 (Section 4.6.3). However, since the restocking program would not mitigate the short-term impact of potential fish kills, impacts on fish populations are considered significant after incorporation of feasible mitigation. Further mitigation was considered and determined to be infeasible as discussed in Section 4.4.3.1 and below:

- Based on recommendations by the Regional Board (NOP letter dated February 24, 2000), temporary removal and restocking of fishes were evaluated as a potential mitigation measure for reducing short-term water quality impacts. However, this measure was determined to be infeasible due to the logistical constraints involved in capturing fish from 30 miles of river channel and transporting and maintaining them in healthy conditions until water quality improves. Netting, trapping, and/or electroshocking of large numbers of fishes, temporarily storing them, then recapturing them for re-release to the river would substantially stress and potentially result in large numbers of injured or dead individuals. The magnitude of any fish kill related to temporary removal is unknown, but could exceed the mortality due to water quality degradation under LORP.

Long-term Impact on Existing Fish Habitats and Populations

Fish mortality may occur during the initial period of flow introduction due to degradation of water quality conditions, specifically decreased dissolved oxygen and increased toxic substances such as ammonia and hydrogen sulfide. Fish are expected to re-colonize the river once water quality conditions improve. Fish would re-colonize from the river above Mazourka Canyon Road, the off-channel lakes and ponds, and the spillgates. The re-watering would have an overall long-term beneficial impact on the warmwater fishery by increasing its productivity (more area) and providing more diverse habitat to support less common species such as the brown trout and smallmouth bass. No new species are expected to colonize the river. In general, non-native game fish such as bluegill, bullhead, catfish, carp and largemouth bass exhibit very plastic life history strategies and a wide variety of physiological tolerances. These characteristics allow for rapid distribution into wetted reaches. Within the newly-created river reach below the Intake, brown trout and smallmouth bass may prefer the more riverine reaches. Largemouth bass and bluegill may be more successful in the impounded areas and backwaters with low velocities. **The enhancement of the existing warmwater fishery is considered a beneficial impact (Class IV).**

The potential fish responses to the long-term re-watering of the river is described below for individual reaches identified in the LORP plan are summarized below:

River Intake to Mazourka Canyon Road

This reach has a well-established channel and is expected to be characterized by riverine flow with minimal backwater slough areas. Fish colonization into the dry reach should proceed rapidly. The species composition of this reach is expected to be similar to the community of fish immediately above the intake. The fish assemblage above the Intake is the same as within the LORP area, as described above, with brown trout being the dominant species (C. Milliron, pers. comm. 2000). Water released from the intake is expected to be of high quality. Muck and other organic material have not accumulated to a great degree in this reach, compared with the reach below the Alabama Gates. The accumulated material should be relatively oxidized and not as detrimental to water as the unoxidized sediments accumulated in the currently-wetted areas located further downstream. Fish passage from above the intake would not be restricted. Owens sucker are present in the river near Big Pine (D. Sada, pers., comm. 2000). This species is expected to eventually repopulate the river within the LORP. Owens speckled dace could also find suitable habitat in this reach.

Mazourka Canyon Road to the North End of the Islands

This wetted reach is expected to be similar in character to the currently dry reach once flows have been established. The primary difference in the wetted reach is the off-channel lakes and ponds, which would provide a steady source of warmwater fish to this reach. Game fish would also be able to capitalize on the corridors between off-channel lakes and ponds. Brown trout and smallmouth bass would also colonize this reach. Owens sucker should colonize the riverine habitats within this reach.

North End of the Islands to Lone Pine Station Road

The river channel has aggraded in this reach, creating a broad flat area. The channel is essentially undefined and water braids throughout the broad flat, resulting in isolated land areas surrounded by shallow, slow water (Hill and Platts 1998). Tules may dominate channel features. Largemouth bass, bluegill, carp, catfish and mosquitofish are expected to become distributed throughout this reach. Owens dace might benefit from habitats created in the island reach. Species that prefer fast-moving water (e.g., brown trout, smallmouth bass, Owens suckers) are not expected to flourish in this reach, although they may migrate through this reach.

Lone Pine Station Road to about 2.5 miles South of Keeler Bridge

Water quality would be the slowest to recover in this reach. Water quality conditions will improve as accumulated muck and organic material are deposited on the floodplains and/or transported downstream. A very productive game fishery is anticipated in this reach. The lower impounded reach of the river would likely be dominated by largemouth bass, bluegill, bullhead, carp and catfish. As water quality conditions improve and flows stabilize, brown trout and smallmouth bass may be common in this reach. Native fish species such as Owens sucker and Owens dace may benefit from habitat created in this reach.

2.5 miles South of Keeler Bridge to the Owens River Delta

This reach is composed of a myriad of channels and shallow depressions. The Delta could provide suitable habitat for native fishes under the proposed baseflows and pulse flows. Owens pupfish and Owens tui chub are habitat indicator species for the Delta reach. Although Owens pupfish were not known historically to inhabit Owens Lake (Miller, 1973), the creation of broad, open and shallow habitat with typically high temperatures and low dissolved oxygen is suitable habitat for Owens pupfish. Pupfish should be able to occupy areas that are isolated from non-native predatory fish, similar to what has happened at Marvin's Marsh and BLM Springs. Owens tui chub would be limited by hybridization with Lahontan tui chub. Owens sucker may be limited by flow. Owens speckled dace should find suitable habitat in the channels.

Data collected during the 1993 flow study were used to determine habitat characteristics at various flow regimes. Modeling was performed using the Physical Habitat Simulation Model (PHABSIM) by Don Chapman Consultants, Inc. (1994). The model was run independently for each of the above reaches, as described above by Hill et al. (1994).

The output from the PHABSIM model is a set of response curves that depict weighted useable area based on model discharge available to fish in accordance with established habitat preference criteria for each species and life stage. The "Wetted Reach" set of response curves for weighted useable area by model discharge are considered representative of potential fish responses after the initial period of flow introduction. These curves are not significantly different from the set of "Combined Curves" provided for the entire Lower Owens River. Predicted responses of individual species to the long-term habitat improvements in the LORP are noted below.

- The weighted useable area (WUA) response curves for largemouth bass indicate that habitat for all life stages increases with flow. Although this appears to be an unusual response to flows for this species, it is likely that this species would increase throughout the river with additional flows.
- Smallmouth bass spawning and juvenile habitat will not be limited at any flow. Adult habitat is predicted to increase only marginally with flows. Fry habitat will be maximized at 8 to 15 cfs. A flow of 40 cfs optimizes adult habitat while minimizing the loss of fry habitat. Smallmouth bass are expected to become more abundant with the new flows. The optimum flow for bluegill appears to be 40 cfs for all life stages. This species is also expected to become more abundant with the new flows.
- Brown trout are likely to colonize the wetted reaches with the new flows. Although flows in the range of 80 - 100 cfs are more suited for brown trout life history stages, flows of 40 cfs would benefit this species. This species would also do well in the impounded reach above the pump station.
- Spawning, adult and juvenile carp habitat increases with increasing flows, although the weighted useable area for fry habitat at 40 cfs exhibited a negative effect. It is likely that this species would increase throughout the river with additional flows.
- All life stages of channel catfish showed a positive response to the 40-cfs baseflow, and as such, this species is expected to increase throughout the river with additional flows.
- Although there are no habitat suitability curves prepared for Owens sucker, flows of 18-25 cfs would provide optimum habitat for all life history stages of Sacramento sucker, a close relative of Owens sucker (D. Sada, pers. comm., 2000). At 40 cfs, habitat suitability for all life stages is below the optimum but is still relatively high.
- Projected suitable habitat for all life stages of speckled dace occurs at about 8 cfs and is relatively low at 40 cfs. It appears that providing 40 cfs would reduce the total productivity of Owens speckled dace. However, these curves may not reflect current knowledge of the life histories of this species (D. Sada, pers. comm. 2000).

4.6.3 Mitigation Measures

F-1 In the event that the natural re-colonization of the game fishery does not occur within 5 years after water quality conditions have improved, or appears to be occurring at a very slow rate, LADWP shall implement and fund a one-time fish-stocking program (depending on availability of fish stock from state fish hatcheries) in coordination with CDFG, in the fifth year after water quality in the river has improved. Fish stocks from sources within the Owens Valley will be used preferentially. Fish stocks from outside the valley will be used if in-valley stocks are not available. The program will be designed to initiate re-colonization and to stimulate population growth to establish game fish populations within 10 years after water quality conditions have improved.

4.7 WILDLIFE, INCLUDING SPECIAL STATUS SPECIES

4.7.1 Existing Conditions

The Owens Valley contains a rich assortment of wildlife species due to the variety of vegetation types, including both upland and wetland types, and the large expanse of open space on the valley floor. There is a particularly rich assemblage of bird species present, including residents, migrants, and summer breeders. The valley supports numerous waterfowl and shorebirds, neotropical migrants, and migrant and resident raptors. The removal of saltcedar under Inyo County's current program allows native vegetation types to become re-established and provide more habitat for native wildlife species, particularly birds.

Bird species that regularly occur in the Lower Owen River Project area are listed in Appendix D. The seasonal status, frequency of occurrence, and habitat for each species are also listed. This information was compiled by Denise LaBerteaux (of Eremico Consulting), from Garrett and Dunn (1981), and from unpublished data provided by Tom and Jo Heindel (pers. comm. with URS Corp. and ICWD). The high number of species that occur within the Lower Owens River project area reflects the importance of the area as a migration corridor, wintering grounds, and/or breeding grounds for these species.

Riparian-dependent bird species are the primary terrestrial wildlife species affected by the riverine-riparian system – i.e., the rewatering of the Lower Owens River. Several surveys have been conducted in recent years to characterize the birds that use the river and associated riparian habitats, including surveys by Layman and Williams (1994), Kirk (1995), Point Reyes Bird Observatory (1999a, 1999b), and a survey conducted by Eremico (2000) for the EIS/EIR. The latter consisted of point count censuses conducted along three stretches of the Lower Owens River to determine breeding bird abundance, species richness, and diversity during the 2000 breeding season. Point count methods followed guidelines described in Ralph et al. (1993 and 1995). These methods were used by the Point Reyes Bird Observatory for its riparian songbird monitoring program in the eastern Sierra Nevada/western Great Basin region in 1998 and 1999 (Heath and Ballard 1999a, 1999b).

The first site, located south of Keeler Bridge, was identified as ORKR. The second site was established south of Lone Pine Station Road and was identified as ORLP. The third site occurred south of Manzanar-Reward Road. This site was identified as ORMR. A total of 20 point count stations were located along each transect. The distance between each point count station was paced out and measured approximately 250 meters. This spacing helped to ensure independent samples between points.

Five-minute point counts were completed at each station along a given transect. Counting at the first station along a transect began within 30 minutes after official sunrise and continued until all points were counted. Each transect was completed within three to four hours. Stations were counted in the same sequence each time the transect was sampled to standardize the results. Each transect was surveyed three times, approximately two weeks apart. Surveys occurred between 29 May and 28 June 2000.

Analyses for relative abundance, species richness, and diversity were completed only for breeding birds detected along each transect. All nonbreeding species were excluded from the analyses. Species not properly censused by the point count method were also excluded, even though they may have bred at the sites. These species included large hawks, owls, swifts, swallows, ravens, waterfowl, shorebirds, waders, goatsuckers, dove, and quail.

The total number of breeding birds detected within 50 meters during the three census periods and the mean number of individuals per point per census are given for each site in Table 4-13. Species richness and diversity at each site are summarized in Table 4-14A. In all, 35 breeding species were detected during the censuses. Only four of the 14 species recognized as riparian focal species by the California Partners In Flight Riparian Habitat Joint Venture (RHJV, 1998) were detected -- willow flycatcher, common yellowthroat, song sparrow, and black-headed grosbeak. Both common yellowthroat and song sparrow were among the most commonly occurring species. Red-winged blackbird and brown-headed cowbird were the other two most common species detected at the point count stations. Only one willow flycatcher was detected during the first survey period at the ORMR site. This bird was probably a migrant since it was not detected during subsequent visits. It could not be determined if it was the federally listed subspecies, *extimus,* because this determination must be made in hand or by genetic analysis.

TABLE 4-13
SUMMARY OF BIRD CENSUS ALONG THE LOWER OWENS RIVER IN 2000

Site	Total Number of Individuals	Mean Number of Individuals Per Point Per Census
ORKR	600	10.02
ORLP	836	13.93
ORMR	600	10.02

TABLE 4-14A
BIRD SPECIES DIVERSITY ALONG THE LOWER OWENS RIVER IN 2000

Site	Species Richness	Mean SR Per Point	Shannon-Wiener Diversity Index $(N_1)^1$	Mean SW Per Point
ORKR	27	9.45	11.80	7.10
ORLP	30	11.65	13.41	7.68
ORMR	25	9.00	9.95	6.44

Note: Mean species richness (SR), Shannon-Wiener index of diversity and mean index of diversity (SW) for breeding species along the Lower Owens River detected within 50 m averaged over three visits in 2000. $^1N_1 = 2^{H'}$ where H' is the Shannon-Wiener Index (Krebs 1989)

The 10 riparian habitat focal species that were not detected by point counts at any site included Swainson's hawk, yellow-billed cuckoo, least Bell's vireo, warbling vireo, bank swallow, yellow warbler, yellow-breasted chat, blue grosbeak, Wilson's warbler, and Swainson's thrush. The former 8 species are potential breeders in the Lower Owens River region. However, the quality and/or quantity of habitat currently existing along this portion of the river may be insufficient in supporting breeding pairs of these species. Habitat requirements for the riparian habitat focal species are discussed by RHJV (1998). The breeding ranges of Wilson's warbler and Swainson's thrush occur at higher elevations than the Owens Valley, and hence, preclude them from breeding along the river.

Other riparian obligate species that were detected during the censuses but were not included in the analyses were red-shouldered hawk and wood duck, both documented breeders in the Owens Valley. The hawk was detected during the first period at the ORLP site. Red-shouldered hawks are considered uncommon breeders in the Owens Valley, including in the Lone Pine area (Tom and Jo Heindel, pers. comm.). Small numbers of these hawks can be found during all months in and around the town of Lone Pine, including the area of the ORLP site (A. Kirk, pers. comm.). Wood ducks were detected at the ORLP and the ORMR sites. A single wood duck flew over the riparian habitat at ORLP during the first census. At the ORMR site, a female wood duck was observed with four chicks during the third census period. Wood ducks are considered uncommon breeders in the Owens Valley (Tom and Jo Heindel, pers. comm.).

Species richness and the mean number of individuals detected per point count station were similar to those from other studies in the area. However, species diversity was on the low end of the range (Heath and Ballard 1999a, 1999b). The lower bird diversity in the Lower Owens River Project area can be attributed to the unevenness in the number of individuals of each species. The point counts from this study recorded high numbers of only a few species (e.g., red-winged blackbirds, song sparrows, common yellowthroats, and brown-headed cowbirds) and low numbers of many species. The low structural diversity in the riparian habitat along the Lower Owens River is probably the primary factor responsible for the low bird diversity in this area.

4.7.2 Potential Impacts – Wildlife, Including Special Status Species

Anticipated Beneficial Impacts

Rewatering the Lower Owens River is expected to increase the diversity, extent, and productivity of riparian and wetland habitats along the river. As described in Section 4.5.2, Ecosystem Sciences (1997) conducted a modeling analysis to predict the anticipated changes in vegetation types along the river due to the 40 cfs baseflow and up to 200 cfs seasonal habitat flows. Their analysis indicated a substantial conversion of habitats that would result in more open water, increased emergent wetlands, and increased willow dominated habitats.

In a related analysis, Ecosystem Sciences examined how bird species would respond to the new habitats using principles of wildlife-habitat relationships and Habitat Evaluation Procedures (HEP), a common analytic model to predict wildlife responses to habitat changes as described in Technical Memorandum and Ecosystem Sciences (1994). In the model, Ecosystem Sciences chose 15 evaluation species or guilds that reflected a wide range of habitat preferences in riparian, wetland, and open water habitats present in the valley. They include yellow warbler, willow flycatcher, yellow-billed cuckoo, marsh wren, belted kingfisher, Canada goose, western snowy plover, downy woodpecker, northern flicker, rails, waterfowl guild, waterfowl breeding guild, and shorebird guild.

Physical characteristics of existing habitats along the river and in wetlands at Blackrock and the Delta were measured in the field in 1993 and incorporated into the model. The HEP uses the predicted changes in habitat characteristics due to re-watering (i.e., habitat conversion) to determine the suitability of the new habitats for the evaluation species. Hence, an increase in woody riparian vegetation would increase vegetative structure and cover, and result in more favorable habitat for riparian breeding birds. Conversely, an increase in open water habitat due to flooding of pastures would increase the suitability of the habitat for waterfowl.

The results of the modeling were consistent with the qualitative predictions: re-watering the Lower Owens River would increase the diversity and abundance of the avifauna, including riparian dependent birds and certain water associated birds. Special status species that could benefit from the re-watering include the willow flycatcher, yellow-billed cuckoo, great blue heron, great egret, black-crowned night heron, Cooper's hawk, sharp-shinned hawk, golden eagle, ferruginous hawk, Swainson's hawk, long-eared owl, Vaux's swift, LeConte's thrasher, and loggerhead shrike.

Waterfowl and shorebirds would not benefit substantially from the river enhancements; however, habitat for these species would be enhanced and expanded at Blackrock and the Delta.

The enhanced riparian habitats along the Lower Owens River would also benefit mammals due to the increased diversity and cover of riparian vegetation.

The wildlife related goals for the Riverine-Riparian system in the MOU are to "*… create and sustain healthy and diverse riparian and aquatic habitats… through flow and land management, to the extent feasible, consistent with the needs of the "habitat indicator species."* The habitat indicator avian species for the river include various riparian dependent species and several water-associated birds: yellow warbler, willow flycatcher, yellow-breasted chat, blue grosbeak, yellow-billed cuckoo, warbling vireo, tree swallow, belted kingfisher, Nuttall's woodpecker, long-eared owl, red-shouldered hawk, Swainson's hawk, northern harrier, rails, least bittern, marsh wren, wood duck, and great blue heron.

The proposed re-watering of the Lower Owens River is anticipated to increase the extent, diversity, and productivity of riparian and wetland habitats along the river. This enhancement of habitats would be consistent with the needs of the habitat indicator species by providing specific habitat requirements that would benefit individual species.

In light of the above information and considerations, the rewatering of the Lower Owens River is anticipated to increase the extent, quality, and diversity of habitat for wildlife, particularly for birds. **This is considered a beneficial impact (Class IV).** The predicted habitat enhancements could potentially benefit both the State and Federally listed subspecies of willow flycatcher.

Effects of Increased Cattail and Bulrush Stands on Avian Diversity

The wetted reach of the river from just above Mazourka Canyon Road to the Delta is currently dominated by cattail and bulrush marsh. These plants thrive in relatively slow moving water, water depths of four to five feet, and exposure to sunlight. Ecosystem Sciences noted in Technical Memorandum 9 (no date) that the re-watering of the Lower Owens River would increase the amount of cattail and bulrush marsh. They estimated the future extent of cattail and bulrush marsh along the river based on an analysis of landforms along the river channel and water surface elevations under the 40 cfs baseflow. Ecosystem Sciences (unpublished data) predicted that the amount of emergent wetlands (e.g., cattails and bulrushes) would increase from 293 to 1,175 acres (see Table 4-11). The predicted increase in cattail and bulrush marsh would be beneficial for many riparian- and water-associated birds, which use the dense cover for shelter and nesting, such as American bitterns, least bitterns, Virginia rails, American coots, pied-billed grebes, ruddy ducks, redheads, mallards, northern pintails, and soras. Many of the habitat indicator species identified in the MOU for the river rely on this type of habitat.

Cattail and bulrush marsh is already very abundant along the Lower Owens River, and as such, is not a target habitat under the LORP. More importantly, the establishment of new and extensive cattail and bulrush marsh could hinder progress towards creating more diversity of riparian and wetland habitats. In particular, the development of large and vigorous stands could reduce open water habitats needed by waterfowl.

The proposed LORP management approach for future cattail and bulrush marsh is to encourage riparian trees to develop along the margins of the river channel to shade the cattails and bulrushes. In addition, there has been an assumption that the seasonal habitat flows would scour the cattail and bulrush stands. However, flows in the river are not expected to scour cattails and bulrushes. Ecosystem Sciences (Technical Memorandum No. 9, no date) referenced a study on the hydrodynamic control of cattails and bulrushes (Groeneveld, 1994), which predicted whether certain flows would dislodge cattail and bulrush stems and prevent the establishment of an emergent marsh. Results of the HEC-2 modeling by Don Chapman Consultants (1993) for the Lower Owens River indicated that average velocities for both the 40 cfs baseflows and the 200 cfs seasonal habitat flows would not exceed the velocity needed to dislodge stems. However, observations of flow velocities at the Mazourka Canyon Road station during the 1993 field experiment were greater than 1 fps under both baseflow conditions, and when the discharge from the River Intake was 155 cfs (Jackson, 1994). Hence, there is potential for some scouring of tules with the proposed flow regime, based on the available data.

Based on the above considerations, there is potential for cattail and bulrush plants to invade newly flooded areas. A proliferation of emergent marsh habitat would benefit many water-associated birds, but could also decrease the diversity of riparian habitats and reduce open water habitat.

Extensive removal or active management of tule stands to control tule growth or to increase open water habitat (i.e., for habitat purposes) is not a part of the LORP and is not addressed in this EIR/EIS. In the future, such extensive measures would only be considered if it was determined that the benefits outweighed the adverse environmental effects, and only if funding for such work was obtained from sources other than LADWP or the County. Because extensive removal of tules could result in significant adverse impacts, such measures would be subject to a separate CEQA and NEPA review as required by law.

The proposed monitoring and adaptive management program (see Section 2.10) includes provisions to address the proliferation of emergent marsh habitat. Under the LORP, active cattail and bulrush removal would only be considered in rare instances and of limited extent, and would probably only be considered where there are significant constrictions along the river or at culverts. **Consequently, there is a potential for the amount of cattail and bulrush marsh to proliferate at the expense of open water habitat, which would be considered an adverse but not significant impact (Class III).**

Removal of cattails and bulrushes, if it is undertaken, could cause several incidental impacts depending upon the time of year, amount removed, and the method of removal. Cattails and bulrushes are used for nesting by various bird species and one special status species – least bittern. Mechanical removal of tules during the spring and early summer could disturb nesting birds by destroying cover and nests, altering breeding behavior, and displacing breeding pairs. **This impact is considered significant, but mitigable (Class II).** This impact can be avoided by scheduling the removal for the fall and winter months, as described below in Section 4.7.3 (Measure RW-1).

Mechanical removal of cattail and bulrush stands would require access routes to the wetted channel for equipment, staging areas for truck and equipment maneuvering, and a temporary dewatering site. Establishment of these temporary work areas could disturb wetland and riparian vegetation. The amount of habitat that would be affected at any single work area is expected to be less than 5,000 square feet, and the frequency of marsh removal operations is expected to be rare. In addition, the habitats that would be disturbed (e.g., alkali meadow, willow scrub) are expected to recover quickly through natural recovery processes. **In light of this information, the temporary disturbance to riparian habitats during limited tule removal is considered an adverse, but not significant impact (Class III).** Best management practices to reduce the magnitude of the impact and facilitate post-work recovery are provided in Section 4.7.3 (Measure RW-2).

Mechanical removal of cattail and bulrush stands would involve the use of a Gradall™ or clamshell bucket working in the wetted channel. The physical excavation of the vegetation, including the root mass, would cause increased turbidity and suspended sediments at and downstream of the work areas. Water quality impacts are described in Section 4.4.3.

Beaver Dam Removal

Beaver dams will continue to be removed on an as-needed basis during the LORP, utilizing the methods of the existing program (described in Section 2.3.7), but also including the reach of the river up to the River Intake.

4.7.3 Mitigation Measures

RW-1 If necessary to remove limited cattail and bulrush obstructions, mechanical removal of cattail and bulrush stands shall only occur in the fall and winter (October 1 to March 1) to avoid conflicts with breeding birds. Work outside of this time may be conducted if field surveys determine there would be no effect to nesting birds.

RW-2 Impacts to wetland and riparian habitats adjacent to the work area shall be minimized by making use of existing barren areas for staging, operations, and stockpiling; crushing vegetation in the work area rather than clearing or grading it; and mulching areas denuded during operations with vegetative debris to encourage natural revegetation and discourage noxious weeds.

4.8 CULTURAL RESOURCES

The consultations with Native American Tribes and the cultural resources inventories completed for the LORP are described below. Three separate field investigations were completed to investigate cultural resources – one in 2000, a second in 2003, and a third in 2004. The second investigation was necessary since channel clearing work was not identified as part of the project until after the first cultural resources inventory in 2000. The third investigation was necessary to evaluate the historic significance of rock dams, old bridge abutments, and other structural obstacles that will be removed from the river channel prior to initial flow releases. Impact assessment for cultural resources is presented in the EIR by geographic area of the LORP - Section 4.8.4 for the Riverine-Riparian System, Section 5.4 for the pump station site and power line corridor, and Section 7.3 for Blackrock Waterfowl Habitat Area. Section 14.9 describes the relationship of the project to the National Historic Preservation Act (NHPA).

Appendix F contains background information on prehistory and history of the LORP area as summarized from a 2001 report by Far Western Anthropological Research Group, Inc. (the cultural resources consultants for LORP), including descriptions of prehistoric and historic uses of the river and other natural resources of the Owens Valley.

4.8.1 Confidentiality of Cultural Resources Information

The EIR/EIS does not provide precise locational information on cultural resources, as it is considered sensitive and confidential. The cultural resources technical reports prepared for the project by Far Western (Far Western, 2001 and 2003; and JRP, 2004) are on file with LADWP and EPA. EPA has provided copies of the two reports to chairpersons and other representatives (e.g., cultural resources staff) of each Native American Tribe in the region (see Section 4.8.2). All copies of the reports that EPA provided were marked "confidential." LADWP will limit its distribution of the technical reports and other technical cultural resources information related to LORP to qualified professionals contracted by LADWP. It should be noted, however, that the technical reports are available to all qualified archaeological professionals through the California Historical Resources Information System (CHRIS), which is administered by the California Office of Historic Preservation (OHP). LADWP does not have control of the distribution of cultural resources technical information through CHRIS.

4.8.2 Native American Consultation

On January 14, 2000, LADWP sent a Notice of Preparation (NOP) of a Draft EIR/EIS to the following Indian Tribal offices: Big Pine Paiute Tribe; Bishop Indian Tribal Council; Bishop Paiute Tribe; Fort Independence Indian Reservation; Fort Independence Tribal Office; Independence Paiute Tribe; Lone Pine Paiute-Shoshone Tribe; and Utu Utu Gwaitu Paiute Tribe. Written responses were received February 22, 2000, from Vernon J. Miller, Tribal Chairman for the Fort Independence Indian Reservation, and Mel O. Joseph, Environmental Coordinator for the Lone Pine Paiute-Shoshone Reservation. Both letters expressed concern about the cultural and archaeological impacts of the project. The NOP was also later sent to the Bridgeport Indian Colony and the Timbi-sha Shoshone Tribe, and the Owens Valley Indian Water Commission.

On June 15, 2000, EPA, as federal lead agency for the project, sent follow-up letters to all of the above noted Tribes detailing the Area of Potential Effect (APE, or field survey area, see Section 4.8.3.1 for definition) for cultural resources and Far Western's plans for survey of the initial APE as part of the first cultural resources inventory conducted in 2000. This letter invited Tribes to participate in the NHPA Section 106 process as consulting parties. Follow-up letters and telephone calls were made through October 2000. The 2000 cultural resources inventory has been distributed to the appropriate Tribal representatives for review and comment.

Additional Tribal consultation was conducted by EPA in 2002 and 2003 for the channel clearing work, because this activity was not identified as part of the LORP project description until after the first consultation in 2000. This consultation included an initial contact letter (dated September 10, 2002), describing the additional APE for the channel clearing work and project description, sent to eight regional Tribal groups. This was followed by phone contacts and meetings with representatives of both the Big Pine Paiute Tribe and the Lone Pine Paiute-Shoshone Reservation, who had requested additional information about the cultural resources inventory and LORP in general. The meetings took place in December 2002 at the Tribal offices. Tribal representatives were concerned about the potential for disturbance to cultural resources during the channel clearing work. No specific references or concerns with regard to Traditional Cultural Properties near or within the APE were raised. In addition to the Tribal consultations, a Tribal cultural resource specialist from the Big Pine Paiute Tribe accompanied the field survey crew during the entire inventory. The specialist independently reported his findings to the Tribal Environmental Director. The draft 2003 cultural resources inventory was provided to all Tribes in the region, and comments were requested. EPA followed up with phone solicitations for comments from the Tribal representatives who had formerly expressed interest. No comments on the 2003 cultural resources inventory were received.

Following the publication of the Draft EIR/EIS in November 2002, written comments were received from the following Tribes and Tribal representatives: Big Pine Paiute Tribe of the Owens Valley, Fort Independence Indian Reservation, Lone Pine Paiute-Shoshone Reservation, Lone Pine Paiute-Shoshone Reservation, and the Owens Valley Indian Water Commission. Oral comments from the Tribes were received from representatives of the Lone Pine Paiute-Shoshone Tribe and the Owens Valley Indian Water Commission.

4.8.3 Cultural Resources Inventories

Three evaluations of cultural resources in the project area (the initial investigation, one focused on the channel clearing work, and one focused on structural obstacles that will be removed from the river channel) were conducted by Far Western with the assistance of JRP Historical Consulting Services (JRP).

The first two evaluations were Class III cultural resources inventories which included: reviews of available literature and records, pedestrian surveys of the APE (see below for definition), National Register of Historic Places (NRHP) site evaluations, and recommendations of management actions for those sites deemed either unevaluated or eligible to the NRHP. The results of the evaluations are presented in two cultural resources technical reports completed by Far Western (2001 and 2003). The reports follow the general guidelines set forth by OHP for archaeological resource management reports (1989), and the cultural resources inventory general guidelines developed by BLM (1989).

The third evaluation was conducted to evaluate the historic significance of 16 manmade structures that are located in or adjacent to the river channel and were identified by LADWP and Ecosystem Sciences (2003) for potential removal or modification prior to initial flow releases. The evaluation included: reviews of available literature and records, a field survey of the structures, and NRHP site evaluations. The results of the evaluation are presented in a report completed by JRP (2004).

4.8.3.1 Area of Potential Effect

An area of potential effect (APE) is defined under Section 106 of the NHPA as the geographic area or areas within which an undertaking (i.e., a project activity) may directly or indirectly cause changes in the character or use of historic properties, if any such properties exist. (Historic properties include prehistoric or historic districts, sites, buildings, structures, or objects). As a result of consultations with the OHP and Far Western, EPA, as the federal lead agency for the project, determined the APE for LORP to be areas that are subject to identifiable land disturbances by construction activities proposed under LORP. The specific areas that comprise the APE (i.e., survey areas) for LORP are described below in Sections 4.8.3.2 and 4.8.3.3 and summarized in Tables 4-14B and 4-14C.

As a result of APE consultations between the EPA and OHP, areas to be affected under LORP by new river flows or flooding alone were not included in the APE, as they are not expected to create adverse impacts to existing cultural resources (see Section 4.8.4.4).

4.8.3.2 2000 Cultural Resources Inventory

Records Search. Prior to commencement of field work, a records and literature search was conducted at CHRIS Eastern Information Center (EIC), located at the University of California, Riverside, to locate any previously recorded sites in the entire LORP area. The purpose of the records search is to obtain background and contextual information on cultural resources in the general project area to facilitate the field surveys and subsequent evaluations. The following sources were also consulted: NRHP Index; OHP Archaeological Determinations of Eligibility; OHP Directory of Properties in the Historic Property Data file; (1951) USGS Independence 15’, (1951) Keeler 15’, (1958) Lone Pine 15’, and (1956) Olancha 15’ topographic maps; and archaeological site records and reports on file at CHRIS EIC.

The records search identified 12 historic sites, 157 prehistoric sites, 6 multi-component sites, 15 isolates, and 2 historic properties within the LORP vicinity along the Owens River corridor. Of the prehistoric sites, 44 were situated along the Highway 395 corridor and 43 were located at a distance greater than 1,000 feet from the Owens River. A total of 70 prehistoric sites, or nearly half, were located within 1,000 feet of the Owens River, most situated on terraces or steep banks above the river. Of all of these previously recorded sites, only one, a prehistoric site, is located within the APE. Located in the area of the proposed power transmission line, this site was subsequently re-recorded and further evaluated during the field survey (see Section 5.4.2).

Definition of APE. In consultation with OHP, the APE (the area for which field surveys were conducted) for the 2000 inventory was determined to be the following: the 30-acre construction zone for the pump station and diversion, a 200-foot wide corridor along 7.5 miles of power line, and a 50-foot wide corridor for 3.75 miles of new berms in the Blackrock Waterfowl Habitat Area, construction of several new or modified spillgates and other flow control structures in Blackrock, and 1.5 miles of new or enlarged ditches in Blackrock. OHP consultation resulted in a consensus that installation of new fences, involving only pole placement, would have negligible impacts on cultural resource sites and would be impractical to survey.

Field Survey Results. Fieldwork was conducted in June 2000 by Wendy Nelson, Ph.D., Far Western, and Rand Herbert, M.A.T., JRP. A permit for the survey was requested and received from BLM for sections of the proposed power line within BLM lands. Field investigations were carried out by a four-person team. The survey was conducted within the project APE described above. Wayne Hopper, Engineering Assistant for the Los Angeles Aqueduct Division of LADWP, accompanied the survey crew on June 22, 2000, acting as a guide in the southern portion of the Blackrock Waterfowl Habitat Area, where maps were inadequate.

Findings from the field surveys during the 2000 Cultural Resources Inventory are summarized in Table 4-14B. In total, six prehistoric sites, four historic sites, three isolated finds, and five historic structures were identified within the initial 2000 APE (Far Western, 2001). Four of the sites are on BLM land, four are located on land owned by LADWP, and the remaining two are held by the State Lands Commission. One of these sites, the River Intake historic structure, is within the Riverine-Riparian System and is discussed below (Section 4.8.4.1). Impact assessments for the other sites are presented in Sections 5.4 and 7.3.

TABLE 4-14B
SUMMARY OF FIELD SURVEY FINDINGS FROM THE 2000 CULTURAL RESOURCES INVENTORY

EIR/EIS Section	Areas Surveyed (APE)	Survey Findings (NRHP* Status)
4.8.4.1	• River Intake Structure	1 historic structure (eligible)
5.4.1	• 30-acre construction zone for the proposed pump station and diversion	2 isolates (ineligible)
5.4.2	• 200-foot wide corridor along 7.5 miles of the proposed power transmission line	1 isolate (ineligible) 4 prehistoric sites (ineligible) 4 historic sites (ineligible)
7.3.1 7.3.2	• 50-foot wide corridor for 3.75 miles of new berms in Blackrock • Spillgates and other flow control structures to be newly constructed or modified in Blackrock • 1.5 miles of new or enlarged ditches in Blackrock	2 prehistoric sites (unevaluated) 4 historic structures (ineligible)

Source: Far Western, 2001.
* Authorized under the National Historic Preservation Act of 1966, the NRHP is the Nation's official list of cultural resources worthy of preservation. Properties listed in the Register include districts, sites, buildings, structures, and objects that are significant in American history (including prehistory), architecture, archeology, engineering, and culture.

4.8.3.3 2003 Cultural Resources Inventory

Records Search. Prior to commencement of fieldwork, a records and literature search was conducted at CHRIS EIC to locate any previously recorded sites in the general area of the channel clearing work. The purpose of the records search is to obtain background and contextual information on cultural resources in the general project area to facilitate the field surveys and subsequent evaluations. The following sources were consulted: the NRHP index, OHP Archaeological Determinations of Eligibility, OHP Directory of Properties in the Historic Property Data file, (1982) USGS Blackrock 15' topographic map, and archaeological site records and reports on file at CHRIS EIC.

The records search identified seven previously recorded cultural resources sites in the search area (within 0.5 mile radius of the APE). Only one of the previously recorded resources, a historic site, was located within the APE. Another previously recorded historic site was located immediately adjacent to the APE. These two sites were subsequently re-recorded and further evaluated during the field survey of the APE (see Section 4.8.4.2).

Definition of APE. In consultation with OHP, the APE for the channel clearing work was determined to be the following: 150-foot wide corridor along the channel/bank margin (as measured from the centerline of the channel) for a 2.2-mile reach of the river downstream of the River Intake; 35-foot wide corridor along the four temporary access roads (Figure 2-2); and the 9-acre sediment stockpile area west of the River Intake. The bottom of the channel was not included in the APE since this area has a very low probability of containing intact cultural resources. The bottoms of river channels are high-energy hydrological environments not conducive to the formation of intact archaeological deposits. Furthermore, the sediments to be removed as a part of the channel clearing work are largely overgrown with tules and consist of materials that have been deposited in the last 90 years (i.e., after the River Intake structure was constructed in 1913). While isolated artifacts might be recovered, they would have been transported and deposited by alluvial processes and thus would not be in their primary archaeological context. Such resources would have little information value or significance (i.e., these resource would be ineligible to the NRHP).

Field Survey Results. Fieldwork for the APE for the channel clearing work was conducted in February 2003 by Kelly McGuire, M.A., and Wendy Nelson, Ph.D., from Far Western. As noted in Section 4.8.2, a Tribal cultural resource specialist from the Big Pine Paiute Tribe accompanied the field survey crew during the entire inventory.

Findings from the field survey in 2003 are described below (Section 4.8.4.2) and summarized in Table 4-14C. In total, three prehistoric sites, five historic sites, and five isolates were identified within or immediately adjacent to the APE for the channel clearing work.

TABLE 4-14C
SUMMARY OF FIELD SURVEY FINDINGS FROM THE 2003 CULTURAL RESOURCES INVENTORY

EIR/EIS Section	Areas Surveyed (APE)	Survey Findings (NRHP Status)
4.8.4.2	• 150-foot wide corridor along 2.2-mile reach of the Lower Owens River downstream of the River Intake • 35-foot wide corridor along the four temporary access roads (Figure 2-2) • 9-acre sediment stockpile area west of the River Intake	5 isolates (ineligible*)* 3 prehistoric sites (2 ineligible and 1 unevaluated*) 5 historic sites (2 ineligible, 2 unevaluated, and 1 eligible*)

Source: Far Western, 2003.
* One prehistoric site (unevaluated) and one historic site (previously recommended eligible) are located outside but immediately adjacent to the APE.

4.8.3.4 2004 Historic Resources Report

As described in Section 2.3.6, several structural obstacles to flow will be removed from the river channel prior to the commencement of releases for the Phase 1 baseflows. In 2004, JRP conducted a historic resources evaluation of 16 manmade structures (see Table 4-14D) that are located in or adjacent to the river channel and were identified by LADWP and Ecosystem Sciences (2003) as potential obstacles to flow. The evaluation included: a field survey of the structures; a review of historical mapping; interviews with LADWP and Inyo County Roads Department personnel; and additional research at the LADWP field office and the California Department of Fish and Game office in Bishop, the Eastern Sierra Museum and Inyo County Roads Department in Independence, and at the California State Library and Bureau of Land Management office in Sacramento.

Findings from the 2004 historic resources evaluation are described below (Section 4.8.4.3) and summarized in Table 4-14D.

TABLE 4-14D
SUMMARY OF FINDINGS FROM THE 2004 HISTORIC RESOURCES EVALUATION

EIR/EIS Section	Reference Number	Resource Name	Construction Date	NRHP Status	Description
4.8.4.3	2	Railroad Flatcar Bridge	unknown	Modern	Removable railroad flatcar bridge
	3	Cable Bridge	1969	Modern	Former LADWP gauging structure
	4	Bridge Berm and Culverts	Circa Early 1900s	Not eligible	Bridge berm and culverts
	5	Eastside Canal Diversion Dam	Circa late 1880s	Not eligible	Diversion dam
	6	Stevens Canal Diversion Dam	Circa 1890s-1900s	Not eligible	Diversion dam
	7	Power Line Road Culverts	Circa 1950s	Not eligible	Five culverts
	8	Mazourka Canyon Road Culverts	1969	Modern	Two culverts in channel
	9	Bridge Foundation	Circa 1900	Not eligible	Bridge abutments and pier wall
	10	Eclipse Ditch Diversion Dam	Circa 1860s	Not eligible	Diversion dam
	11	Earthen Dike	Circa 1950s-1960s	Not eligible	Earthen dike or levee
	12	Manzanar Reward Road Culverts	Circa 1969	Modern	Two culverts in channel
	13	Mojave-Owenyo Railroad Bridge	1910	Not eligible	Railroad bridge abutments and pier wall
	14	Lone Pine Narrow Gauge Road Culverts	Circa 1969	Modern	Two culverts in channel
	15	Keeler Road Bridge Abutment	Circa 1900	Not eligible	Bridge abutment and LADWP
	16	Keeler Road Bridge	1986	Modern	Concrete bridge
	17	Access Road Crossing	2001	Modern	Access road crossing on berm

Source: JRP, 2004.

4.8.4 Impacts to the Riverine-Riparian System

Impact assessment for cultural resources in the Riverine-Riparian System (the River Intake, the area of channel clearing, and areas subject to proposed flows) is presented below.

4.8.4.1 River Intake

The River Intake is part of the construction of the original phase of development of the Los Angeles Aqueduct system. It was completed in 1913, and controls flows to the Owens River by blocking the river from entering the natural channel of the Owens River and forcing it to flow west and south into the

Aqueduct Intake. Operation of the radial gates and floodbays allows the river to flow through the River Intake into the natural channel.

The River Intake has very good integrity for its period of significance (1913). It has suffered only two minor losses of integrity – the removal of the lift mechanism for one radial gate, and a slight alteration through the installation of a modern pipe railing at its eastern end in 1999. Otherwise it has good integrity of setting (which is little changed from 1913), design (it is in essentially its original condition and configuration), materials (original except for the previously-mentioned modern pipe railing), workmanship (original), feeling (original), and association (original).

The River Intake appears to meet the criteria for listing in the NRHP under Criteria A and C. The River Intake appears to meet the requirements for listing under Criterion A, as a site that is "associated with events that have made a significant contribution to the broad patterns of our history." The River Intake is associated with the development of the Los Angeles Aqueduct, and the augmentation of urban water supplies for the City of Los Angeles. The exploitation of the Owens River by the City of Los Angeles is one of the most famous examples in our nation's history of the early use of a distant water supply by an urban area. While there were some earlier examples, such as those of Boston and New York, none has assumed such a storied place in our national history.

The River Intake also appears to meet the requirements for listing under Criterion C, as a resource that embodies "the distinctive characteristics of a type, period, or method of construction." A measure of the significance of the overall system of which the River Intake is a part is indicated by the fact that its construction has been heralded in the engineering community as a work magnificent in scope and engineering. The American Society of Civil Engineers dedicated the entire original system as a National Historic Civil Engineering Landmark, noting:

> *Unprecedented in size and scope at the time of completion, this aqueduct system was the prototype for the extensive water supply systems needed to support the major urban complexes of today. Begun in 1907, this aqueduct is 232 miles (373 km) long and provides Los Angeles with a flow of 440 cubic feet per second (12.5 cubic meters per second) and generates hydroelectric power in the process* (ASCE, 2000).

While numerous reports have been written on various segments of the Los Angeles Aqueduct detailing the eligibility or lack thereof of each segment, there has been no systematic evaluation of the Aqueduct as a whole. In 1992, Julia Costello and Judith Marvin prepared a Supplemental Archaeological Survey Report for the Highway 395, Alabama Gates Four Lane Project in Inyo County. While they evaluated only the Alabama Gates and their vicinity, they suggested that the Los Angeles Aqueduct system as a whole appears to be eligible for listing in the NRHP under Criteria A and C, because it is associated with events that have made a significant contribution to the broad historical patterns and because it represents a remarkable engineering feat. In their report, Costello and Marvin (1992) recorded the Aqueduct as an archaeological site, rather than as a structure. They observed:

> *The LA Aqueduct appears to be significant for its role in the history of Owens Valley and the development of Los Angeles, and for its unique historical associations with the economics and politics of Western water issues. It is also significant for its impressive physical conveyance of virtually an entire river system through a mountain range to a city 200 miles away* (Costello and Marvin, 1992:42).

Furthermore, they stated that the Aqueduct segment within the area of their own study, extending from the Alabama Gates south for about 1 mile, "exhibits good integrity of location, setting and design, and a fair feeling of original material and workmanship," during its period of significance from the beginning of construction in 1907 to the completion of the final extension of the Aqueduct north into Mono County in 1940. Additionally, in their analysis other sites such as construction camps, maintenance roads and pump sites located along the Aqueduct also carried the potential for grouping as resources with the Aqueduct system. Costello and Marvin noted that the Alabama Gates were the largest of a total of 13 such structures along the Owens Valley portion of the Aqueduct; their list of other, smaller gates included the River Intake.

To allow for the new flow regimes proposed under LORP, the radial gate at the east end of the structure would be replaced with a new, automated metal gate. Installation would primarily involve securing and sealing the new gate to a new concrete spillway channel. The existing concrete spillway walls and upper wooden walkway would remain intact. A new 300-foot long concrete spillway channel will extend downstream from the modified gate to protect the metering station from vegetative overgrowth and excessive scouring during high flow conditions.

JRP assessed the significance of the proposed modifications to the River Intake using the criteria under the NHPA for historic properties. The results of the assessment by JRP are presented in the “Finding of No Adverse Effect” (JRP, 2001). JRP (2001) concluded that the proposed modifications would not alter the characteristics of the structure that qualify the River Intake for inclusion in the NRHP. The proposed modifications would not alter the historic integrity of location, design, materials, workmanship, feeling and association because the modification would be minimal. The proposed modifications do not involve any demolition and are all reversible. JRP (2001) also assessed whether the proposed modifications could be defined as a “substantial adverse change” as defined under the CEQA Guidelines. “Substantial adverse change” includes demolition, destruction, relocation, and alteration of a historic structure such that its significance would be impaired. JRP (2001) concluded that the proposed modifications would not significantly alter the significance or integrity of the structure, and as such, would not cause a significant impact under CEQA. **Therefore, project impacts on the River Intake are considered a less than significant impact (Class III).**

4.8.4.2 Channel Clearing

As described in Section 2.3.6, the channel clearing work involves mechanical removal of channel obstructions such as sediments and tules from a portion of the Lower Owens River channel below the River Intake prior to the initial flow releases under LORP. This channel clearing work will require the following: mechanical removal of sediment and other debris from 2.2 miles of the Lower Owens River channel downstream of the River Intake; disposal of the removed materials at a 9-acre sediment stockpile area (west of the River Intake); and construction of temporary access roads (one on the western bank along the reach of the channel to be cleared and four additional roads to provide access to the river from nearby existing service roads (Figure 2-2)). To the extent feasible, these roads would be formed by traveling over existing vegetation. However, minor clearing and grading may be required.

As summarized in Table 4-14C, a total of three prehistoric sites, five historic sites, and five isolates were identified within or immediately adjacent to the APE for the channel clearing work. Two of the prehistoric sites, two of the historic sites, and all five isolates are recommended not eligible for the NRHP. The two prehistoric sites are not considered eligible because they consist of artifact scatters with little potential for intact subsurface deposits and information they contain would not contribute to regional research issues for Owens Valley prehistory. The two historic sites are not considered eligible because they consist of small ephemeral trash accumulations, which have little research value. The five isolates are not considered eligible. No further management actions are required for these resources.

Three historic sites and one prehistoric site are either unevaluated or potentially eligible for inclusion on the NRHP. One historic site (No. 3 in Table 4-14D) is a suspension-style footbridge that crosses the channel. The channel clearing work can be accomplished without disturbing this footbridge; therefore, no impact would occur on this site. The remaining two historic sites (one unevaluated and one eligible) are previously recorded sites located near one of the proposed temporary access roads. The prehistoric site (unevaluated) is located adjacent to the sediment stockpile area. These three sites could be disturbed by establishment of the access roads and/or use of construction equipment during the channel clearing work. **This impact is considered potentially significant, but mitigable (Class II).** Significant impacts can be avoided by implementing Mitigation Measure CRR-1, which includes locating the temporary access roads around the sites and installing temporary protective fencing to prevent inadvertent disturbances from heavy equipment or sediment spoil from intruding onto the sites.

4.8.4.3 Removal of Obstacles to Flow

As described in Section 2.3.6, several structural obstacles to flow will be removed from the river channel prior to the commencement of releases for the Phase 1 baseflows. Of the 16 structures that were evaluated by JRP (2004), up to 11 may be removed or modified prior to initial flow releases (Nos. 2, 4, 5, 6, 7, 8, 9, 10, 11, 12, and 14). No modifications are proposed for the remaining five structures at this time (Nos. 3, 13, 15, 16, and 17).

As summarized in Table 4-14D, none of the 16 resources is considered significant, or eligible for inclusion on the NRHP. Seven of the 16 structures were found to be of modern construction (i.e., less than 50 years old). A resource must be at least 50 years old in order to be eligible to the NRHP unless it meets specific and exacting criteria for special significance. Since these seven modern structures did not appear to meet the criteria of special significance for recently-built resources, they were not evaluated in detail with respect to their eligibility for the NRHP.

The remaining 9 structures that appear to be more than 50 years old were evaluated further for their eligibility for the NRHP. None of the resources were found to be significant within the historic contexts of irrigation and transportation (under Criterion A of the NRHP historical significance criteria), by association with important historic persons (Criterion B), in terms of construction technique or engineering (Criterion C), or as a source of information important to history (Criterion D). In addition, none of the resources retain a sufficient amount of integrity to merit listing in either NRHP or the California Register of Historical Resources. Therefore, **removal and modification of these structures would represent a less than significant impact (Class III)**.

4.8.4.4 Potential for Disturbance of Archaeological Sites from Proposed Flows

As described in Section 4.8.3.1, consultations between EPA and OHP resulted in a consensus that under LORP, areas of new river flows or flooding alone are not expected to create adverse impacts to existing cultural resources and therefore would not be included in the APE (areas to be surveyed). As described in Section 4.3.2, the width of the wetted reach of the river is expected to increase by at most 40 feet under proposed flow releases. Proposed new flows in the river and the Delta would be similar to and would certainly not exceed those experienced under natural (i.e., with no diversions from the Lower Owens River to the Aqueduct) flood conditions. No prehistoric or archaeological sites are known to occur along the margins of the Lower Owens River within the floodplain that would be affected by the baseflows and seasonal habitat flows (Far Western, 2001). Similarly, the Blackrock Waterfowl Habitat Area has been inundated repeatedly since the 1960s, and the proposed discharges under LORP to Blackrock will be low velocity. Hence, potential changes in landform over time due to the additional flows are not expected to damage or expose any archaeological sites. However, there is a remote possibility that unknown archaeological sites or cultural deposits could be affected by the new flows. **While this impact is not expected to occur, it is considered a potentially significant, but mitigable impact (Class II)**. It can be mitigated by reporting unexpected finds to a qualified archaeologist for further investigation and implementation of management actions to protect the resource, as described in Measure CRR-2.

4.8.5 Mitigation Measures

CRR-1 LADWP shall implement the following management actions to avoid impacts on cultural resources during the channel clearing work:

- LADWP shall work with a qualified archaeologist to locate the temporary access road for the channel clearing work to avoid the two historic sites identified in the field survey by Far Western (2003).
- Temporary construction fencing shall be installed along the perimeter of the area where these two historic sites are located to avoid construction equipment, vehicles, or personnel from accidentally entering and disturbing the site.
- Temporary construction fencing shall be installed between the sediment stockpile area and the adjacent prehistoric site to avoid heavy equipment and or sediment spoil from accidentally entering and disturbing the site.
- Installation of temporary fencing referenced above shall be conducted under the supervision of a qualified archaeologist.
- LADWP shall notify representatives of regional Native American Tribes prior to beginning earthwork for the channel clearing work. Interested Tribal representatives shall be invited to be present (on a volunteer basis) during earthwork.
- In the event that previously unknown prehistoric or historic cultural material is encountered, a qualified archaeologist will be contacted and will investigate the find and determine if it represents an intact deposit or archaeological site. LADWP shall implement the recommendations of the archaeologist concerning measures to protect or salvage the site. If prehistoric cultural material, LADWP shall coordinate the investigations and actions to be taken with appropriate Native American parties.

CRR-2 In the event that previously unknown prehistoric or historic cultural material is observed in areas subject to LORP-related flows or earthwork, LADWP shall retain a qualified archaeologist to investigate the find and determine if it represents an intact deposit or archaeological site. LADWP shall implement the recommendations of the archaeologist concerning measures to protect or salvage the site. If prehistoric cultural material is identified by the archaeologist, LADWP shall coordinate these investigations and actions to be taken with appropriate Native American parties. If any investigations are conducted, interested Tribal representatives would be invited to participate (on a volunteer basis).

4.9 AIR QUALITY

Emissions from Channel Clearing

As described in Section 2.3.6, LADWP will need to clear vegetation and sediments from the river channel immediately downstream of the River Intake prior to making releases. LADWP will mechanically remove sediments and marsh vegetation obstructions from 10,800 feet of the river channel. Desilting work will occur using a tracked excavator. Excavated material will be placed directly into dump trucks, and then hauled to a permanent sediment stockpile area adjacent to the River Intake. A temporary haul road will be established on the top of the west bank for the excavator and trucks. Several temporary roads will be created perpendicular to the main haul road to provide access to an existing dirt road along the Aqueduct. These roads will be restored to pre-construction grade and revegetated.

The channel clearing operations will require about four months to complete. Approximately six trucks will be used in the operation (four 4-cubic yard trucks and two 8-cubic yard trucks). The amount of material removed and hauled will range from 192 to 288 cubic yards per day, requiring about 32 to 48 truck round trips per day. Work is expected to begin in fall of 2004 or winter of 2005..

An estimate of the combined daily and total emissions from the channel clearing is provided below in Table 4-15. **Emissions from channel clearing are considered adverse, but not significant impacts (Class III).** The emissions contribute to degradation of air quality conditions in the valley, but are unlikely to cause air quality violations. The primary impact of concern is emissions of fugitive dust due to the PM10 non-attainment status for the region. Fugitive dust emissions can be reduced by the application of dust control measures (see Mitigation Measure AQ-1 in Section 5.3.3). A more detailed description of all construction related emissions from the LORP is provided in Section 5.3.

TABLE 4-15
ESTIMATED EMISSIONS FROM CHANNEL CLEARING *

Activity	Carbon Monoxide	Reactive Organic Gases (hydrocarbons)	Nitrogen Oxides	Particulate Matter (PM10)
Maximum Daily Emissions (lbs per day)				
Initial channel clearing	1.1	0.5	15	1.3
Total Construction Emissions (tons)				
Initial channel clearing	0.1	0.2	0.4	<0.1

*Emissions calculated by URS Corporation for the EIR/EIS.

Release of Gases During Initial Rewatering

The initial rewatering of the river will cause a short-term adverse water quality impact that could result in objectionable odors from off-gassing of the organic sediments. Hydrogen sulfide and methane could be released. People that are located adjacent to the river during the initial releases could be exposed to these gases, which could be unpleasant. Individuals that are on the river banks could be exposed to high concentrations that could cause respiratory distress. The magnitude of this impact is expected to be very low because few people reside adjacent to the river, or will be present along the river during the initial rewatering. If LADWP and the County become aware that hydrogen sulfide and/or methane is arising from the river, efforts to warn people who may visit the river of the situation (i.e., the posting of warning signs and/or notification of media) will be undertaken by LADWP and the County. Hence, **the potential exposure to objectionable gasses and odors during the initial rewatering is considered an adverse but not significant impact (Class III).**

5.0 DIVERSION, PUMP STATION, POWER LINE, AND ROAD SURFACING

5.1 VEGETATION TYPES, INCLUDING WETLANDS

5.1.1 Existing Conditions

Diversion and Pump Station

The pump station site was surveyed on May 4 and 5, 1999, and again on May 24 and 25, 2000 by URS and Ecosystem West botanists. The objectives of the surveys were to map vegetation types, compile a list of plant species, and search for sensitive plant species. The entire 24-acre construction site (see Figure 2-7 and Figure 5-1) was surveyed on foot. Vegetation types were delineated on a topographic site map (scale 1" = 200'). All vascular plant species in identifiable condition at the time the survey was conducted were identified to species or infra-specific taxon using keys and descriptions in standard floras. The timing of the botanical survey was appropriate for identification of most of species present.

Four vegetation types occur at the proposed pump station site: Mojave riparian forest, transmontane freshwater marsh, transmontane alkali meadow, and desert greasewood scrub. All but desert greasewood scrub are classified as federal jurisdictional wetlands as defined under Section 404 of the Clean Water Act. Each of these vegetation types is briefly described below using the classification system of Holland (1986) and the Green Book (LADWP and Inyo County, 1990). The classification of the following vegetation types differ slightly from those presented in Section 4 (river), Section 6 (Delta), and Section 7 (Blackrock), which were prepared by White Horse Associates, in that the following descriptions include a specific reference to Holland and the Green Book. Boundaries of vegetation types at the pump station site are shown on Figure 5-2.

1. Mojave Riparian Forest (Holland Type 61700). This vegetation type occurs in the Owens River channel. The canopy is composed of Goodding's black willow (*Salix gooddingii*) and, to a lesser degree, red willow (*Salix laevigata*). The herbaceous layer is commonly composed of bulrush (*Scirpus acutus* var. *occidentalis)* in the deeper water, and on the shallow water margins is characterized by cut-leaf water-parsnip (*Berula erecta*), water-parsnip (*Sium suave*), saltgrass (*Distichlis spicata*), yerba mansa (*Anemopsis californica*), and wire rush (*Juncus arcticus* ssp. *ater*). This habitat is typically considered a wetland under Section 404 of the Clean Water Act. This vegetation is currently in a severely degraded condition due to beaver dam impoundments.

2. Transmontane Freshwater Marsh (Holland Type 52320). This vegetation type also occurs in the river channel. Two phases are present: tall marsh and short marsh. The tall marsh phase occurs in deeper areas of the channel and is composed primarily of tall emergent species, mainly bulrush and, to a lesser degree, common reed (*Phragmites australis*) and southern cattail (*Typha domingensis*). The short marsh phase is found in shallower portions of the river channel, primarily on the channel margins, and is composed of lower herbaceous vegetation, primarily cut-leaf water-parsnip, water-parsnip, wire rush, common threesquare (*Scirpus pungens*), and the non-native species annual beardgrass (*Polypogon monspeliensis*). This habitat is considered a wetland under Section 404 of the Clean Water Act.

3. Transmontane Alkali Meadow (Holland Type 45310). This vegetation type occurs in two different phases, depending on groundwater conditions. Groundwater is at or near the surface in the low-lying area west of the Owens River channel where a small pond is located, and along the

margins of the floodplain east of the channel. The alkali meadow vegetation in these areas is composed mainly of saltgrass except for a sprinkling of alkali bird's beak (*Cordylanthus canescens*), western nitewort or alkali pink (*Nitrophila occidentalis*), yerba mansa, and wire rush. The floodplain east of the river has deeper groundwater. The species composition of the alkali meadow vegetation in this area varies from areas of dense monocultures of saltgrass to areas that have Torrey's saltbush (*Atriplex lentiformis* var. *torreyi*) and to a lesser degree bush seepweed (*Suaeda moquinii*) and arrowscale (*Endolepias covillei = Atriplex phyllostegia*). Barren salt flats are also present in this area. This habitat is considered a wetland under Section 404 of the Clean Water Act when it occurs in areas with prolonged saturated soils, such as in the river channel noted above.

4. <u>Desert Greasewood Scrub (Holland Type 36130)</u>. This vegetation type dominates the uplands west of the Owens River at the proposed pump station site, and also occupies a portion of the floodplain east of the river. The shrub layer is composed of greasewood (*Sarcobatus vermiculatus*), bush seepweed (*Suaeda sp.*) and, to a lesser degree, Parry's saltbush (*Atriplex parryi*). The herb layer is composed of kidney-leaved buckwheat (*Eriogonum reniforme*), Mojave stinkweed (*Cleomella obtusifolia*), fan-leaf (*Psathyrotes annua*) and in a few areas few-leaved bee plant (*Cleome sparsifolia*) and the non-native species Russian-thistle (*Salsola tragus*). In a few areas, the greasewood is lacking and bush seepweed is the dominant shrub. This habitat is not considered a wetland under Section 404 of the Clean Water Act.

In addition to the above vegetation types, two areas on the upland west of the Owens River contain very sandy soils that are unvegetated, although these areas might support a sparse cover of annual plants in seasons with favorable precipitation.

<u>Power Line</u>

The power line route (see Figure 2-10) was surveyed on May 24 and 25, 2000 by EcoSystems West botanists to map vegetation types, compile a list of plant species, and search for sensitive plant species. The survey was conducted on foot in the same manner as for the pump station site (see above).

A total of 76 species of vascular plants were observed along the proposed power line. Of these, 69 species are native and 7 species are non-native. Five vegetation types occur along the proposed power line: Mojave mixed woody scrub, desert saltbush scrub, shadscale scrub, desert sink scrub, and transmontane alkali meadow. Only the alkali meadow represents a wetland under Section 404 of the Clean Water Act.

Mojave mixed woody scrub occurs along the southernmost approximately 1.3 miles of the proposed line, where it traverses alluvial fans at the base of the Sierra Nevada. The desert saltbush scrub is the most extensive vegetation type along the proposed line, occurring along approximately 3.9 miles of the proposed line at the west edge of the valley west of Owens Lake. Shadscale scrub occupies a 1.2-mile long segment near the north end of the proposed line. Desert sink scrub occurs only along the approximately 0.3 mile segment where the proposed line deviates from the existing steel tower line in the northern portion of the proposed alignment. Saltbush scrub, playa, alkali meadow, and a freshwater seep occur in a mosaic along a 0.5 mile segment near the northwest shore of Owens Lake.

A description of the individual vegetation types along the route is provided below. The classification of the following vegetation types differs slightly from those presented in Section 4 (river), Section 6 (Delta), and Section 7 (Blackrock), which were prepared by White Horse Associates, in that the following descriptions include a specific reference to Holland and the Green Book.

- Mojave Mixed Woody Scrub (Holland Type 34210). This vegetation type is composed of turpentine-bush (*Ericameria laricifolia*), white bursage (*Ambrosia dumosa*), broad-leaved California buckwheat (*Eriogonum fasciculatum* var. *polifolium*), winter fat (*Krascheninnikovia lanata*), and hopsage (*Grayia spinosa*).

- Desert Saltbush Scrub (Holland Type 36110). This vegetation type contains several phases. In some areas, it is dominated by white bursage, all-scale (*Atriplex polycarpa*), burrobrush (*Hymenoclea* sp.), and shadscale (spiny saltbush) (*Atriplex confertifolia*) in the shrub layer. The herb layer is composed primarily of pebble pincushion (*Chaenactis carphoclinia* var. *carphoclinia*), wing-nut cryptantha (*Cryptantha pterocarya*), and checker fiddleneck (*Amsinckia tessellata*). In some areas, white bursage comprises most of the cover, while in other portions all-scale comprises most of the cover with shadscale being sparse. Burrobrush is most common in areas where alluvium is present from outwash of creeks. Another phase of saltbush scrub areas occurs in relatively moist, or seasonally moist, alkaline soil. It is composed mostly of Torrey's saltbush, except one area which is composed almost entirely of yellow-green rubber rabbitbrush (*Chrysothamnus nauseosus* var. *oreophilus and var. hololeucus*). The herbaceous layer contains areas of saltgrass, wire rush, or yerba mansa.

- Shadscale scrub (Holland Type 36140). This vegetation is transitional between the desert saltbush scrub and shadscale scrub types of Holland (1986). It occurs in sandy soil that is relatively hard-packed. The shrub layer is composed primarily of all-scale and shadscale, with a small amount of small-leaved Mojave indigo bush (*Psorothamnus arborescens* var. *minutifolius*). Inflated buckwheat (*Eriogonum inflatum*) is common in the herb layer. Annuals are scarce. In dry sandy soils, the shrub layer is composed primarily of shadscale and small-leaved Mojave indigo bush. Very few, if any, herbs were present in this habitat.

- Desert Sink Scrub (Holland Type 36120). This vegetation type occurs in low-lying, moist alkaline soils. It is composed of shadscale, Parry's saltbush, yellow-green rubber rabbitbrush, and big sagebrush (*Artemisia tridentata*, occurring only locally). The herb layer in this type is largely dominated by alkali sacaton (*Sporobolus airoides*), narrowleaf stephanomeria (*Stephanomeria tenuifolia*), and saltgrass (occurring only in a few small areas).

- Transmontane Alkali Meadow (Holland Type 45310). An area of transmontane alkali meadow dominated by saltgrass occurs along one segment of the proposed power line near the northwest shore of Owens Lake. In this area, the vegetation has developed at the upper margin of a playa and around the outlet of a small spring. Most of the water from the spring is piped to a water trough. In this area, this habitat type is mostly composed of saltgrass and to a lesser degree yerba mansa and wire rush. This habitat is considered a wetland under Section 404 of the Clean Water Act.

In addition to the above vegetation types, portions of the power line route along the margins of Owens Lake contain unvegetated sand. A small seep occurs in one location along the power line route. The site is dominated by herbs indicative of moist conditions, primarily ciliate willow-herb (*Epilobium ciliatum*), wire rush, common scratchgrass (*Muhlenbergia asperifolia*), and the non-native species white sweet-clover (*Melilotus alba*).

5.1.2 Impacts – Construction of Pump Station

A more detailed discussion of the pump station is available in Section 2.4.3. A description of the construction activities and phases for pump station is provided in Section 2.4.3.9. Construction activities that would result in temporary and permanent impacts to upland, riparian, and wetland habitats are described below.

Construction Period and Phases

Construction would occur over a 12-month period. Construction will involve the following major phases:

1. Prepare Site; Road Surfacing – Build temporary diversion and bypass pipeline or open channel, then divert flows around the construction site; remove vegetation from alignment of the diversion; install temporary cofferdams around the pump station site and dewater; install service roads to sediment basin and east side of river; place, grade, and compact aggregate base on existing access road;. This phase would require about 2 months. The temporary diversion and bypass pipe are shown on Figure 2-7.

2. Install Diversion Structure – Construct the spillway, spillway abutment, bypass/flushing gate, and erosion control structure; excavate sediment basin. This phase would require about 3 months.

3. Construct Pump Station Structure – Install foundations, concrete sump, structural backfill, and piping. This phase would require about 5 months, of which 2 would overlap with the above activities.

4. Install Pumps, Mechanical, Electrical, Controls, and Pipeline – Install pumps, electrical, and mechanical equipment; install air chamber and electrical transformer yard; install fencing; site clean up; remove temporary river diversion and bypass; install 36-inch diameter pipeline to the Dust Mitigation Program pipeline; test system. This phase would require about 5 months, 1 of which would overlap with the above activities. Once this phase in completed, Phase 2 releases to achieve the 40-cfs baseflow would begin.

Areas of Impact at the Pump Station

The temporary construction area at the pump station and diversion site is shown on Figures 2-7 and 5-1. All construction work and staging would occur within this boundary. All equipment storage, equipment maintenance, and vehicle parking would occur in upland areas at least 100 feet from the banks of the river.

Construction Activities That Would Affect Habitat

The following activities would occur in the river channel or floodplain areas where they could affect native vegetation, as described below. The acreages of temporary and permanent disturbances to upland and riparian or wetland habitats are provided in Table 5-1. Approximately 24 acres would be temporarily disturbed and restored after construction, while an additional 8 acres would be permanently disturbed. The location of the pump station facilities relative to the river channel at the site is shown on Figures 5-1 and 5-2.

- A 2- to 3-foot high temporary earthen berm will be constructed to divert flow from the river and around the diversion site during the construction of the permanent diversion structure. Construction of the berms will require clearing a 100-foot wide corridor across the river, and temporarily constructing an earthen berm across the river channel (using riverbed materials) that diverts flows to a bypass culvert or open channel on the east side of the river (Figure 2-7). The berm and bypass culvert or channel will be removed after construction is completed. The riverbed will be re-graded to pre-construction conditions, and flows would be returned to the river. Installation and removal of these berms would affect the following habitats: open water, freshwater marsh, and riparian forest.

- Installation of the spillway and abutment (combined, about 220 feet in length) will require excavation work in a 100-foot wide corridor across the river. The abutment will be constructed of compacted on-site material with a 25-foot deep sheet pile cutoff wall. The spillway and abutment will require imported rock riprap. The river channel area disturbed by this construction will be re-graded to pre-project conditions after construction, except for the base of the spillway and abutment (about 70 feet wide). Installation and removal of these berms would affect the following habitats: open water, freshwater marsh, and riparian forest.

- A 650-foot long erosion control structure will be constructed in the floodplain east of the river (Figure 2-7). Sheet piles will be placed below grade to form the erosion control structure. The structure will mostly be below grade, except where it will cross several of these small channels. At these locations, the structure will be about 1 to 2 feet in height, constructed using on-site material excavated from the pump station site on the west bank. Installation of the erosion control structure will require excavation work in a 50-foot wide corridor across the river. Installation of the structure will temporarily affect greasewood scrub and alkali meadow.

- About 1 acre of the west bank will be lowered and cut slopes will be constructed around the perimeter for the pump station and sump. A buried 28- by 46-foot sump will be installed in the center of the yard, along with a 60- by 60-foot pump station building. The 189- by 229-foot facility yard will be surfaced with gravel. Most of the facility site will remove upland vegetation – greasewood scrub. However, construction of the inlets to the sump will temporarily disturb the margins of the river, which support freshwater marsh and riparian forest.

- Creation of the 185- by 270-foot sediment basin upstream of the diversion will require removal of vegetation and sediments from the river to lower the existing channel by several feet. The basin will be periodically maintained to prevent the accumulation of sediments and vegetation. The initial and periodic desilting will permanently affect riparian forest and freshwater marsh. The sediments will be removed from the basin using an excavator or crane with a clamshell bucket. The wet sediments will be placed in two upland locations (approximately 5 acres) for dewatering over several weeks (Figure 5-2). The sediment pile will typically be about 2 to 3 feet high, containing about 9,000 cubic yards. Sediments will most likely be removed by a wheeled excavator, or by a crane with a clamshell bucket. The dried sediments will then be spread along the top of the west bluff well above the river in a barren sandy area, up to a height of 6 feet with a potential footprint of 100 by 150 feet (3,000 cubic yards). Additional sediments that accumulate over time will be transported to appropriate off-site areas.

- The sediment stockpile areas currently contain desert greasewood scrub vegetation and barren sand (see Figures 5-1 and 5-2). The sediments will remain in the stockpile until additional storage is required. After sediments are dewatered, they will be loaded onto trucks and hauled off site to a suitable disposal site, or for use in construction projects in the valley.

- A 2,200-foot long, 16-foot wide gravel service road will be constructed to access the sediment basin (Figure 5-2). It will be constructed on a fill slope. The base of the fill will have an average width of about 45 feet. Approximately 6,000 cubic yards of fill material will be required for this road. The fill will be derived from on-site excavations for other facilities (as it is available) and from off site sources. The road will displace unvegetated sand, greasewood scrub, alkali meadow, and riparian forest.

- A 600-foot long, 16-foot wide gravel service road will be constructed on the east side of the river to allow inspection of the diversion structure and sediment basin (Figure 5-2). It will be constructed on a fill slope with a base of about 45 feet. Approximately 2,000 cubic yards of fill material will be required for this road. The fill will be derived from off-site sources. The road will temporarily and permanently affect alkali meadow vegetation.

- A 400-foot long, 16-foot wide gravel access road will be constructed from the existing dust control road to the pump station (Figure 5-2). The existing grade will be excavated as the road slopes down to the pump station. This road will displace greasewood scrub.

TABLE 5-1
TEMPORARY AND PERMANENT HABITAT DISTURBANCES (ACRES) DUE TO CONSTRUCTION AT THE PUMP STATION

Project Elements (see Figures 2-7, 5-1, and 5-2)	Desert Greasewood Scrub	Trans-montane Alkali Meadow*	Mojave Riparian Forest*	Trans-montane Freshwater Marsh*	Flowing Water**	Isolated Pond**	Total
Temporary Construction Impacts (areas to be restored after construction)							
General upland disturbance, including service road construction	20.7	0.8					21.5
Temporary diversion berms			0.40	0.40	0.12		0.92
Installation of permanent diversion structure	0.8		0.40		0.10		1.30
Total =	21.5	0.8	0.80	0.40	0.22	0	23.72
Permanent Impacts from Construction of Facilities (not included above)							
Diversion structure	0.15		0.30		0.05		0.50
Facility pad, including pump station and sump	0.88						0.88
Service roads	1.60	1.85	0.05				3.50
Sediment basin in the forebay			1.01	0.37			1.38
Sediment stockpiling adjacent to the forebay	5.0						5.0
Subtotal =	7.63	1.85	1.36	0.37	0.05	0	11.3
Total Wetland Loss =		3.58 acres					

* Vegetated wetlands as defined under Section 404 of the Clean Water Act. ** Defined as non-wetland "waters of the United States" under Section 404 of the Clean Water Act.
** Impacts to vegetation caused by construction of the power line are not included in this table because they are deemed insignificant (see Section 5.1.3).

Approximately 3.6 miles of the existing dirt road from Highway 395 to the pump station site will be surfaced with an aggregate base. Placement of the aggregate will not affect any native habitat.

Summary of Temporary Vegetation Impacts at the Pump Station

The construction of the pump station would cause general disturbance to upland vegetation from equipment staging, overland travel between work areas, construction of the service roads, and installation of the permanent diversion structure. About 21.5 acres of desert greasewood scrub would be temporarily disturbed (see Table 5-1). **This impact is considered a significant, but mitigable impact (Class II)** because the disturbed areas would be restored to native vegetation as described in Mitigation Measure P-1 (see Section 5.1.4), which is considered a mandatory mitigation measure that must be implemented to reduce a significant impact. Mitigation Measure P-1 will be implemented in coordination with CDFG.

Construction activities in the river channel would disturb about 2.0 acres of vegetated wetlands (0.4 acres of freshwater marsh, 0.8 acres of riparian forest, and 0.8 acres of alkali meadow). **This impact is considered adverse, but not significant (Class III)** because these areas are expected to recover through natural processes as has been observed in other areas along the river from previous disturbances (e.g., from maintenance activities along the river, creeks, and ditches tributary to the river) and the loss of approximately 2.0 acres of vegetated wetlands will be compensated by the gain of 3,113 acres of wetlands created by the implementation of the overall project (see Table 14-1).

Summary of Permanent Vegetation Impacts from Pump Station

Construction of the pump station facilities (i.e., paved yard, pump station sump and building, service roads, and sediment stockpile areas) would result in the permanent loss of 7.6 acres of greasewood scrub (Table 5-1). **This is considered an adverse, but not significant impact (Class III)** because the loss of approximately 7.6 acres of greasewood scrub will be compensated by the gain of acres of marsh/wet alkali meadow and alkali meadow, and by the creation of other habitats that will result from the implementation of the overall project (see Table 14-1). No mitigation is proposed for this impact.

Creation and maintenance of the sediment basin would result in the permanent conversion of 0.37 acres of freshwater marsh and 1.01 acres of riparian woodland to the open water of the forebay (Table 5-1). The conversion of these wetland and riparian vegetation types to open water **is considered adverse, but not significant (Class III)** due to the small acreage involved and because the loss of approximately 1.38 acres of freshwater marsh and riparian habitat will be compensated by the gain of 3,113 acres of wetlands created by the implementation of the overall project (see Table 14-1).

Construction of the western and eastern service roads to the sediment basin would result in the permanent loss of 1.85 acres of alkali meadow and 0.05 acre of riparian woodland (Table 5-1). **The loss of these wetland types is considered adverse, but not significant (Class III)** due to the small acreage involved and because the loss of approximately 1.9 acres of alkali meadow and riparian woodland will be compensated by the gain of 3,113 acres of wetlands created by the implementation of the overall project (see Table 14-1).

The diversion structure would permanently displace about 0.15 acres of upland vegetation (also included in 7.6 acres of greasewood scrub described above) and about 0.30 acre of riparian woodland in the river channel (Table 5-1). **This is considered an adverse, but not significant impact (Class III)** due to the small area involved, and because the loss of approximately 0.30 acres of riparian woodland will be compensated by the gain of 3,113 acres of wetlands created by the implementation of the overall project (see Table 14-1).

In summary, the proposed diversion and pump station facilities would result in the loss of 3.58 acres of vegetated wetlands, as shown in Table 5-1. Of this total, about 1.38 acres would be converted to open water (sediment basin in the forebay). The remainder (2.20 acres) would be converted to non-wetlands or developed areas. The total cumulative impact of this loss and conversion is considered adverse, but not significant for the reasons provided above (i.e., small acreage, compensation provided by the implementation of the overall LORP). Therefore, no mitigation is proposed for these wetland losses.

Summary of Permanent Vegetation Impacts from Forebay

Under the 40-cfs baseflow conditions, the flooded area behind the pump station spillway and diversion structure (forebay) will encompass about 17 acres of open water, inundating alkali meadow, freshwater marsh, and riparian forest in the river channel upstream of the diversion (Figure 2-14).

The establishment of the forebay would result in the permanent loss of about 4.1 acres of alkali meadow and 7.5 acres of freshwater marsh, as these vegetation types would be converted to open water (Table 5-2). **This is considered an adverse, but not significant impact (Class III)** because the loss of approximately 7.5 acres of freshwater marsh and 4.1 acres of alkali meadow will be compensated by the gain of 3,113 acres of wetlands created by the implementation of the overall project (see Table 14-1).

TABLE 5-2
HABITAT DISTURBANCES (ACRES) DUE TO FLOODING OF RIVER CHANNEL BY THE FOREBAY

Project Elements (see Figures 2-14, 5-2)	Trans-montane Alkali Meadow*	Mojave Riparian Forest*	Trans-montane Freshwater Marsh*	Open Water**	Total
Permanent Impacts from Flooding in the Forebay					
Habitats inundated during 40 cfs baseflow	4.1	5.3	7.5	0.5	17.4
New Habitats Created in the Forebay					
New habitats created in the forebay under 40 cfs baseflow	0	0	1.9	15.5	17.4

* Vegetated wetlands as defined under Section 404 of the Clean Water Act. ** Defined as non-wetland "waters of the United States" under Section 404 of the Clean Water Act.

The creation of the forebay would also result in the loss of 5.3 acres of Mojave riparian forest from the river channel due to the effects of permanent inundation. However, the loss of this forest area **is considered an adverse, but not significant impact (Class III)** for the following reasons: (1) the riparian woodland in the river channel that would be inundated by the forebay is in poor condition (approximately 85 to 90 percent of the vegetation in this area is currently dead due to the effects of past flow management in the river and the effects of beaver, and (2) the loss of approximately 5.3 acres of riparian woodland will be compensated by the of 3,113 acres of wetlands created by the implementation of the overall project (see Table 14-1).

To compensate for this loss of riparian forest, EPA defined the following mitigation measure (previously identified as P-2 in the Draft EIR/EIS):

> Three years after completion of the pump station, LADWP shall determine if willow and cottonwood trees are colonizing the margins of the new forebay in such amounts to create a new riparian woodland corridor over time. If recruitment is poor, LADWP will create a total of 5.3 acres of Mojave riparian forest along the riverbanks between the pump station and Keeler Bridge by planting black and red willow and Fremont cottonwood cuttings in suitable sites along the

> river corridor. Poor recruitment is defined as a density of willow seedlings that is less than 50 percent of the pre-construction tree density in the river channel at the pump station site. The new habitat shall also include riparian understory shrubs and herbs (if available in seed or container plant form) common to the river. The restoration sites shall be configured to provide cover and shelter for riparian breeding birds. The restoration sites shall be located at or near the forebay where riparian impacts occurred. A 7-year monitoring and maintenance program shall be implemented to ensure successful establishment of the plants. The following are the mitigation goals for revegetation: (1) 80 percent survivorship of plants by year 3 and 90 percent of the remaining by year 7; (2) 50 percent plant cover by year 5 and 85 percent by year 7; (3) plants shall exhibit normal growth rates and healthy conditions for at least 2 years without supplemental watering and weeding; and (4) cover by non-native noxious weeds shall not exceed 10 percent at any time.

However, since the impact to riparian forest from the creation of the forebay was determined to be less than significant, and since LADWP does not intend to implement the above measure, this mitigation measure will not be adopted.

If seasonal habitat flows of 200 cfs reach the pump station, the forebay would extend upstream about 500 feet further than under the 40-cfs baseflow conditions, and inundate about 2 acres more of the river channel, for a total of 19 acres. This temporary flooding of several days is not expected to permanently convert existing wetland and riparian woodland habitats in the river channel due to the short duration of the flooding.

Water Quality Impacts from Pump Station

Construction activities in the river channel would expose channel bed materials and soil along the banks that would be susceptible to erosion and transport downstream, where suspended sediments could be deposited. This impact would be avoided by the planned diversion of flows around the construction site in the river channel. The spillway, abutments, and erosion control structures would be stabilized with rock riprap prior to introducing flows back to the river. Hence, only minor sedimentation immediately following the initial introduction of flows is anticipated. Most of the material suspended during the initial filling of the forebay and pump operations is expected to remain in the forebay, where it would settle out and be deposited.

Similarly, periodic desilting of the sediment basin would increase suspended sediments in the forebay due to excavation of the channel bottom, fall-back from the clam-shell, and runoff from the sediment stockpile adjacent to the forebay. Most of this sediment is expected to remain in the forebay. Any increase in downstream suspended sediment and turbidity is expected to be minor and temporary. Stockpiled material would be located outside of the river channel, and would not be susceptible to erosion.

In summary, sedimentation due to the construction of the pump station facilities and maintenance desilting of the forebay would be minor in magnitude, localized, and temporary. **This would be considered an adverse, but not significant impact (Class III).** Mitigation Measure P-2, discussed in Section 5.1.4, would provide assurances that this impact would remain less than significant.

Heavy equipment would be used for construction of the pump station and diversion. As such, there is potential for accidental spills of fuel, lubricating oils, paints, and concrete. Depending upon the size and location of the spill, and the time of year, contaminants could be discharged to the river and adversely affect water quality. This impact is not expected to occur due to best management practices incorporated into the Construction Stormwater Pollution Prevention Plan (SWPPP) required by state law. However, any accidental spill is anticipated to be highly localized because most accidental spills are limited in quantity (e.g., less than 50 gallons). **This impact is considered adverse, but not significant (Class III) due to the protective measures in the SWPPP.** Mitigation Measure P-2, discussed in Section 5.1.4, would provide assurances that this impact would remain less than significant.

5.1.3 Impacts - Power Line Construction

The new power line would traverse several upland vegetation types. Access to the route will be accomplished using existing dirt roads that are parallel to the proposed power line route and that are currently used for maintenance of nearby power lines. The new power poles would be installed 12 feet east of the existing lines. Single wooden poles would be used. An auger truck would drill holes and place the poles. Trucks would travel overland from the existing road to the pole sites, usually a distance less than 50 feet. Once the poles are installed, conductors would be strung using several specialized trucks and crews operating from or near the existing access roads, traveling overland as necessary.

No grading or filling would occur, nor would any permanent access roads be constructed. The loss of upland vegetation at each pole site (about 10 by 10 feet) is considered a negligible impact. Overland travel during construction will crush shrubs, but is not expected to destroy plants or alter the soils and drainage patterns. Existing vegetation is expected to recover without adverse effects. The disturbance is not expected to facilitate weed invasion, as soils will not be physically scraped or removed, except at the base of the poles. Based on these considerations, temporary disturbance to upland vegetation during **the installation of the power line is considered an adverse, but not significant impact (Class III).** Mitigation Measure P-3 would be applied to reduce impacts during construction (see Section 5.1.4).

No wetland or riparian habitat will be traversed by the power line, or by any proposed overland travel route. However, a small (<200 square feet) freshwater seep is present within 100 feet of the proposed route, about 2,000 feet north of Highway 395 on the margins of Owens Lake. It is dominated by willow-herb, wire rush, common scratchgrass, and the non-native species white sweet-clover. This wetland is not anticipated to be disturbed. **However, any unintended disturbance to this wetland would not be significant (Class III)** because it would likely only involve temporary and reversible effects. To ensure avoidance of this wetland, LADWP will implement Mitigation Measure P-4.

5.1.4 Mitigation Measures

P-1 Upland areas disturbed during construction at the pump station site shall be regraded to create natural contours that match adjacent topography, then shall be seeded with native plant species. Restoration shall commence within 1 year of completion of the pump station. The goal of the restoration shall be to restore plant species and cover to pre-construction conditions over time. The species included shall be based on the species removed, availability of seeds or plant materials, and ability to cultivate each species. The colonization by non-native aggressive or noxious weeds shall be inhibited by weed control for 3 years after construction. Revegetation methods, plant maintenance, performance goals, and monitoring methods shall be based on: (1) the guidance in Inyo County's Revegetation Plan prepared pursuant to the Agreement; and (2) results of LADWP's ongoing experimental dryland revegetation studies in the Owens Valley. A 7-year monitoring and maintenance program shall be implemented to ensure successful establishment of the plants. The following are the mitigation goals for revegetation: (1) at least 50 percent of the native perennial species present at the site prior to construction shall be established by year 3 and persist through year 7; (2) plant cover shall achieve 50 percent of pre-construction cover values by year 5 and 65 percent by year 7; (3) newly established plants shall exhibit normal growth rates and healthy conditions for at least 2 years without supplemental watering and weeding; and (4) cover by non-native noxious weeds shall not exceed pre-construction conditions.

P-2 The Storm Water Pollution Prevention Plan (SWPPP) to be prepared under the provisions of the required Construction General Storm Water NPDES Permit shall specifically include measures to: (1) prevent erosion from the construction site and from the post-construction site that could cause sedimentation into the river, with a focus on stabilizing the river banks to prevent sloughing and erosion during the initial river flows and due to water level fluctuations in the forebay; and (2) prevent discharge of construction materials, contaminants, washings, concrete, fuels, and oils into the river from construction equipment and vehicles. These measures shall include, at a minimum, physical devices to prevent sedimentation and discharges (e.g., silt fencing, hay bales), and routine monitoring of these devices and the conditions of the river downstream of the pump station site.

P-3 The area of temporary disturbance associated with construction of the power line shall be minimized by using overland travel to reach pole sites, prohibiting construction of new roads, and minimizing soil disturbance such as scraping or excavation, except where necessary to ensure safe passage or to complete construction.

P-4 The small freshwater seep along the power line shall be avoided during construction by marking its boundary on construction drawings and flagging the boundary in the field prior to construction activities to indicate an environmentally sensitive area to be avoided.

5.2 FISH AND WILDLIFE

5.2.1 Impacts – Pump Station

The pump station site contains a wide variety of upland, wetland, aquatic, and riparian habitats that provide high quality forage and shelter for wildlife. Conversion of this site to a large forebay with 17 acres of mostly open water would benefit waterfowl, but to the detriment of riparian-dependent bird species. The overall habitat, wildlife diversity and productivity of the site are expected to decrease as a consequence. This impact would be partially offset by the anticipated overall increase in riparian woodland habitat due to the rewatering of the river, and the associated increase in wildlife productivity and diversity along the river. The benefits to wildlife along the remainder of the river would compensate for the potential reduction in wildlife abundance and variety at the forebay. **Hence, this impact is considered adverse, but not significant (Class III).**

Threatened or endangered wildlife species are not expected to occur at the pump station site. Habitat conditions are not suitable for the southwestern willow flycatcher because suitable habitat is absent (i.e., dense continuous willow thickets). Similarly, suitable habitat for the yellow-billed cuckoo (dense multi-layer gallery riparian forest) is also absent. Cattail and bulrush marsh that could be used by the least bittern occur at the pump station site, but there is no evidence that this species of special concern occurs at the site. As part of the conditions of the CDFG Streambed Alteration Agreement for the LORP, pre-construction surveys may be conducted as relevant to avoid bird nests if construction would take place during nesting season.

Game fish are common along this reach of the river, and there are several popular fishing locations upstream of the pump station. A trash screen would be placed at the intake to the pump station. An analysis by Ecosystem Sciences (2002; unpublished data) indicates that approach velocities to the trash screen are too low (less than 0.5 feet per second) to impinge fish against the screen. Hence, fish are not expected to be entrained in the pump station.

5.2.2 Impacts – Power Line

As described in Section 2.4.3, the new power line will employ vertical construction with conductors spaced at least 4 feet apart (vertical distance), which minimizes the risk of raptors or other large birds becoming electrocuted by touching both conductors simultaneously. The distance between the existing and new power lines (12 feet or more) will also be sufficient to prevent electrocution. In addition, the vertical construction does not include a crossbar, which minimizes the potential for large birds to perch on the pole. Since the new power line will parallel existing infrastructure, including the existing power line and Highway 395, it minimizes any fragmentation of open landscapes, which helps to minimize bird collisions (BirdLife International, 2003). Therefore, the risk of bird collision with and/or electrocution from the new power line is expected to be low. **This impact is considered adverse, but not significant (Class III).**

The potential for increase in predation on plovers and other shorebirds from the increase in power poles is expected to be low due to the use of vertical construction, which minimizes the area available for ravens and raptors to perch or nest. **This impact is considered adverse, but not significant (Class III).** However, since portions of the new power line will be located in close proximity to Owens Lake, a shorebird habitat, Mitigation Measure P-5 is proposed to further reduce the potential for increase in predation on plovers and other shorebirds that use Owens Lake.

5.2.3 Mitigation Measures

P-5 Power poles installed for the LORP pump station that are located within 0.25 mile of Owens Lake will be equipped with anti-predator perches (aluminum combs or other appropriate devices placed on top of poles or other potential perching sites).

5.3 AIR QUALITY

5.3.1 Existing Conditions

Under the federal Clean Air Act, the US Environmental Protection Agency (EPA) has set ambient air quality standards to protect public health and welfare. Air quality standards have been set for the following pollutants: particulate matter less than 10 microns in diameter (PM10), particulate matter less than 2.5 microns in diameter (PM2.5), carbon monoxide (CO), nitrogen oxides (NOx), sulfur dioxide, and lead. The State of California has also set air quality standard for these pollutants, which are generally more stringent than federal standards.

The southern Owens Valley is located in the Great Basin Air Pollution Control District. The valley has been designated by the State and EPA as a non-attainment area for the state and federal 24-hour average PM10 standards. Wind-blown dust from the dry bed of Owens Lake is the primary cause of the PM10 violations. The area has been designated as attainment or unclassified for all other ambient air quality standards. Air quality is considered excellent for all criteria pollutants with the exception of PM10. Large industrial sources are absent from Owens Valley. The major sources of criteria pollutants, other than wind-blown dust, are woodstoves, fireplaces, vehicle tailpipe emissions, fugitive dust from travel on unpaved roads, prescribed burning, and gravel mining.

5.3.2 Impacts – Power Line and Pump Station

Overview of Emissions-Generating Activities Associated with the Entire LORP

Implementation of the LORP will involve the following activities, which involve construction equipment (e.g., loader) or construction-related vehicles (e.g., light trucks) and trips:

- Installation of the new gate at the River Intake
- Desilting the river channel near the River Intake
- Construction of the pump station, diversion, and power line
- Replacement and installation of spillgates in the Blackrock Waterfowl Habitat Area
- Construction or repair of ditches and berms in the Blackrock Waterfowl Habitat Area
- Installation of new fencing for riparian pastures
- Road paving

These activities would generate emissions of pollutants. In addition, fugitive dust could be generated from travel on unpaved roads and from certain earth-disturbing activities. These emissions would contribute to the degradation of air quality conditions in the Owens Valley. As noted above, the region exhibits very good air quality conditions except for PM10.

Operations of the LORP would involve emissions from the following sources: (1) periodic vehicle travel (i.e., weekly) for monitoring purposes throughout the LORP project area; (2) daily vehicular traffic to the pump station for inspection and maintenance; 3) vehicular traffic generated by visitors to the LORP area. Most of the electricity for the pump station will be provided by LADWP's Cottonwood Power Plant or other LADWP hydroelectric facilities on the Owens Valley grid; since these arehydroelectric facilities, they do not generate air pollutants.

Emissions associated with operations are expected to be negligible, and similar to emissions associated with other LADWP operations in Owens Valley. For example, LADWP crews perform daily maintenance work on water facilities throughout the valley. The LORP maintenance would be similar in nature and magnitude. As such, no adverse air quality impacts are anticipated to occur associated with operations of the LORP.

In contrast, certain construction activities will cause short-term, localized increases in emissions. The primary emissions would be from construction of the pump station, diversion, power line, and Blackrock area berms and ditches. Installation of the new gate at the River Intake, initial river channel clearing, and installation of new or replacement spillgates at Blackrock would cause negligible emissions because the work would be performed with small equipment (e.g., auger truck or backhoe), require only several days to weeks, and involve few worker trips (2 to 3 vehicles per day).

Daily and total emissions of criteria pollutants are estimated below for the construction of the pump station, diversion, and power line. The emissions were estimated from heavy equipment operations, fugitive dust from grading, construction truck and worker vehicle trips. Key assumptions concerning the construction activities are listed in the following subsections. Estimates of emissions associated with channel clearing along the river are presented in Section 4.9, and for various construction activities in the Blackrock Habitat Area are presented in Section 7.4.

5.3.2.1 Emissions-Generating Activities from the Construction of the Pump Station

Construction would occur over a 12-month period, and would involve the following major phases. These construction activities would generate pollutants from gasoline and diesel vehicles and construction equipment, and from fugitive dust created by earthwork and vehicular travel along dirt roads. A more detailed description of construction activities is provided in Section 2.4.3.1 and 5.1.2.

1. Prepare Site – build temporary diversion around the construction site; install temporary cofferdams around the pump station site and dewater; install service roads.

2. Install Diversion Structure – construct spillway, spillway abutment, bypass gate structure, and erosion control structure; excavate sediment basin.

3. Construct Pump Station Structure – install foundations, concrete sump, structural backfill, and associated piping.

4. Install Pumps, Mechanical, Electrical, and Controls – install pumps, electrical and mechanical equipment; install air chamber and electrical transformer yard; install fencing; site clean up; and remove temporary river diversion and bypass.

5. Surfacing of Access Road From Highway 395 – install permanent aggregate base.

5.3.2.2 Emissions-Generating Activities Associated with Construction of the Power Line

Construction of the new power line and installation of a new conductor would require about 3 months. Construction access would be provided by the existing dirt road along the existing nearby power line. A daily crew of five to eight people would typically be involved in the installation of a new power line, with four to five light trucks along the construction corridor. No heavy equipment would be used.

Summary of Emissions

An estimate of the combined daily and total emissions from the construction activities at the pump station site is provided below in Table 5-3. Note that these activities may or may not occur concurrently, and that the activities are located at great distances from one another. Hence, the daily emissions provided in Table 5-3 are considered worst case estimates.

Table 5-3 also includes the emissions from the construction activities at the Blackrock Waterfowl Habitat Area (described in Section 7.4), and from the initial channel clearing near the River Intake (described in Section 4.9) to provide an estimate of the cumulative emissions of all LORP construction work.

TABLE 5-3
ESTIMATED CONSTRUCTION EMISSIONS FOR THE LORP*

Activity	Carbon Monoxide	Reactive Organic Gases (hydrocarbons)	Nitrogen Oxides	Particulate Matter (PM10)
Maximum Daily Emissions (lbs per day)				
Pump station and diversion, including road paving and pipelines	55	13	110	17
Power line	2	0.5	12	2
Blackrock berms and ditches	5.5	7.5	20	4.5
Initial channel clearing	1.1	0.5	15	1.3
Total =	63.6	21.5	157	24.8
Total Construction Emissions (tons)				
Pump station and diversion	5.0	1.2	10	1.5
Power line	<0.1	<0.1	0.3	<0.1
Blackrock berms and ditches	0.2	0.3	0.7	<0.1
Initial channel clearing	0.1	0.2	0.4	<0.1
Total =	5.4	1.7	11.4	1.6

* See Section 7.4 for a description of emissions associated with the Blackrock Waterfowl Habitat Area. See Section 4.9 for a description of emissions associated with initial channel clearing near the River Intake. Emissions calculated by URS Corporation.

Emissions from construction activities are considered an adverse, but not significant impact (Class III). The emissions would contribute to degradation of air quality conditions in the valley, but are unlikely to cause air quality violations. The primary impact of concern is emission of fugitive dust because the region has a PM10 non-attainment status. Fugitive dust emissions can be reduced by the application of dust control measures (see Mitigation Measures AQ-1 and AQ-2).

5.3.3 Mitigation Measures

Although air quality impacts were determined to be less than significant, the following mitigation measures will be implemented to further minimize impacts:

AQ-1 To minimize dust/PM10 emissions during construction activity, as necessary, one or more of the following measures shall be implemented:

- After clearing, grading, earth moving or excavation is complete, the disturbed areas shall be treated by watering, or revegetating, or by spreading soil binders until the area is stabilized.
- During construction, use water trucks or sprinkler systems to keep areas of vehicle movement, temporary soil stockpiles, and construction disturbance damp enough to minimize dust from leaving the site. This may include wetting down such areas in the late morning and after work is completed for the day. Watering frequency may be increased when wind speed exceeds 15 mph.
- Minimize the amount of disturbed area and reduce on-site vehicle speeds to 15 miles per hour or less.

AQ-2 LADWP shall stabilize the sediment stockpile at the pump station site as necessary to minimize wind-blown dust from the stockpile. Methods to reduce fugitive dust emissions include revegetating the pile, armoring it with a layer of coarse materials, soil binders, or water application.

5.4 CULTURAL RESOURCES

A description of the two cultural resources inventories conducted for the EIR/EIS is provided Section 4.8.3. Field surveys were performed for the pump station site and the power transmission line corridor as part of the first cultural resources inventory conducted in 2000 (Far Western, 2001) to search for evidence of cultural resources. Precise locational information for cultural resources is not provided in the EIR/EIS, as it is considered sensitive and confidential (see Section 4.8.1 for additional information on confidentiality of cultural resources technical information).

5.4.1 Pump Station

As described in Table 4-14B (Section 4.8.3.2), the Area of Potential Effect (APE, field survey area) for the pump station site was defined as the 30-acre construction zone for the proposed pump station and diversion.

Two isolated finds were located at the pump station site. The isolated finds are not significant cultural resources and are not eligible for inclusion on the National Register of Historic Places (NRHP). No other cultural resources are known or expected to occur at the pump station site.

Based on the above information, no impacts to cultural resources at the pump station site are anticipated. However, there is always potential, in a region with known prehistoric use, that cultural material could be unexpectedly encountered during construction. The potential for encountering buried site deposits is considered greater within high alluvial deposition zones near the river delta. **Therefore, the potential for encountering an intact, potentially significant, archaeological site is considered a significant, but mitigable impact (Class II).** A significant impact can be avoided through the implementation of Mitigation Measure CRP-1.

5.4.2 Power Line

As described in Table 4-14 (Section 4.8.3.2), the APE (field survey area) for the proposed power line was defined as the 200-foot wide corridor along 7.5 miles of the proposed power transmission line.

An isolated find, four prehistoric sites (one previously recorded in 1950 and three newly recorded), and four newly recorded historic sites were located along the power line route. The isolated find is not a significant cultural resource and is not eligible for inclusion on the NRHP. All four prehistoric sites are considered ineligible for the NRHP because they consist of very disturbed, ephemeral artifact scatters with little potential for intact subsurface deposits. All four historic sites are not considered eligible for inclusion on the NRHP as they consist of insignificant historic can scatters (trash dumps).

These features are located in proximity to the proposed power line and existing dirt access road. It appears that all sites would be avoided. However, there is potential for inadvertent disturbance to one or more cultural resource sites. **This would represent an adverse, but not significant impact (Class III)** because none of the resources is considered significant, nor eligible for inclusion in the NRHP.

5.4.3 Mitigation Measures

CRP-1 LADWP shall implement the following management actions to avoid impacts on cultural resources during construction of the pump station:

- LADWP shall notify representatives of regional Native American Tribes prior to beginning earthwork for the pump station. Interested Tribal representatives shall be invited to participate (on a volunteer basis) in the monitoring of the earthwork.
- A qualified archaeologist shall be present during site grading for the pump station to monitor for and avoid cultural resources. In the event that prehistoric or historic cultural material is encountered, the archaeologist will investigate the find and determine if it represents an intact deposit or archaeological site. LADWP shall implement the recommendations of the archaeologist concerning measures to protect or salvage the site. If prehistoric cultural material is identified by the archaeologist, LADWP shall coordinate the monitoring, investigations, and actions with appropriate Native American parties. If any investigations are conducted, interested Tribal representatives would be invited to participate (on a volunteer basis).

CRP-2 LADWP shall implement the following management actions during installation of the power line:

- LADWP shall notify representatives of regional Native American Tribes prior to beginning construction of the power line. Interested Tribal representatives shall be invited to be present (on a volunteer basis) during construction.

6.0 DELTA HABITAT AREA

6.1 EXISTING CONDITIONS

6.1.1 Physical Features

The Delta Habitat Area is located at the terminus of the Lower Owens River (Figure 6-1). It contains various riparian and wetland vegetation types that contrast sharply with adjacent unvegetated playa of the mostly dry Owens Lake and its margins. The MOU identified general boundaries of the Delta Habitat Area, and the area along the river where the pump station should be located, as shown on Figure 2-4. The Delta Habitat Area identified in the MOU was expanded to include the area between the Dust Control Road and Pipeline Corridors, between Zones 1 and 2 of the Owens Lake Dust Mitigation Program, and north of the brine pool (Figures 2-5 and 6-1). The north boundary of the Delta Habitat Area corresponds with the downstream edge of the road crossing the Owens River and linking Corridors 1 and 2. The elevated corridors and dikes along the perimeters of the Dust Mitigation Program zones confine the north, east and west boundaries of the Delta Habitat Area. The southern boundary corresponds with a subtle transition from vegetated wetland confined by shallow dunes and playa to the broadly depressed, unconfined brine pool transition area. The Delta Habitat Area contains 3,578 acres.

The Delta Habitat Area extends about 16,000 feet south from the Powerline Road at an approximate elevation of 3,585 feet to the maximum limit of the current brine pool at elevation 3,560 feet (Figure 6-1). The pump station location is about 4 river miles downstream of Keeler Bridge. The pump station site is also 3,000 linear feet upstream of Powerline Road.

Four land types were identified by White Horse Associates (2004) in the Delta Habitat Area based on 2000 conditions. They are described below by White Horse Associates and shown on Figure 6-2:

- ***Floodplain:*** Lands influenced by contemporary stream (floodplain) processes. Includes the floodplain of the Owens River, channels that are often discontinuous, ponds, and adjacent areas of dense vegetation sustained by shallow groundwater. Indices of hydric soil include aquic moisture regime, sulfidic odor, reducing conditions, gleyed or low-chroma colors, high organic content and organic streaking. Wetland hydrology indicators include inundation and saturation in the upper 12 inches. Hydric soil and wetland hydrology are present. Vegetative cover is high. Floodplains, most of which are potential jurisdictional wetlands per the Clean Water Act and U.S. Army Corps of Engineers guidelines, comprise 605 acres (17 percent) of the Delta Habitat Area. Small pockets of floodplain landtype are divorced from the west branch by dunes (Figure 6-2). Expansion of vegetated wetlands in the Delta Habitat Area generally corresponds with a conversion of lacustrine to floodplain landtype.

- ***Low terrace:*** Historic floodplains of the Owens River that have been left high-and-dry by channel incision. While low terrace is a major landtype in other parts of the LORP area, it is only a very minor component of the Delta Habitat Area. Indices of hydric soil and wetland hydrology are typically not evident. Rabbitbrush-Nevada saltbush/saltgrass-alkali sacaton is the dominant vegetation. Low terraces, all of which are upland, comprise only 14 acres (<1 percent) of the Delta Habitat Area.

- ***Aeolian*****:** Lands influenced by wind (aeolian) processes. In the Delta Habitat Area, a veneer of loose, wind-blown sand and fine-gravel ranging from a foot to several meters deep is underlain by lake-bed (lacustrine) sediments. Indices of hydric soil and wetland hydrology are not evident in surface soils. Hydrophytic vegetation may be present, but with low canopy cover. Aeolian lands are typically not jurisdictional wetlands. They comprise 1,273 acres (36 percent) of the Delta Habitat Area. Aeolian land has expanded in a south-southeasterly direction since 1944 (see historical perspective, Section 6.1.3.4). Dunes have covered the west side of the historic floodplain and pushed the Delta Habitat Area outlet about 1 mile southeast since 1944. Wet spots (Figure 6-2) divorced from the main channel by dunes are sustained by infiltration through the coarse aeolian sediment. Boundaries between aeolian and lacustrine lands are diffuse. Inclusions of lacustrine land in aeolian land are common.

- ***Lacustrine:*** Lands influenced by lake (lacustrine) processes. Fine-texture, saline-alkaline sediments with very low permeability form the historic bed of Owens Lake. White salt crusts are common on the surface. Indices of hydric soil include sulfidic odor, aquic moisture regime, reducing conditions, and gleyed or low-chroma colors. In early May 2000, the water table in the Delta Habitat Area was typically 1 to 2 feet below the surface. Sediment was saturated in the upper 12 inches. Hydric soil and wetland hydrology were assumed present. Vegetation cover is sparse or absent. Lacustrine lands, small portions of which are potentially jurisdictional wetlands, comprise 1,686 acres (47 percent) of the Delta Habitat Area. The intermittently flooded brine pool transition area at the southern end of the Delta Habitat Area is included in lacustrine lands. The expansion of vegetated wetland in the Delta Habitat Area corresponds mostly with a conversion of lacustrine to floodplain landtype. The boundaries between lacustrine and aeolian lands are diffuse. Inclusions of aeolian land in lacustrine land are common.

The complex distribution of land types in the Delta Habitat Area is illustrated in Figure 6-2 and listed in Table 6-1.

TABLE 6-1
AREAS OF LAND TYPES, DELTA HABITAT AREA

Land Type	Acres	Percent
Fluvial	605	17
Low terrace	14	<1
Aeolian	1,273	36
Lacustrine	1,686	47
TOTAL =	3,578	100

Source: White Horse Associates (2004).

Several hundred feet downstream of Powerline Road, the river channel splits into the east and west branches (Figure 6-1) at a point called the “Y.” Historically, the west branch has contained the primary flows. It remains the primary conveyance channel and flows year-round. A sand dune confines the west boundary of the west branch. The channel of the west branch of the wetted floodplain varies from 300 feet wide near the “Y” to about 40-50 feet wide at the southern end of the Delta. Water depth in discontinuous channels and pools varies from about 6 feet at the northern end to less than an inch at the southern end of the Delta Habitat Area.

The east branch (Figure 6-1) receives flows created by a backwater effect from the west branch, where dense cattail and bulrush marsh vegetation has accumulated. It also receives water during higher flows to the Delta. A well-defined 50-foot wide channel is present at its origin. As the channel progresses downstream, it widens into a swale up to several hundred feet wide and often less than 1 foot deep. The channel eventually loses its integrity and flows spread out into a myriad of swales and depressions that coalesce at the southern end of the Delta and join the west channel.

At the southern end where the two branches converge, a broad sheet flow (referred to as the brine pool transition area) occurs below the convergence of the east and west branches and collects to the east of the brine pool before emptying into the brine pool. The overall channel gradient through the Delta has been estimated to be about 0.03 percent by Ecosystem Sciences (Technical Memorandum 8, January 1999).

A small overflow channel occurs along the western bank of the river about 800 feet upstream of the "Y" (Figure 6-1). This channel consists of an ephemeral drainage swale with poorly defined bed and banks. It receives seepage and surface flows when the water elevation in the main river channel overtops a low-lying portion of the bank. Under current flows in the river, it does not appear that surface water passes over the bank to this drainage. Instead, the drainage swale typically exhibits saturated soils and shallow water derived from seepage and high groundwater. A discussion of the amount and frequency of flows that would be diverted to the overflow channel under the LORP is provided in Section 6.3.3 (Potential for Bypass Flows to be Conveyed Away from the Center of the Delta).

6.1.2 Uses of the Delta

Most of the Delta Habitat Area occurs on State-owned lands, managed by the State Lands Commission (Figure 2-6). LADWP land occurs north of Powerline Road and east of the river, except for a small sliver of land that extends to the west of the west channel for about 8,000 feet. The small portion of the Delta Habitat Area that occurs on LADWP land is included in LADWP's 7,100-acre Delta Lease, which extends north of the Delta area. LADWP land included in the Delta Habitat Area consists of a narrow band about 1,500 feet wide that runs parallel to the upper 4,000 feet of the west branch of the river (Figure 2-6). The total area of LADWP land in the Delta Habitat Area is 361 acres[1]. The proposed land management plan for the Delta Lease is described in Section 2.8.2.5. The LADWP lease lands (Delta Lease) are unfenced in the Delta. No grazing is authorized in the Delta Habitat Area proper, except for this narrow band of the LADWP lease. However, grazing appears to occur in the Delta Habitat Area between the east and west branches, and east of the east branch due to the absence of fences.

State lands are not managed by LADWP or the County, and thus, there are no proposed LORP-related land disturbances on State lands, except for the installation of two temporary gaging stations. Additionally, monitoring is proposed within Delta lands under SLC jurisdiction. LADWP will obtain a land use approval from SLC prior to installation of the gaging stations.

The Lone Pine elk herd occurs east of the Aqueduct from Manzanar Reward Road to the Delta Habitat Area. The herd primarily uses the alluvial fans of the Inyo Mountains. The herd spends the summer and fall along the Owens River in irrigated pastures on the Lone Pine Lease and at the Delta Habitat Area. The latter is considered a highly suitable calving area by the Bureau of Land Management.

The public is allowed access to the Delta Habitat Area on both LADWP and State lands for recreation, including hunting, bird watching, and fishing at the upper end.

In December 2001, LADWP began shallow flooding 11.9 square miles (7,639 acres) in an area along the northeast part of Owens Dry Lake referred to as Zone 2 (northeastern portion of the lake, immediately adjacent to the Delta Habitat Area; see Figure 6-1). By 2003, the Dust Mitigation Program included 15.4 square miles (9,823 acres) of shallow flooding. Shallow flooding areas are operated between October 1 and June 30 each year. In addition, as part of the CDFG Streambed Alteration Agreement for dust control activities in the southern portion of the lake, LADWP has committed to maintaining 1,000 acres of

[1] Since the publication of the Draft EIR/EIS, the acreage of LADWP land in the Delta Habitat Area was recalculated based on more recent GIS data compiled by CH2MHILL, consultant to LADWP for the Owens Lake Dust Mitigation Program.

shorebird habitat within Zone 2 shallow flood area and up to 1,000 acres of additional shorebird habitat using naturally occurring water. Additionally, 42 acres of wetlands will be created in an area west of the Delta Habitat Area.

6.1.3 Vegetation Types

The descriptions of vegetation and hydrologic conditions in the Delta Habitat Area presented in Section 6.1.3 are based primarily on analyses of aerial photographs that are available for 8 periods between 1944 and 2000. The most recent aerial photographs of the Delta Habitat Area are from 2000, which were taken as part of an Owens Valley-wide inventory of riparian and wetland resources. In Section 6.1.3 of the Draft EIR/EIS, the existing conditions description of the Delta was based primarily on the analysis of 1999 aerial photographs since the evaluation of the 2000 photographs had not been finalized at the time of Draft EIR/EIS publication in November 2002. Since the aerial photographs from 2000 are of higher quality than those taken earlier (including 1999) and are the most recent, Section 6.1.3.2 of the Final EIR/EIS has been revised to reflect the results of White Horse Associates mapping from the 2000 aerial photographs. The 2000 conditions are used in this document as the basis for the assessment of changes in the Delta Habitat Area. The results of mapping of aerial photographs from 1999 and the preceding years are presented in Table 6-3 and also discussed in Section 6.1.3.3 (Historical Perspective of Wetland Development).

The distribution of vegetation types and their wetland status have been addressed in studies conducted by Jones & Stokes (1996) and White Horse Associates (2004), each with different results. A historical perspective of changes in the extent of wetlands in the Delta Habitat Area can be surmised from interpretation of aerial photos and from mapping of 1993, 1996, 1999 and 2000 conditions by White Horse Associates.

6.1.3.1 Jones & Stokes Wetland Delineation of 1996 Conditions

A delineation of jurisdictional wetlands on the east side of the Owens Lake playa (from the Delta to Olancha) was conducted by Jones & Stokes (1996) and summarized by the Great Basin Unified Air Pollution Control District (GBUAPCD, 1997). Wetlands identified within the Delta Habitat Area as part of this study are shown in Figure 6-3. The perimeter of jurisdictional wetlands was determined by walking or driving the line between upland and wetland vegetation with a Global Positioning System (Jones & Stokes, 1996). The outermost line of wetland vegetation was determined by locating where obligate, facultative wetland and facultative plant species comprised at least 50 percent of the total aerial cover of herbaceous, shrub and tree strata.

Jones & Stokes (1996) identified 1,289 acres of jurisdictional wetland in the Delta Habitat Area. However, the western wetland boundary identified in the Jones & Stokes study (Figure 6-3) is 300 to 600 feet west of the vegetated wetland (based on White Horse Associates interpretation of aerial photographs with field verification; see below) and includes dunes and alkali scrub vegetation types typical of aeolian lands. Although sparse wetland vegetation is present in these areas, hydric soil and wetland hydrology are not evident. However, all three factors (vegetation, soils and hydrology) are required to designate Corps jurisdictional wetland. White Horse Associates believe that the delineation method used in the Jones & Stokes study resulted in an overestimate of the extent of jurisdictional wetlands in the Delta Habitat Area since it was based on the presence of wetland vegetation but not on hydric soil and wetland hydrology. The Corps requires investigation of all three conditions to determine jurisdictional wetlands, as described in the 1987 wetlands delineation manual (USACE, 1987).

6.1.3.2 White Horse Associates Mapping of 2000 Conditions

White Horse Associates (2004) mapped land types (Figure 6-2) and vegetation types (Figure 6-11) in the Delta Habitat Area from aerial photos dated September, 2000. Mapping was conducted from high-resolution (2-foot pixels) digital orthophotos plotted at 1:6,000 (1 inch = 500 feet) scale in color. This level of resolution is sufficient to pick up small shallow flooded areas and ponds important as waterfowl, wading bird, and shorebird habitat. While the Delta Habitat Area has not been officially delineated by the Corps, field descriptions of vegetation, soil and hydrologic parameters were used to assign a wetland status to combinations of landform and vegetation type following guidelines of the Corps' wetlands delineation manual (USACE, 1987). The area and status of vegetation types in the Delta Habitat Area from the 2000 aerial photos are listed in Table 6-2. The total area of potentially jurisdictional wetlands and "waters of the United States" was estimated to be 831 acres (23 percent of the Delta Habitat Area). The total estimated area of upland was 2,689 acres (75 percent of the Delta Habitat Area). The jurisdictional status of the intermittently flooded, nearly barren brine pool transition area (58 acres) in the Delta Habitat Area was not considered in the study conducted by White Horse Associates since determination of the jurisdictional status of unvegetated communities varies by local Corps office and site-specific conditions.

Given the complex and gradual-to-diffuse boundaries between wetland vegetation types (i.e., water, alkali marsh, wet alkali meadow, alkali meadow) and between upland vegetation types (i.e., alkali meadow, playa, Parry saltbush, and dune), the areas of individual vegetation types within wetland or upland categories should be viewed with discretion. In contrast, boundaries between upland and wetlands are generally more abrupt. Descriptions of vegetation and miscellaneous types that follow are generally ordered from wet to dry.

TABLE 6-2
VEGETATION TYPES MAPPED IN THE DELTA HABITAT AREA – 2000

Vegetation Type	Potential Jurisdictional Status	Area	
		acres	percent
Water	Waters of US	**7**	**<1**
Vegetated Wetland			
Alkali marsh (marsh)*	Wetland	192	5
Wet alkali meadow	Wetland	366	10
Alkali meadow (dry alkali meadow)*	Wetland	248	7
Goodding-red willow (riparian forest)*	Wetland	18	1
Subtotal (Vegetated Wetland)		**824**	**23**
Total (Vegetated Wetland + Water)		**831**	**23**
Upland			
Alkali meadow (dry alkali meadow)*	Upland	19	1
Rabbitbrush-Nevada saltbush (alkali scrub)*	Upland	8	<1
Parry saltbush (alkali scrub)*	Upland	1,210	34
Dune	Upland	50	1
Playa	Upland	1,402	39
Subtotal (Upland)		**2,689**	**75**
Intermittently Flooded Playa within the Brine Pool Transition Area	Not Considered	**58**	**2**
TOTAL (Delta Habitat Area)		**3,578**	**100**

Source: White Horse Associates (2004)
* In the report prepared by White Horse Associates (2004), the names of vegetation types were changed from those presented in the Draft EIR/EIS to more specifically identify the vegetation types that exists in the Delta and distinguish them from similar vegetation types that are present in other areas of the Owens Valley. The names used in the Draft EIR/EIS are shown in parentheses.

A description of the different vegetation types is provided below (White Horse Associates, 2004):

- **Alkali marsh (bulrush-cattail association):** This vegetation type includes permanently flooded and saturated habitat dominated by obligate hydrophytes. Dominant plants include southern cattail (*Typha latifolia)*, hard-stem bulrush, saltmarsh bulrush (*Typha maritimus*) and creeping spikerush (*Eleocharis macrostachya*). Total vegetative cover exceeds 90 percent. Obligate wetland species are prominent. This vegetation type occurs on floodplain landtypes. Wetland hydrology and hydric soils are evident. These habitats are vegetated wetlands. Inclusions of water and broad transitions to wet alkali meadow are common. Areas transitional in character from wet alkali meadow to marsh are also common, especially in the west branch. This vegetation type corresponds to transmontane alkali marsh in the Holland (1986) vegetation classification system and in the Green Book (LADWP and Inyo County, 1990).

- **Goodding-red willow (Goodding-red willow/bulrush-cattail association).** This relict vegetation type is permanently flooded habitat. Goodding willow (*Salix gooddingii*) is the dominant tree in the Delta Habitat Area; Fremont cottonwood (*Populus fremontii*) may be present; total tree cover ranges from 10 to 60 percent. The understory is similar to that described for alkali marsh. Obligate wetland species are prominent. Hydrophilic vegetation is present; wetland hydrology and hydric soil are also evident. These areas are vegetated wetland. Boundaries with marsh vegetation type are somewhat arbitrary, encompassing areas with significant tree canopy. Trees are decadent, dying or dead. Trees were established on scoured, seasonally flooded substrate that has since been inundated and engulfed by marsh vegetation. Given the existing hydrologic character of the Delta Habitat Area, riparian trees are expected to die and are not likely to regenerate naturally. Because of sparse foliage on the decadent trees, these areas are difficult to distinguish from the surrounding marsh on the orthophotos, resulting in a relatively high expected error. This vegetation type corresponds most closely to Mojave riparian forest in the Holland (1986) vegetation classification system and in the Green Book (LADWP and Inyo County, 1990). The Goodding-red willow series also includes associations with dryer understories (i.e. Goodding-red willow/creeping wildrye-saltgrass and Goodding-red willow/scrub).

- **Wet alkali meadow (saltgrass-rush association).** This vegetation type occurs mostly on floodplains with high water table in the Delta Habitat Area (366 acres). A single, somewhat atypical, parcel (22 acres) occurs on floodplain that is intermittently flooded in the brine pool transition area. . Dominant plants include saltgrass, Mexican rush (*Juncus mexicanus*), clustered field sedge (*Carex praegracilis*), and three-square bulrush (*Scirpus pungens*). Scattered saltcedar (*Tamarix ramosissima*) may be present. Total vegetative cover is greater than 50 percent. Facultative wetland species are prominent. Wetland hydrology and hydric soil are evident. These areas are vegetated wetland. Boundaries with alkali meadow (saltgrass) and marsh (bulrush-cattail) are gradual to diffuse. Areas transitional from alkali meadow to wet alkali meadow and areas transitional from wet alkali meadow to marsh are common. This vegetation type corresponds to transmontane alkali meadow in the Holland (1986) vegetation classification system and in the Green Book (LADWP and Inyo County, 1990).

- **Alkali meadow (saltgrass association).** This vegetation type occurs on floodplain, low terrace, lacustrine and aeolian lands with contrasting soil and hydrologic characteristics. The dominant species is saltgrass; scattered Parry's saltbush (*Atriplex parryi*) and Torrey seepweed (*Suada moquinii*) may be present. Total cover ranges from 20 to 70 percent. Facultative wetland species are prominent. Wetland hydrology and hydric soils are evident in floodplains and lacustrine lands that total 248 acres, but not on low terrace and aeolian lands (19 acres). Alkali meadow occurring on floodplains and lacustrine land is vegetated wetland. Alkali meadow occurring on low terrace and aeolian land is not wetland. This vegetation type corresponds to transmontane alkali meadow in the Holland (1986) vegetation classification system and in the Green Book (LADWP and Inyo County, 1990).

- **Parry saltbush (Parry saltbush-Torrey seepweed association).** This vegetation type includes sandy habitat dominated by alkali tolerant shrub and herbaceous species. The shrub stratum typically includes Parry saltbush (*Atriplex parryi*) and Torrey seepweed (*Suada moquinii*); Nevada saltbush (*Atriplex lentiformis ssp. torreyi*), shrubby alkali aster (*Macoranthera carnosa*) and greasewood (*Sarcobatus vermiculatus*) are also common. Saltgrass is typically present, but with low cover. Total shrub cover ranges from 10 to 30 percent; total herbaceous cover is less than 10 percent. Facultative wetland species are prominent. Soils consist of surface deposits of wind-blown sand over lacustrine sediments. The depth of the sand varies from 1 to several feet. Indices of hydric soil and wetland hydrology are not evident in surface horizons, as required for wetland status. These areas are not wetland. Boundaries with unvegetated playa in lacustrine lands are typically complex and diffuse – areas identified as Parry saltbush scrub may contain up to 25 percent inclusions of playa. Boundaries with wetland vegetation types are generally clear. This vegetation corresponds to desert sink scrub in the Holland (1986) vegetation classification system and in the Green Book (LADWP and Inyo County, 1990). This vegetation type occurs only in aeolian lands in the Delta Habitat Area (Figure 6-2), mostly west of the west branch and between the east and west branches.

- **Rabbitbrush-Nevada saltbush (rabbitbrush-NV saltbush/saltgrass-alkali sacaton association).** This low shrub vegetation type occurs on low terraces with low water table. The dominant low shrubs were Nevada saltbush (*Atriplex lentiformis ssp. Torreyi*) and rubber rabbitbrush (*Chrysothamnus nauseosus*); greasewood (*Sarcobatus vermiculatus)* was present in some parcels. Total average shrub cover was variable, but averaged 40 percent. Saltgrass (*Distichlis spicata*), alkali sacaton (*Sporobous airoides*), and Torrey seepweed (*Sueda moquinii*) were prominent herbaceous plants; average total herbaceous cover was 50 percent. These areas are typically not vegetated wetland. This type corresponds with the Nevada saltbush meadow and rabbitbrush meadow in the Holland (1994) vegetation types. It also resembles the alkali meadow Holland vegetation type, which may include significant alkali shrub canopy. This vegetation type comprises only 8 acres of the Delta Habitat Area, but is extensive along the Lower Owens River.

- **Dune.** Similar to the Parry saltbush series, dunes occur in aeolian lands, but the depth of sand varies from 1 to 2 meters. Clusters of alkali tolerant shrubs (shrubby alkali aster, greasewood, Torrey seepweed, and tamarisk) are typically present. Sparse saltgrass is usually present in the herbaceous layer, often distributed in lines, each corresponding with a single rhizome. Total shrub cover ranges from 0 to 20 percent; total herbaceous cover is less than 20 percent. Hydric soil and wetland hydrology are not evident. These areas are not wetland. Dunes occur along the western flank of the west branch. Boundaries with Parry saltbush series are diffuse.

In addition to the above vegetation types, several non-vegetated habitats are present:

- **Water.** Permanently flooded aquatic habitat typically complimented by sparse obligate hydrophytes with less than 25 percent total cover. Water is typically less than 3 feet deep and occurs in discontinuous channels and shallow depressions in floodplain landtype.. Southern cattail (*Typha domingensis*), hard-stem bulrush (*Scirpus acutus*), duck-weed (*Lemna* sp.) and algae are typically present. Wetland hydrology is evident. These areas are considered jurisdictional "waters of the United States" under the Clean Water Act. Boundaries with alkali marsh and wet alkali meadows are typically complex. Areas identified as water may include some vegetated wetland types.

- **Playa.** Essentially barren areas that occur in lacustrine land (Figure 6-2). Soils are gleyed and seasonally saturated. Hydric soil and wetland hydrology are evident, but hydric vegetation is not present. These areas are not wetlands. Boundaries with alkali meadow on lacustrine soils are diffuse. Boundaries with Parry saltbush-Torrey seepweed are also diffuse – areas identified as playa may contain up to 25 percent inclusions of Parry saltbush-Torrey seepweed. Boundaries with other wetland vegetation types are typically abrupt.

- **Intermittently Flooded Playa within the Brine Pool Transition Area.** At the southern end of the Delta Habitat Area, the east and west branches converge. Intermittent, shallow water spreads across the ground surface in broad meandering swaths, terminating in the brine pool. The unvegetated portions of the brine pool transition area with topography suitable for shallow flooding were mapped as intermittently flooded playa; however, standing water was not observed in this area in the September 2000 aerial photograph. Hydric soils and wetland hydrology are evident. Vegetation is mostly absent, except along the border of wetted rivulets. The jurisdictional status of these nonvegetated areas was not considered.

Similar vegetation types were mapped for 1996 (White Horse Associates, unpublished) and 1999 conditions (White Horse Associates, 2000) for the Delta Habitat Area. The areas of wetland vegetation types for 1996, 1999 and 2000 conditions are compared in Table 6-3. Areas of wetland vegetation types and water increased from 645 acres in 1996 to 774 acres in 1999, to about 831 acres in 2000. The upland vegetation types listed in Table 6-3 include rabbitbrush-Nevada saltbush, Parry saltbush, dune, and playa.

They also include alkali meadow on aeolian land and Goodding-red willow series on the low terrace landtype. The area of upland vegetation types decreased to the same extent as wetlands increased.

TABLE 6-3
VEGETATION TYPES MAPPED IN THE DELTA HABITAT AREA – 1996, 1999, AND 2000

Vegetation Type	Potential Jurisdictional Status	1996 Conditions		1999 Conditions		2000 Conditions*	
		(acres)	(%)	(acres)	(%)	(acres)	(%)
Water	Waters of US	6	<1	67	2	7	<1
Vegetated wetland							
Alkali marsh	Wetland	118	3	156	4	192	5
Goodding-red willow	Wetland	22	<1	13	<1	18	1
Wet alkali meadow	Wetland	304	8	320	9	366	10
Alkali meadow	Wetland	196	6	218	6	248	7
Subtotal (Water + Vegetated Wetland)	**Wetland**	**645**	**18**	**774**	**22**	**831**	**23**
Upland	Upland	2,845	80	2,739	76	2,689	75
Intermittently flooded playa within the brine pool transition area	Not considered	88	2	66	2	58	2
TOTAL		**3,578**	**100**	**3,578**	**100**	**3,578**	**100**

Source: White Horse Associates, 2004.
*Preliminary estimates of the acreages of wetland vegetation types from the 2000 aerial photos, as presented in Draft EIR/EIS, were skewed towards the alkali meadow type due to an inconsistency in correlation of the 2000 legend and misinterpretation of the 2000 aerial photos. The acreage values presented above in the Final EIR/EIS reflect the results of field verification and correlation of the 2000 mapping and analysis.

6.1.3.3 Evapotranspiration and Precipitation

Ecosystem Sciences developed a preliminary estimate of water demand in the Delta Habitat Area (Technical Memorandum 8, January 1999, and addenda, 2000). Evaporation from bare playa with thick sand deposits (e.g., the North Flood Irrigation Project adjacent to the Delta) is estimated to be 3.4 inches per year. Clay/crust playa areas have an evaporation rate of about 4.1 inches per year. Evaporation from open water (brine pool transition area) is estimated at 11 inches from of February through May and 25 inches from June through January, for a total of 36 inches.

In vegetated areas, evapotranspiration varies spatially as a function of vegetation cover and species composition and temporally as a function of plant growth stage (i.e., leaf surface area) and complex climatic variables (e.g., wind speed, temperature, humidity). Estimated evapotranspiration rates for vegetation types in the Delta range from 30 to 60 inches per year (Green Book, 1990; Lopes, 1988). Other somewhat different evapotranspiration rates for alkali meadow with low saltgrass cover range from 8 to16 inches per year (Brad Schultz, Desert Research Institute reported in GBUAPCD, 1997) and for alkali scrub from 12 to 19 inches per year (Duell, 1990).

Assuming 5 inches annual rainfall (50-year average at LADWP weather station in Lone Pine), direct precipitation will provide about 1,491 acre-feet per year to the Delta Habitat Area annually. Great Basin Unified Air Pollution Control District (GBUAPCD) measures precipitation at eight stations on or near Owens Lake. Average annual precipitation at these stations ranged from 2.0 to 3.6 inches from 1999 to 2002 (GBUAPCD, 2003a). Since 1999 through 2002 were years with below normal precipitation, LADWP considers the 50 years of data collected at Lone Pine to be more representative of long-term weather conditions. While most of the precipitation falling directly on unvegetated playas, comprising about 39 percent of the Delta Habitat Area, will evaporate, some will run off to augment vegetated wetlands. Direct precipitation on alkali scrub and dune vegetation types, comprising about 35 percent of the Delta Habitat Area, will infiltrate rapidly into the sandy surface soils and is expected to sustain these communities.

6.1.3.4 Historical Perspective of Wetland Development

A historical perspective of changes in the extent of wetlands and waters of the U.S. in the Delta Habitat Area was developed by White Horse Associates from aerial photos. The historical perspective may be useful for interpreting the functional attributes of Delta Habitat Area and processes instigating change. Aerial photos are available for eight periods:

1. 1:24,000 scale black-and-white photos dated October 14, 1944
2. 1:3,300 black-and-white photos dated May 8, 1967
3. 1:12,000 scale color photos dated July 21, 1981 for only the north part of the Delta Habitat Area
4. 1:12,000 scale color photos dated July 26, 1992 for only the north part of the Delta Habitat Area
5. 1:12,000 scale color photos dated July 16, 1993
6. 1:12,000 scale color photos dated August 7, 1996
7. 1:12,000 scale color photos dated April 13, 1999
8. High resolution, digital orthophotos dated September 2000

Aerial photos were scanned and registered to the 2000 digital orthophotos. Wetlands in the Delta Habitat Area were delineated from the 1944 and 1967 images. The 1981 and 1992 aerial photos cover only the north part of the Delta Habitat Area, so the extent of wetlands could not be estimated for those years. The extent of wetlands for 1993, 1996, 1999 and 2000 conditions was estimated from studies conducted by White Horse Associates (1997; unpublished; 2000; and 2004). Historical photos were rectified using common points (e.g., trees, shrubs, roads, stream features) that remained evident on the 2000 digital orthophotos. The Arc-Info Register and Rectify programs were used. Vegetation boundaries are commonly shifted slightly on maps developed from the 1993, 1996, and 1999 aerial photo images. This shift results from distortion inherent to the stereo photos (e.g. tilt, yaw, and parallax) and errors in registering photos during the original mapping (control points were few and far between before the digital orthophotos became available in 2000). The shift has little effect on the area of map polygons. Inflow to the Delta Habitat Area discussed for each period is based on measured discharge at Keeler Bridge, reduced by 1.6 cfs to account for 0.35 cfs per mile loss to evapotranspiration and bed loss along the 4.5 mile reach between the gage at Keeler Bridge and the top of the Delta Habitat Area (Table 6-4).

TABLE 6-4
ESTIMATED AVERAGE INFLOW TO THE DELTA HABITAT AREA FOR SELECTED PERIODS*

Water Years	Average Flow (cfs)		
	Winter (October – March)	**Summer** (April – September)	**Annual**
1939-1944	13	5	9
1944-1967	7	3	5
1969-1981	11	4	7
1983-1992	17	6	11
1991-1992	7	3	5
1992-1996	12	10	11
1996-1999	16	10	13
1999-2000	16	9	12
2000-2001	12	4	8

Source: White Horse Associates, 2004; Flow data provided by LADWP.
* Estimated from flows at the Keeler gage, diminished by estimated channel loss between the gage and the Delta Habitat Area (1.6 cfs).

In 1944, there was a relatively continuous strand of seasonally flooded wetland (167 acres) that terminated about 1.6 miles north-northwest of the present-day outlet of the Delta Habitat Area (Figure 6-5). A very narrow extension of the dune along the west side of the channel divided vegetated wetlands from the unvegetated transition to the brine pool (24 acres). Beaver probably reinforced the dune extension. An island of wind-blown (aeolian) sediments was evident in the middle of the reach. Vegetated wetlands included riparian forest and alkali meadow that were seasonally flooded and a few pockets of marsh that were saturated and/or semi-permanently flooded. There was a clearly defined stream draining through most of the vegetated wetland. The stream was diffuse through two marshes, one in the vicinity of what is now the elbow (Figures 6-1 and 6-5) and the other at the lower end of the vegetated wetland. The overflow channel was a small intermittently flooded oxbow that returned to the main channel about 1,500 feet downstream, where an encroaching dune occluded the channel. The sand sheet was present in the north part of area between the present day west and east branches. The average inflow to the Delta Habitat Area for October 1944, the period of the aerial photos, was 3 cfs. Vegetated wetland was overflowing to the brine pool. Average winter (October through March) inflow to the Delta Habitat Area for the previous 5-year period (1939-1944) was 13 cfs, average summer (April through September) inflow was 5 cfs, and total annual inflow averaged 9 cfs. Inflow to the Delta Habitat Area was typically negligible (< 1 cfs) during July, August and September when evapotranspiration demand was highest.

By 1967, the lower extent of vegetated wetlands (42 acres) had retreated about 1.4 miles upstream (Figure 6-6). Dunes encroached along the west flank of vegetated wetland. Vegetated wetlands drained to a broad zone of open water and wet playa (152 acres). Encroaching dunes pushed the outlet to the brine pool (103 acres) about 0.3 miles east and occluded the overflow channel inlet. Vegetated wetlands included seasonally flooded riparian forest and alkali meadow on elevated floodplains and islands surrounded by extensive marsh in lower positions. Beaver channels were evident in the marshes. Inclusions of marsh vegetation and a few widely scattered trees were present in the open water/wet playa complex. The average inflow to the Delta Habitat Area for May 1967, the date of aerial photos, was 6 cfs. The open water/wet playa complex was overflowing to the brine pool. Average winter (October through March) inflow to the Delta Habitat Area for the previous 23-year period (1944-1967) was 7 cfs, average summer (April through September) inflow was 3 cfs, and total annual inflow averaged 5 cfs. Inflow to the Delta Habitat Area was typically negligible (< 1 cfs) during July, August and September when evapotranspiration demand was highest.

The 1981 aerial photos cover only the north part of the Delta Habitat Area (Figure 6-7). The east branch was well established by 1981. Riparian forest that was on high ground in 1967 was now saturated and engulfed in marsh for a distance of about 0.4 miles below the north divergence. The saturated zone of vegetated wetland overflowed to a well-defined channel (the hook) with open water flanked by seasonally flooded meadows on higher ground. The channel dissipated into a myriad of rivulets through alkali meadow about 0.6 miles downstream. Accretion had raised water levels above a low, sandy bank at the inlet to the east branch, where marsh and alkali meadow had established. The average inflow to the Delta Habitat Area for June 1981, the period of aerial photos, was 1.4 cfs. Average winter (October through March) inflow to the Delta Habitat Area for the previous 12-year period (1969-1981)[2] was 11 cfs, average summer (April through September) inflow was 4 cfs, and total annual inflow was 7 cfs. Inflow to the Delta Habitat Area was typically negligible (< 1 cfs) during July, August and September when evaotranspiration demand was highest.

By 1992, (Figure 6-8) the saturated zone had moved at least 0.75 miles downstream, beyond the limits of aerial photo coverage and the east branch was wetter. The average inflow to the Delta Habitat Area in July 1992, the period of the aerial photos, was 3 cfs. Average winter (October through March) inflow for the previous 8-year period (1983-1992)[3] was 17 cfs, average summer (April through September 1991) inflow was 6 cfs, and total average inflow was 11 cfs. Average inflow during July, August and September ranged from 3 to 4 cfs with only a few years when inflow was negligible (< 1 cfs).

White Horse Associates mapped the extent of wetland vegetation types from 1993 photos (Figure 6-9) as part of a baseline LORP inventory that was used to predict future vegetation types (White Horse Associates, revised 1997[4]). Wetland vegetation types (422 acres) included water (36 acres), alkali marsh and wet alkali meadow (125 acres), Goodding red willow (17 acres) and alkali meadow (244 acres)[5]. Mapping from the 1993 photos is somewhat coarse, with inclusions of uplands in areas designated vegetated wetland (e.g., the island of playa in the east branch above the near convergence with the west branch) and inclusions of wetlands in areas designated upland (e.g., very narrow rivulets forming the eastern-most limb of the east branch). The area of designated water included a buffer on the main channel draining the east and west branches, most of which was really vegetated wetland. These aerial photos are dated July 16, 1993, just a week before the experimental LORP flows were released. Average flow at the Keeler gage for July 1993 (35cfs) is skewed by this event. The average inflow for the first half of July 1993, before the experimental flow, was <1 cfs. Although open water was present at its southern limit, vegetated wetland did not overflow to the brine pool. Average winter (October through March) inflow to the Delta Habitat Area for the previous water year (1991-1992) was 7 cfs, average summer (April through September) inflow was 3 cfs, and total annual inflow was 5 cfs.

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[2] Discharge at Keeler gage for the 1968 water year was about 435 percent of normal and was not considered for this analysis. While the high flows in 1968 influenced the hydrology of the Delta Habitat Area in 1968 (and possibly through 1969), they most likely had little influence on the conditions of the wetlands that were present at the time the aerial photographs were taken in 1981 (10+ years after the high flows occurred) since most of the water is assumed to have passed through and was not used by the plants. The average winter, summer, and annual flows for the 1968-1981 period were 21, 40, and 30 cfs, respectively.

[3] Discharge at Keeler gage for the 1982-83 water year was about 678 percent of normal and was not considered for this analysis. While the high flows in 1982-83 influenced the hydrology of the Delta Habitat Area in 1983, they most likely had little influence on the conditions of the wetlands that were present at the time the aerial photographs were taken in 1992 (nearly 10 years after the high flows occurred) since most of the water is assumed to have passed through and was not used by the plants. The average winter, summer, and annual flows for the 1982-1992 period were 26, 22, and 24 cfs, respectively.

[4] White Horse Associates (1997) listed 408 acres of vegetated wetland. A map error was corrected, resulting in an additional 14 acres of vegetated wetland reported here.

[5] The nomenclature for wetland/riparian vegetation types used in White Horse Associates (1997) was standardized to that previously discussed for 2000 conditions.

White Horse Associates also mapped the extent of wetland vegetation types for 1996 conditions (Figure 6-10) in a mapping effort that began in 1999. When more recent aerial photos became available in late 1999 this detailed draft mapping from the 1996 aerial photos was abandoned prior to preparation of a report. Wetland vegetation types (645 acres) included water, alkali marsh, wet alkali meadow, alkali meadow and Goodding-red willow. The average inflow to the Delta Habitat Area for August 1996, the date of aerial photos, was 9 cfs. Extensive overflow was occurring from the west branch to the brine pool. Average winter (October through March) inflow to the Delta Habitat Area for the 1992-1996 water years was 12 cfs, average summer (April through September) inflow was 10 cfs, and total annual inflow averaged 11 cfs.

White Horse Associates (2000) also mapped vegetation types in the Delta Habitat Area from aerial photographs dated April 13, 1999 (Figure 6-4). Field descriptions of vegetation, soil and hydrologic parameters were used to assign a wetland status to combinations of landtype and vegetation type following guidelines of the Wetlands Delineation Manual (U.S Army Corps of Engineers, 1987). The total area of jurisdictional wetlands and "waters of the United States" was estimated to be 774 acres (22 percent of the Delta Habitat Area). Similar to 1996, extensive overflow was occurring from the west branch of the brine pool. The average inflow to the Delta Habitat Area for April 1999, the period of aerial photos, was 9.1 cfs. Both the east and west branches were overflowing to the brine pool. Average winter (October through March) inflow to the Delta Habitat Area for the 1996-1999 water years was 16 cfs, average summer (April through September) inflow was 9 cfs, and total annual inflow averaged 12 cfs.

As described in Section 6.1.3.2, White Horse Associates (2004) mapped the extent of wetland vegetation types from the 2000 digital orthophotos (Figure 6-11). Vegetation types similar to those used for the 1996 and 1999 mapping were identified. Landtypes and water-regime modeled after Cowardin, et al. (1979) were also assigned to each polygon. The total area of vegetated wetlands and water identified was 831 acres. The estimated average inflow to the Delta Habitat Area for September 2000, the date of aerial photos, was 11 cfs. Vegetated wetland was overflowing from the west branch to the brine pool. Average winter (October through March) inflow to the Delta Habitat Area for the 1999 to 2000 water year was 16 cfs, average summer (April through September) was 9 cfs, and total average inflow was 12 cfs.

The flow releases to the lower Owens River that began in 1986 (and modified jointly by the County and LADWP in 1989 during the drought) under the "Lower Owens River Rewatering Project" (see Section 2.3.2) will continue until the flow releases proposed under LORP begin (see Section 2.3.5). Therefore, with the exception of emergency or maintenance releases to the river from the Aqueduct, etc., the portion of the flows to the Delta Habitat Area that is being managed by LADWP (i.e., excluding natural runoff) has remained and will remain the same as under existing conditions until the LORP flow releases begin. However, in the past few years, reduction in flows to the Delta has been observed, most likely due to increased water consumption by vegetation growth and impoundment due to beaver activity along the river upstream of the Delta. Nevertheless, during field reconnaissance of the Delta conducted by White Horse Associates in 2001 and 2002, continued expansion of wetlands since 2000 was evident (areas transitional from drier to wetter vegetation types were common).

The extent of vegetated wetlands and water in the Delta Habitat Area for 1944, 1967, 1993, 1996, 1999 and 2000 is summarized in Table 6-5.

TABLE 6-5
WETLANDS AND WATER AREAS IN THE DELTA HABITAT AREA, 1944 - 2000

Year	Wetland and Water* Areas (acres)
1944	167
1967	42
1993	422
1996	645
1999	774
2000	831

Source: White Horse Associates, 2004.
* Excludes the intermittently flooded playa within the brine pool transition area.

6.1.4 Bird Use

The shallow flooded, unvegetated or sparsely vegetated alkali playa provides unique habitat for many resident and migratory waterfowl and shorebirds. When wetted, it provides an abundant invertebrate food supply, fresh water for ingestion and cleaning, and open expanses for sighting predators. The playa within and near the Delta provides greater resources than other playa areas around Owens Lake due to the proximity of freshwater from the river, which supports a greater variety of invertebrate species (food for birds) and provides water for thermoregulation and salt balance for birds.

Shorebirds that utilize the alkali playa in the Delta Habitat Area include western snowy plover, American avocet, black-necked stilt, spotted sandpiper, semi-palmated plover, black-bellied plover, greater yellowlegs, lesser yellowlegs, western sandpiper, whimbrel, least sandpiper, dunlin, marbled godwit, killdeer, willet, and long-billed curlew.

In addition to the shallow flooded areas, the waterfowl that occur in the Delta use various wetland-related habitats, including the marsh and riparian forest along river upstream of the Delta and along the west branch; open water ponds that occur as deep sections along the west channel or as isolated ponds near the east or west branches; and marsh and alkali meadow that occur along the margins of the two main channels in the center of the Delta. Waterfowl species in the Delta area include mallard, northern pintail, gadwall, cinnamon teal, green-winged teal, redhead, northern shoveler, American widgeon, canvasback, ruddy duck, Canada goose, snow goose, and wood duck.

Bird species that occur in marsh areas of the Delta include the American bittern, least bittern, great blue heron, great egret, black-crowned night-heron, Virginia rail, sora, marsh wren, common yellowthroat, red-winged blackbird, and yellow-headed blackbird.

Bird species that utilize the riparian forest and alkali scrub along the Owens River above the “Y” and along the west branch below the “Y” include wood duck, great blue heron, great egret, black-crowned night heron, Cooper's hawk, sharp-shinned hawk, ferruginous hawk, Swainson's hawk, long-eared owl, ash-throated flycatcher, western kingbird, Bewick’s wren, LeConte's thrasher, and loggerhead shrike.

Owens Lake has been identified as important bird habitat in two area-wide planning documents. The U.S. Shorebird Conservation Plan is a collaborative document prepared by a partnership of agencies and organizations throughout the United States committed to the conservation of shorebirds. The Plan outlines conservation goals for each region of the country, identifies critical habitat conservation needs and key research needs, and proposes education and outreach programs to increase awareness. Owens Lake is identified as a key shorebird area of the Intermountain West Region, especially for snowy plover (USSCPC, 2000).

Owens Lake has also been designated an Important Bird Area by the National Audubon Society (Audubon California, 2003). The Important Bird Areas Program works through partnerships to identify places that are critical habitat to birds during some part of their life cycle (breeding, wintering, feeding, or migrating) (National Audubon Society, 2004).

6.1.5 Beaver

A beaver population is present along the river from the proposed pump station site to the "Y," and along the upper third of the west branch where riparian woodland is present. This population has created several large dams along the west branch that have caused backwater effects upstream of the Delta, and have substantially slowed the river flows and caused elevated water levels in the river and west branch for many years. This backwater effect in the west branch appears to divert flows to the east branch where beaver are absent.

6.1.6 Saltcedar

In the Delta Habitat Area, saltcedar are present primarily along the east and west branches. Saltcedar in the Delta area have not formed dense stands as they have elsewhere in the Valley; however, many large trees are present.

6.1.7 Special Status Species

Several special status species utilize the Delta Habitat Area on a year-round or seasonal basis. These species include those listed as threatened or endangered by the state or federal government, or Species of Special Concern (designated by the California Department of Fish and Game). The latter include species that are rare or declining in the state, but are not yet considered threatened or endangered. A list of special status species in the Delta Habitat Area is provided in Table 6-6. Information about the occurrence of selected species is provided below.

Only one threatened or endangered species is known to occur in the Delta Habitat Area. The peregrine falcon is a state endangered species which occurs as a spring and fall migrant at Owens Lake, taking shorebirds in and near the Delta Habitat Area.

The Delta Habitat Area contains suitable nesting habitat for the following threatened or endangered species: black rail (state threatened), bank swallow (state threatened), and Swainson's hawk (state threatened). These species could conceivably breed in suitable portions of the Delta in the future (including the river between the pump station and the Delta proper), with or without the LORP. It appears that two variants of the willow flycatcher occur in Owens Valley – the federal endangered southwestern willow flycatcher and the state endangered willow flycatcher. Both could occur as migrants in the riparian woodlands along the upper portions of the Delta.

The western snowy plover is a state Species of Special Concern that occurs at Owens Lake as a summer breeder and migrant. There is considerable interest amongst local ornithologists in the local population of snowy plovers due to the high numbers of birds and their restricted occurrence on the playas of Owens Lake. Plovers nest in open, sparsely vegetated playas around the margins of the lake from March through July. Nests are located within 1,500 feet of freshwater areas, such as seeps, ponds, and riparian corridors, where birds can forage for brine flies and aquatic invertebrates; ingest freshwater; and thermoregulate.

Plovers feed by gleaning insects off both dry and wet areas, but not in open water or dry sand. Owens Lake supports possibly the largest interior population of the western snowy plover in California. (A separate and distinct population, which the USFWS has identified as a separate "evolutionary significant unit," occurs along the Pacific Coast, which is listed as a federal endangered species.) Recent surveys of the plover throughout Owens Lake by the Point Reyes Bird Observatory from 1999-2001 indicate higher numbers, indicating that the population is larger or that more birds have been observed due to a greater number of surveys in recent years.

TABLE 6-6
SPECIAL STATUS SPECIES THAT MAY USE THE OWENS RIVER DELTA HABITAT AREA

Species	Protection Status	Status in the Delta
Great blue heron	LC	Resident
Great egret	LC	Migrant
Least bittern	SSC	Nesting & foraging
White-faced ibis	SSC	Migrant, spring & fall foraging
Black-crowned night-heron	LC	Spring, fall, and winter migrant
Cooper's hawk	SSC	Spring & fall migrant
Sharp-shinned hawk	SSC	Spring & fall migrant
Golden eagle	SSC	Foraging
Ferruginous hawk	SSC	Winter foraging
Swainson's hawk	ST	Potential nester
Northern harrier	SSC	Resident, nesting & foraging
Osprey	SSC	Migrant
Merlin	SSC	Winter foraging
Prairie falcon	SSC	Year-round foraging
American peregrine falcon	SE	Migrant, winter foraging
Western snowy plover	SSC	Nesting and foraging (see below)
Long-billed curlew	SSC	Potential nester, foraging
California gull	SSC	Spring & fall migrant, winter resident
Black tern	SSC	Migrant, spring & fall foraging
Long-eared owl	SSC	Resident
Vaux's swift	SSC	Migrant
Willow flycatcher*	SE, FE	Migrant
Loggerhead shrike	SSC	Nesting & foraging scrub habitat
Bank swallow	ST	Migrant
Le Conte's thrasher	SSC	Nesting & foraging scrub habitat
Yellow warbler	SSC	Migrant, potential nester
Yellow-breasted chat	SSC	Migrant, riparian nester
Owens Valley vole	SSC	Resident, alkali meadow

SE= state endangered. ST = state threatened. FE= federal endangered. SSC = state Species of Special Concern. LC = Species of local concern. *Includes both willow flycatcher (state listed species) and southwestern willow flycatcher (federal listed species).

No nesting plovers have been recorded within the Delta Habitat Area. However, several nests were recorded in May 2001 in Zone 1 of the North Sand Sheet water spreading area, southwest of the Delta Habitat Area (Figure 6-1). Nests were located within 2,000 feet of the western boundary of the Delta Habitat Area and directly adjacent to the brine pool transition area at the southern end of the Delta Habitat Area. Dozens of nests were also observed in May 2001 in Zone 2 of the Dust Mitigation Program.

No threatened, endangered, or special interest plant species are known to occur in the Delta Habitat Area (Ecosystem Sciences, Technical Memorandum 8, January 1999).

The endangered Owens pupfish and Owens tui chub do not appear to occur in the Delta Habitat Area, although potentially suitable habitat may be present. Ecosystem Sciences (Addendum to Technical Memorandum 8, April 2000) estimated the potentially suitable habitat for these species (1996 conditions) to be a portion of 567 acres (consisting of areas that are dominated by water, including alkali marsh, wet alkali meadow, riparian scrub, open water, and brine pool transition area).

6.2 PROPOSED FLOW REGIME

LADWP's proposed management actions for the Delta Habitat Area consist of three types of flow releases: (1) baseflows; (2) four pulse flows; and (3) bypass of annual seasonal habitat flows. The sum of baseflows and pulse flows will be within the 6 to 9 cfs annual average stipulated in the MOU. Bypass of seasonal habitat flows to the Delta will not be included in the calculation of the 6 to 9 cfs annual average. The proposed flow release regime for the Delta Habitat Area is described in detail in Section 2.4.2.

6.3 POTENTIAL IMPACTS

The impacts of proposed flow management for the Delta Habitat Area are evaluated in the following subsections. The primary issues to be addressed are the effects of the amount and timing of the proposed baseflows, pulse flows, and seasonal habitat bypass flows on existing aquatic and wetlands habitats in the Delta Habitat Area (as of 2000, the most recent reported wetland inventory).

There are many uncertainties in predicting the effects of the proposed flows on wetlands in the Delta due to an incomplete understanding of the complex ecological and hydrologic processes. Uncertainties include: effect of changes in timing of flows on vegetation, effect of changes in the overall magnitude of flow, interaction between surface water and groundwater and resultant effects on salinity in the root zone, effects of wind on landforms, and the magnitude of channel losses from evaporation, transpiration and percolation. In addition, the overall effects on groundwater conditions in the Delta from rewatering the river and from the applications of water to Owens Lake under the Dust Mitigation Program are not completely understood. Reasonable differences of opinion exist amongst technical experts interpreting the same data and are described below. Section 6.3.6 presents the impact determinations for the Final EIR/EIS.

6.3.1 Impact Assessment No. 1 (Prepared by Ecosystem Sciences and White Horse Associates)

The following impact assessment was primarily prepared by staff from White Horse Associates based on their work completed for the "Delta Habitat Area Vegetation Inventory - 2000 Conditions" (White Horse Associates, 2004) in coordination with staff from Ecosystem Sciences.

The total hydrologic input to the Delta Habitat Area includes surface inflow, alluvial groundwater inflow and direct precipitation. The Keeler stream gage, about 4.5 river miles upstream of the pump station, has surface flow readings from 1927 to present. The methods of determining flow at the Keeler gage and potential errors in the results are described in Section 4.3.1. Average monthly flows at the Keeler gage for 1927/28 through 1985/86 and 1986/87 through 2000/01 water years are summarized in Table 6-7. These two periods are shown separately because the preliminary release to the lower Owens River under the "Lower Owens River Rewatering Project" began in 1986 (see also Section 2.3.2). Table 6-8 presents average monthly flows measured at Keeler gage since publication of Draft EIR/EIS in November 2002. These average monthly flows must be viewed with reservation. Monthly flows prior to March 1990 appear to be based on a measure of flow for a single day that was then assigned to all other days of the same month. While most monthly flows since March 1990 represent the average of daily measures, similar extrapolations of flows for a single day to all days of a month are apparent in some years. In addition, the accuracy of flow measurements at Keeler gage is reduced when the measuring station is inundated due to nearby beaver activities; at these times, LADWP hydrographers estimate flows.

TABLE 6-7
AVERAGE MONTHLY FLOWS AT THE KEELER GAGE
1927/28 – 2000/01 WATER YEARS

Month	1986/87-2000/01 Water Years* (cfs)				1927/28-1985/86 Water Years (cfs)			
	AVG	MAX	MIN	SD	AVG	MAX	MIN	SD
OCT	11	22	6	5.6	13	241	1	36.9
NOV	14	21	8	4.5	11	160	3	21.1
DEC	14	22	8	4.3	19	272	4	38.8
JAN	15	20	9	3.2	21	295	4	41.5
FEB	16	22	9	3.4	31	356	5	65.2
MAR	16	31	8	5.7	36	493	1	84.8
Winter Avg =	14	21	8	3.8	22	214	4	36.7
APR	12	21	6	4.7	37	503	3	87.7
MAY	9	21	3	5.2	17	293	3	47.3
JUN	5	12	1	3.0	39	1,080	1	171.3
JUL	8	35	0	8.1	35	1,002	0	155.8
AUG	10	28	0	6.4	20	428	0	78.0
SEP	10	21	2	5.3	7	130	0	21.0
Summer Avg =	9	14	2	3.3	26	501	2	90.5
Annual =	12	15	5	3.1	24	306	3	58.5

Source: File of average monthly flows provided by LADWP. Prepared by White Horse Associates.
Note: Flows recorded prior to 1990 appear to be based on a measure of flow for a single day that was then assigned to all other days in the same month.
* Preliminary release to the lower Owens River commenced in 1986.

TABLE 6-8
AVERAGE MONTHLY FLOWS AT THE KEELER GAGE
2001/02 AND 2002/03 WATER YEARS

Month	2001/02 Water Year (cfs)	2002/03 Water Year (cfs)
OCT	13	7
NOV	15	11
DEC	12	12
JAN	13	12
FEB	13	16
MAR	13	11
Winter Avg =	13	12
APR	11	8
MAY	6	5
JUN	3	2
JUL	3	1
AUG	7	21
SEP	4	8
Summer Avg =	6	8
Annual =	9	9

Source: Keeler gage data collected by LADWP.

Average winter flows at the Keeler gage for the 1927-1986 period (22 cfs) were highly variable, ranging from 4 to 214 cfs. Maximum average monthly flows for this period were in March, while minimum average monthly flows were in March and October. Average summer flows for the period (26 cfs) were higher and more variable (2 to 500 cfs). Maximum average monthly flows were in June and July while minimum average monthly flows were in June, July, August and September.

In 1986, a preliminary release to the lower Owens River commenced. Average winter flows for the 1986-2001 period (14 cfs) were less variable than for the 1927-86 period, ranging from 8 to 21 cfs. Maximum average monthly flows for this period were in March and minimum average monthly flows in October. Summer flows averaged 8.9 cfs, ranging from 2 to 14 cfs. The maximum average monthly flow in July corresponds with preliminary experimental releases to the Owens River in 1993. Minimum monthly flows of less than 1 cfs occurred inJuly and August.

Flow to the Delta Habitat Area can be estimated by subtracting the estimated losses along the 4.5-mile long reach of the river between the Keeler gage and the pump station. Based on a channel loss estimate of 0.35 cfs (see Section 10.5), the estimated loss from the Keeler gage to the pump station would be 1.6 cfs.

Alluvial groundwater inflow to the Delta Habitat Area is expected to increase in response to re-watering of the Owens River. The magnitude of future groundwater inflow has not been estimated.

As discussed in Section 6.1.3, between 1944 and 1967 the extent of vegetated wetlands in the Delta Habitat Area decreased from about 167 to 42 acres, possibly a response to negligible summer inflows (< 1 cfs). Since 1993, the extent of vegetated wetlands and water has increased from 422 to 831 acres in 2000

(Table 6-3), possibly related to more consistent summer inflows. As shown in Chart 6-1, there is a highly significant correlation ($r^2 = 0.98$) between time (years since 1992) and the extent of vegetated wetlands, showing an average increase of about 61 acres per year. The regression equation is:

$$Y = 58.1X + 371$$

Where: Y = acres of wetland and waters of U.S.
and
X = number of years since 1992

A similarly significant correlation ($r^2 = 0.97$) was found between area of wetlands and average discharge for the previous calendar year (Chart 6-2). The regression equation is:

$$Y = 0.068X + 62.3$$

Where Y = acres of wetland and waters of the U.S.
and
X = average discharge (acre-feet) the previous year

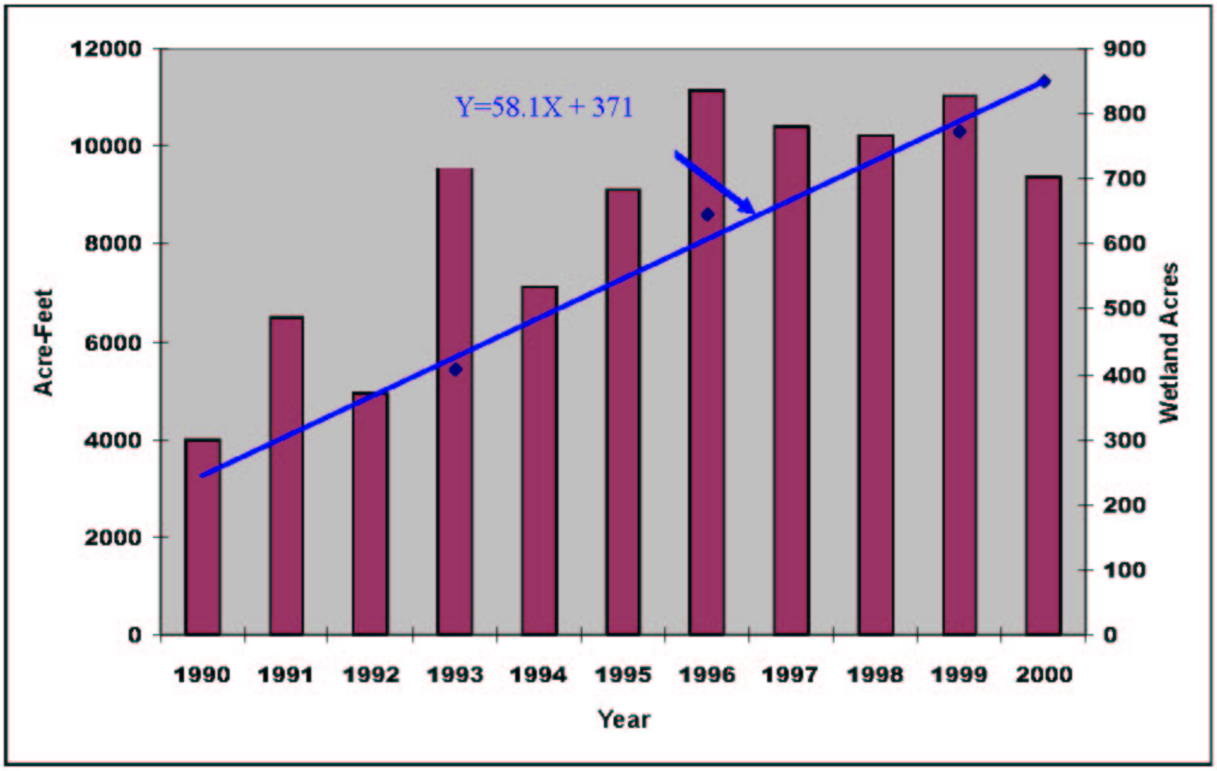


Chart 6-1. Areas of wetlands for 1993, 1996, 1999 and 2000 versus time.

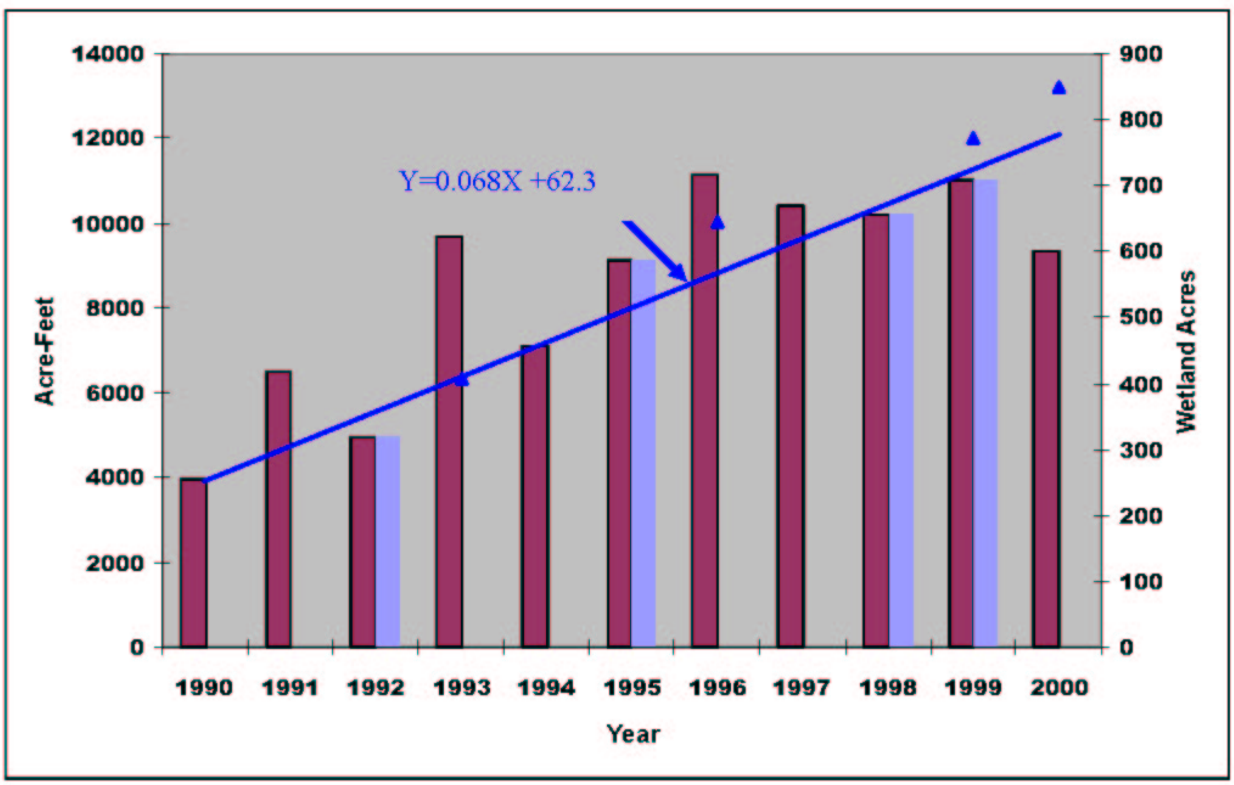


Chart 6-2. Areas of wetlands for 1993, 1996, 1999 and 2000 versus previous year.

These results are somewhat confounding to an understanding of the mechanisms responsible for the consistent expansion of wetlands since 1993, leading White Horse Associates to two hypotheses:

- **Hypothesis 1:** The same expansion of wetlands would have occurred with higher or somewhat lower inflows, as long as inflow met the evapotranspiration demand of wetland vegetation types that existed for the period.
- **Hypothesis 2:** Wetlands would have expanded more with higher average annual inflows and would have shrunk with lower inflows.

Continued expansion of wetlands since 2000 was evident during field reconnaissance of the Delta in 2001 and 2002 (areas transitional from drier to wetter vegetation types were common), yet average annual inflow to the Delta Habitat Area decreased from 12 cfs in 1999-2000 to 8 cfs in 2000-2001 (see Table 6-4). While these observations seem to contradict hypothesis 2, they do not preclude alternative hypotheses that the seasonality of inflow (e.g., summer) is most important for wetland expansion, but regressions of wetland area (1993-2000) and several measures of seasonal inflow (e.g., summer inflow for the current and previous water year) were not significant.

The expansion of wetlands since 1967 appears to correspond to a subtle rise in the saturated surface. By 1981, seasonally flooded riparian forest vegetation that was on high-and-dry ground in 1967 was permanently flooded and water had overflowed into the east branch. The rise in the saturated surface is believed to result from both beaver activity and the accretion of organic matter, especially in the wettest vegetation types. The continued rise in the saturated surface is evident in the steady expansion of vegetated wetlands from 1993 to 2000. As vegetated wetlands expand, water is spread over a broader area, the amount of water storage in the Delta Habitat Area increases, and the rate of flow-through decreases.

When inflow exceeds water storage and plant utilization, the Delta Habitat Area overflows to the brine pool. This overflow to the brine pool is a good indication that the water needs of existing wetlands are being met and that storage capacity has been exceeded. Extensive overflow to the brine pool is evident on the August 1996, April 1999 and September 2000 aerial photos (Figures 6-10, 6-4 and 6-11, respectively) when average inflow to the Delta Habitat Area ranged from 8.7 to 9.5 cfs. This indicates that inflow to the Delta Habitat Area exceeded storage and evapotranspiration demand for those periods. Given about 50 percent higher winter inflow (Table 6-7) and lower winter evapotranspiration demand, it can be surmised that more extensive outflow occurred during winter months.

It is unlikely that water overflowing to the brine pool either serves to maintain existing vegetated wetlands or influences expansion of vegetated wetlands in the Delta Habitat Area. Impounded drainage “overflowing” to the brine pool is evident for 1944, 1967, 1996, 1999 and 2000 summer and spring conditions when evapotranspiration demand was highest. It is a misconception that permanently flooded and saturated wetlands and open water will “drain” to the brine pool if inflows are reduced to the point where no outflow to the brine pool occurs – open water and marsh are evident in 1993 when there was no overflow to the brine pool. Dr. Ron Ryel, Ecosystem Sciences (undated memo), modeled the hydrology of the Delta Habitat Area as a pool that fills to capacity, and then overflows in response to higher flows.

These observations lend credence to Hypothesis 1 that a similar expansion of vegetated wetlands would have occurred with higher or lower average annual inflows to the Delta Habitat Area as long as the evapotranspiration demand of existing vegetated wetlands was met. They also serve to refute Hypothesis 2 that vegetated wetlands would have expanded more or less in response to different average annual inflows.

Baseflow Impacts

The extent of vegetated wetlands in the Delta Habitat Area has increased about 2,000 percent since 1967 (Figures 6-4 through 6-11; Table 6-3). Wetlands have expanded at a steady rate of about 61 acres per year between 1993 and 2000, when about 831 acres of vegetated wetlands and water existed in the Delta Habitat Area. Continued expansion of wetlands since 2000 was evident during field reconnaissance of the Delta conducted by White Horse Associates staff in 2001 and 2002 – areas transitional from drier to wetter vegetation types were common. Based on the trend in wetland growth since 1993, the area of wetlands in the Delta Habitat Area is expected to continue to increase for some time, but eventually level off when the evapotranspiration demand of the vegetation resource exceeds inflow and direct precipitation.

The expansion of wetlands is believed to result from the subtle rise in surface and alluvial groundwater levels resulting from beaver activities and accretion of organic matter, which is dependent upon inflow meeting storage and evapotranspiration demands. As wetlands expand, the amount of water storage in the Delta increases and the rate of flow-through decreases. When inflow exceeds evapotranspiration demand, storage, and infiltration, the Delta overflows to the brine pool. Monitoring of a stream gage to be established at the outlet of the Delta Habitat Area will be used the first year following completion of the pump station to fine tune baseflows for all monitoring periods and to calibrate and refine predictive models. Given that baseflows will be adjusted to maintain 0.5 cfs outflow from the Delta Habitat Area at least initially, it is expected that the “Delta conditions” will be maintained within the confines of 6 to 9 cfs annual average flow stipulated in the MOU. Under the proposed initial release regime, it is likely that flows to the Delta will be lower in the winter (over existing conditions) when evapotranspiration is low, and higher in the summer (over existing conditions) when water demand is high. Based on field observations by LADWP staff and review of aerial photographs, there is generally no outflow from the Delta in the summer under existing conditions.

The predicted impacts of baseflows to vegetation resources in the Delta Habitat Area are:

- Loss of unvegetated playa that will be converted to vegetated wetland types and open water
- Conversion of drier wetland vegetation types to wetter vegetation types and open water
- Possible accelerated loss of vertical structure associated with the Goodding-red willow (riparian forest) vegetation type which is expected to die and not regenerate naturally.

An increase in the areal extent of vegetated wetlands is anticipated, as barren playa is converted first to alkali meadow and later to wet alkali meadow in response to a slow and steady rise in groundwater level due to accretion of vegetation. The riparian forest that established in the Delta Habitat Area under seasonally flooded conditions in the past has since been inundated by the steady rise in groundwater level. As described in Section 6.1.3.2, trees are decadent or dead and are not reproducing under existing conditions. Under both existing conditions and under the proposed flow regime, conditions favorable for propagation of riparian forest (Goodding-red willow) (i.e. seasonally or intermittently flooded, sparsely vegetated substrate) are not expected to return unless flows to the Delta are first eliminated for a long enough time to eliminate vegetated wetlands, then reinstated under different water management. By providing more consistent flows in the summer when trees are biologically active and hence maintaining consistent low oxygen levels in the root zone, the proposed baseflows could accelerate the loss of riparian forest and, consequently, accelerate loss of vertical structure. A total of about 18 acres of decadent riparian forest identified in 2000 (White Horse Associates, 2004) are expected to be replaced by water and marsh.

Pulse Flow Impacts

Pulse flows will be established to replenish the freshwater lens, to enhance vegetation production during critical periods, and to provide unique habitat for selected wildlife. Studies by GBUAPCD and Schultz (1993) indicate that recharge of the freshwater lens overlaying the saline groundwater may be important during winter months. Depletion of the freshwater lens during the growing season, without replenishment prior to spring runoff, could expose plant roots to toxic levels of saline water as they come out of dormancy in March and April. The pulse flows are expected to fully recharge the freshwater lens by providing flows large enough to overflow to the brine pool (i.e., inflow to the Delta exceeds evapotranspiration demand and storage capacity, including the freshwater lens). By providing additional water at critical times of the year, pulse flows are also expected to enhance wetlands expansion, not through direct short-term expansion of a wetted zone, but rather through promotion of more vigorous wetland vegetation that will serve to increase roughness, slow water velocities, increase residence time, and contribute to accretion of organic matter responsible for rising effective groundwater levels.

The adequacy of pulse flows for replenishing the freshwater lens, enhancing vegetation, and providing critical habitat will be evaluated during the monitoring and adaptive management phase. The presence of wetland vegetation is one indicator that the salinity of the shallow groundwater has not exceeded wetland plant tolerances (i.e., freshwater lens is being replenished). Adjustments to pulse flows will be founded on the observed response in the Delta Habitat Area and will be made within the 6 to 9 cfs average annual flow stipulated in the MOU (see Section 2.10.5 and Section 2.4.2.2).

Pulse flows are expected to enhance the health and vigor of wetlands, enhancing production resulting in the rise of effective water level and further expansion of wetlands. Pulse flows will serve to accelerate impacts (relative to 2000 conditions) previously discussed with respect to baseflows.

Seasonal Habitat Flow Impacts

Without considering channel losses, seasonal habitat flows that will bypass the pump station to the Delta Habitat area would range up to 150 cfs every other year on average. Impacts to the Delta from the bypass of seasonal habitat flows are expected to include:

- Discharge to the overflow channel inlet when inflows are above 50 cfs, enhancing conditions for expansion of intermittently flooded vegetated wetland in this area.
- Flooding of lower parts of the east branch that are currently intermittently flooded alkali meadow.
- Increased seepage under the dunes to isolated wetlands west of the west branch.
- Inundation of upland habitats along the edges of vegetated wetlands.

Hydrologic modeling conducted by Dr. Ron Ryel, Ecosystem Sciences (Appendix E), indicates that under existing channel conditions, flows above 50 cfs could top the overflow channel inlet and may open the channel to more consistent surface flow. The inlet to the overflow channel is in a straight reach that is confined (by aeolian sediments) immediately upstream. The probability of the overflow channel capturing more than a small part of flow to the Delta Habitat Area is small. Surface discharge in the overflow channel is confined by dunes in the immediate vicinity of the overflow channel inlet, by a sand sheet further west, and ultimately by a dike along the west flank of the Delta Habitat Area. Hence, the probability of the overflow channel capturing the major flow to the Delta Habitat Area is further diminished.

The current conditions in the overflow channel resemble conditions that existed in the east branch prior to 1981. It is likely that vegetated wetlands associated with the overflow channel will expand in response to rising effective water levels, even without seasonal habitat flows. The area west of the west branch that could be wetted by the overflow channel is an asset where further expansion of vegetated wetlands is likely to occur. Given the dunes along the west side of the west branch, it appears unlikely that surface flow in the overflow channel will return to the west branch (although existing subsurface flow along the sand/playa interface will continue), as is the apparent trend to the myriad of rivulets constituting the east branch.

Flooding of the lower parts of the east branch that are currently intermittently flooded alkali meadow for the short duration (±10 days) is expected to invigorate saltgrass production. Given that saltgrass spreads primarily by extension of stolons, short-term expansion of the extent of alkali meadow is expected in response to seasonal habitat flows.

Seepage of groundwater under the dunes that border the west branch is expected to enhance isolated wetlands that exist where the sand sheet is thin (see Figure 6-2). Similar to that discussed above, the extent of alkali meadow may increase in this area in response to seasonal habitat flows.

Flooding may also occur in areas outside the existing vegetated wetlands, resulting in intermittently flooded playa and alkali scrub vegetation types. Flooding of these areas for up to 10 days every other year is not expected to change these upland vegetation types to vegetated wetlands. Infrequent, intermittent flooding of upland vegetation types may cause an influx of weeds.

Additional effects on the Delta from the bypass of seasonal habitat flows are expected to be:

- Potential increase in weeds in upland areas that are flooded by seasonal habitat flows
- Potential stranding of fish in flooded portions of the Delta Habitat Area
- Undesirable accumulation and concentration of salts in intermittently flooded uplands that may inhibit survival of existing vegetation
- Potential stranding of fish in the western branch
- Undesirable accumulation and concentration of salts in small depressions that are flooded every 2 to 5 years (Ecosystem Sciences, Addendum to Technical Memorandum 8, April 2000)

Impact Summary Related to Delta Habitat Area

For purposes of the EIR/EIS, impacts were assessed relative to 2000 conditions (White Horse Associates 2004). In this study it was estimated that approximately 831 acres of water and vegetated wetlands existed in 2000. The proposed water budget is expected to result in further expansion of vegetated wetlands relative to 2000 conditions. Wetlands expansion is expected to continue until evapotranspiration demands exceed baseflow and the expansion of wetlands levels off. Further wetlands expansion may occur in response to pulse flows. Vigorous wetland vegetation will result in more efficient use of available water (e.g., increased transpiration and reduced evaporation). Except for the brine pool transition area as described in Section 6.3.5, no adverse impacts to the extent of water and vegetated wetlands as compared to 2000 conditions are anticipated.

The MOU specifies “riparian areas and ponds” will be enhanced and maintained “to the extent feasible.” Given static conditions, all open water in the Delta Habitat Area would eventually be converted to marsh. But conditions in the Delta Habitat Area since 1944 (see Section 6.1.3) have not been static. Shifting dunes and beaver are important dynamic forces that create new areas of open water that will eventually revert to vegetated wetland. Intensification of these forces is expected to cause a short-term shift towards more open water and less vegetated wetlands. Reduction of these forces is expected to cause a long-term shift towards less open water and more vegetated wetlands. However, please note that implementation of

LORP is not expected to affect the extent, distribution or dynamics of dunes. At this time, beaver management is not proposed in the Delta Habitat Area, but is a potential adaptive management measure as described in Section 2.10.5..

Anticipated beneficial impacts resulting from implementation of baseflow, pulse flows, and bypass of seasonal habitat flows include: (1) conversion of unvegetated playa to vegetated wetlands; and (2) conversion of drier wetland types to wetter vegetated wetland types and open water. Anticipated adverse, but less than significant, impacts resulting from implementation of baseflows include the accelerated loss of vertical structure associated with the riparian forest wetland type. Existing riparian forest areas developed under historical seasonally flooded conditions and have been reduced to small areas of decadent, dying and dead trees that are permanently flooded or saturated.

Determination of the significance of Delta flow regime changes on Delta aquatic and wetland habitats is presented below in Section 6.3.6.

6.3.2 Impact Assessment No. 2 (Prepared by URS)

An alternative opinion on the potential effects of the proposed flow regime on aquatic and wetland habitats in the Delta is described in the following subsections. The following analyses were prepared by URS Corporation, consultant to Inyo County, during preparation of the Draft EIR/EIS:

- Anticipated changes in the amount of water available to the Delta as a result of the proposed baseflows and pulse flows (Section 6.3.2.1)
- Potential for seasonal habitat flows to reach the Delta (Section 6.3.2.2)
- Ecological effects of reduced flows to the Delta (Section 6.3.2.3)
- Potential for flows to bypass the Delta in a channel that occurs outside the Delta (Section 6.3.2.4)
- Potential for water to spread laterally through the Delta under different flow conditions (Section 6.3.2.5)

These analyses are then used to determine if the proposed flow regime will enhance aquatic and wetland habitats by evaluating the underlying ecological mechanisms in the Delta.

6.3.2.1 Amount of Water Reaching the Delta From Proposed Baseflows and Pulse Flows

The goals of the MOU are intended to be achieved, in part, by improving flow management to the Delta using an average annual flow of 6 to 9 cfs, including four pulses of higher flows to increase water spreading for specific wetland and avian needs. LADWP proposes establishing the Delta baseflow regime during the first year after the pump station is completed (see Section 2.4.2), thus actual Delta baseflows to be implemented under the LORP are unknown at this time, although they will be an annual average of 6 to 9 cfs as required by the MOU. For the purposes of this analysis, Delta baseflows are assumed to be an average annual flow of 7.1 cfs, with daily flows of 5.3 cfs plus the four pulse flows and potential additional flows due to the seasonal habitat flows that are bypassed to the Delta. This flow amount is considered a reasonable estimate for the purpose of analysis because (1) it was the flow regime initially proposed by Ecosystem Sciences in Technical Memorandum 8 (January 1999) and addenda (April and June 2000), (2) it is within the MOU-required range of 6 to 9 cfs, and (3) it is the initial flow release that LADWP will use to establish baseflows. The following analysis evaluates whether an average annual flow of 7.1 cfs will represent an increase over the flows to the Delta that were occurring in 1996 when the MOU was signed, as well as under current conditions. The ecological impact of the change in flows is addressed in Section 6.3.2.3.

There are no stream gages at the north end of the Delta. However, the LADWP stream gage at Keeler Bridge, about 4 river miles upstream of the pump station, has flow readings from 1927 to the present. The methods of determining flow at the Keeler Bridge and potential errors in the results are described in Section 4.3.1. Major conclusions from the analysis include the following:

- Flows at Keeler Bridge are derived from releases from upstream spillgates that reach the river, runoff from precipitation and snowmelt, and groundwater baseflows. A major source of recharge to the shallow groundwater is likely to be water released from upstream spillgates. The high variability in flows among and within years is largely explained by the fact that flows are manipulated by upstream water management actions.

- Groundwater baseflows that reach Keeler Bridge were estimated to be about 4 cfs by Inyo County in 1986 (Hutchison, 1986).

- The median monthly flows at Keeler Bridge during the period 1986-2001 when LADWP began releasing water from upstream spillgates for the Lower Owens River Rewatering Project (a precursor to the LORP) range from 5 to 17 cfs (Chart 4-4).

- Flows at Keeler Bridge are low in the summer and high in the winter (Chart 4-4). One explanation for this pattern is that flows are dominated by groundwater discharge from the valley, which would be depressed in the summer due to evapotranspiration. Precipitation and runoff also contribute to the annual variations in flow.

Flows at Keeler Bridge for various time periods are summarized in Table 6-9. Median and average flows between 1986 and 1996 were both about 11 cfs. Slightly higher flows have been occurring since 1996. Median monthly flows were about 7 cfs. Median monthly flows over the entire period of record were 7.8 cfs. Without the two flood years of 1938 and 1969, median monthly flows were 7.1 cfs. Average monthly flows were higher.

TABLE 6-9
SUMMARY OF EXISTING AND PROPOSED FLOWS AT KEELER BRIDGE AND BELOW THE PUMP STATION LOCATION

Period of Record	Median Monthly Flow (cfs)*	Average Monthly Flow (cfs)*	Median Annual Discharge (acre-feet)
Measured Flows at Keeler Bridge			
1986-2001 (baseline conditions for impact assessment)	12.2	11.8	8,833
1986-1996 (baseline conditions for MOU)	11.1	11.2	8,036
1927-2001 (available historic data)	7.8	21.7	5,647
1927-2001, minus 1938-39, 1969-70 flood flows which skew the average data (column 2)	7.1	13.6	5,140
Estimated Flows to the Delta (pump station location)			
1986-2001 (baseline conditions for impact assessment), calculated by subtracting 1.4 cfs channel loss from measured flows at Keeler Bridge	10.8	10.4	7,819
Proposed Flows to the Delta (pump station location)			
Proposed baseflows and four pulse flows (average annual flows); see Table 2-11.	~7.1 average annual	7.1 average annual	5,140

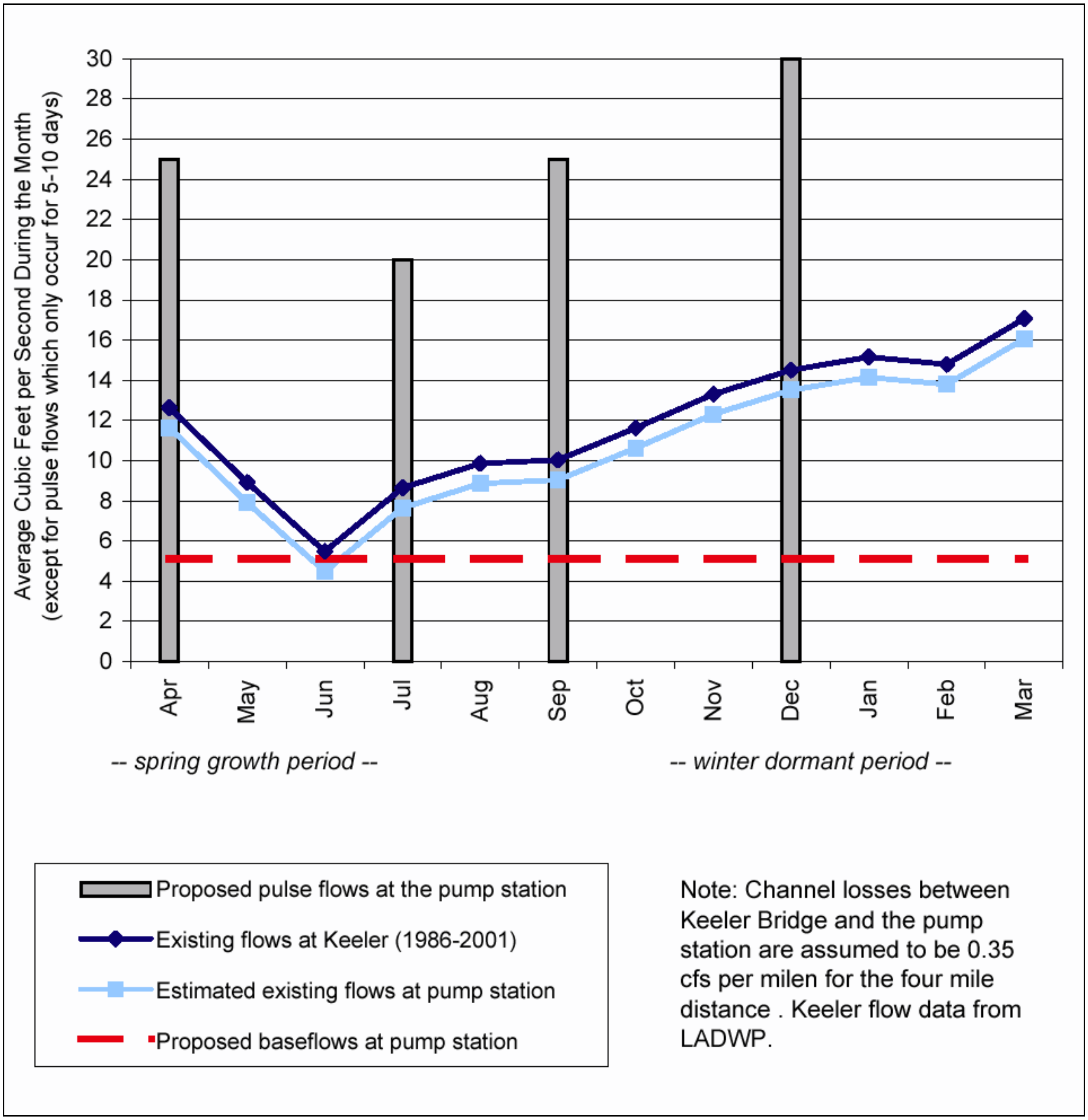
Source: Spreadsheet provided by LADWP June 2000. *Monthly flows based on daily measured flows. 1 cfs = 724 acre-feet per year, 1.98 acre-feet per day.

Flows at the pump station site were estimated by subtracting the estimated losses along the 4-mile long reach of the river between Keeler Bridge and the pump station site. As described in detail in Section 10.5, the losses during steady state conditions are estimated to be about 0.35 cfs per mile. Based on this value, the estimated loss from Keeler Bridge to the pump station would be 1.4 cfs. Hence, the median and average flows at the pump station site from 1986 to 2001 are estimated to be about 11 cfs and 10 cfs, respectively.

Based on this analysis, it appears that the proposed initial annual average baseflow of 7.1 cfs at the pump station site would be about 35 percent less than the current and recent historic flows of about 11 cfs. In essence, the required average annual flows of 6 to 9 cfs are already being achieved, and exceeded, under current operations. Implementation of the LORP, as proposed, would reduce baseflows to the Delta to 6 to 9 cfs from about 10 cfs. The relationship between the estimated existing flows to the Delta and the proposed baseflows is shown on Chart 6-3.

An average initial annual flow of 7.1 cfs would result in less water being discharged to the Delta on an annual basis. As shown in Table 6-9, the current (i.e., during the period of 1986-2001) estimated median annual discharge to the Delta is about 7,819 acre-feet. Under the 7.1 cfs annual average flow regime, the total initial annual discharge would be about 5,140 acre-feet. The ecological consequences of the overall reduction in flows to the Delta over current and recent historic conditions are described in Section 6.3.2.3, taking into consideration the seasonality of the proposed pulse flows and the effects of the seasonal habitat flows.

CHART 6-3
EXISTING (1986-2001) AND PROPOSED FLOWS AT PUMP STATION SITE



6.3.2.2 Potential for Seasonal Habitat Flows to Reach the Delta

Release Regime for Seasonal Habitat Flows from the River Intake

Seasonal habitat flows would be released from the River Intake during most years, as described in Section 2.3.5.3. The maximum amount of the annual seasonal habitat flow would be determined each year based on predicted runoff conditions. No habitat flows will be released in dry years, but the amount of the flow would increase in accordance with runoff predictions up to a maximum of 200 cfs in average and above average runoff years. The seasonal habitat flows would be established each February by the Standing Committee, in consultation with the California Department Fish and Game using LADWP's Runoff Forecast Model for the Owens Valley. The maximum flow of 200 cfs would be released every other year on average. Over the long-term, the average annual seasonal habitat flow would be 150 cfs at peak release (Randy Jackson, pers. comm., 10-4-01).

The amount of water released from the River Intake for the seasonal habitat flows will be ramped up from the 40-cfs baseflow to reach the peak flow and back down to the baseflow rate in accordance with a specified ramping schedule described in Section 2.3.5.3, as well as shown on Chart 2-2. The number of days of flows above the 40-cfs baseflow will range from 1 day for a 50-cfs peak flow, to 6 days for a 75-cfs peak flow, to 14 days for a 200-cfs peak flow. Seasonal habitat flows will be ramped up starting from the 40-cfs baseflow to achieve the specified seasonal habitat flow magnitude for that year. For example, if a seasonal habitat flow of 200 cfs is specified, flows will increase 160 cfs on top of the 40-cfs baseflow to achieve a peak magnitude of 200 cfs.

The seasonal habitat flows will be released from the River Intake and will not be augmented by water released from spillgates downstream of the River Intake. Thus, seasonal habitat flows released at the River Intake would be subject to channel losses, described below and in Section 10.5. As a consequence, seasonal habitat flows above the 40-cfs baseflows would be depleted as they travel from the River Intake to the pump station. In contrast, the 40-cfs baseflow would be supplemented by spillgate releases to ensure approximately 40 cfs reaches the pump station.

<u>Estimated Channel Losses for Seasonal Habitat Flows</u>

Loss rates along the Lower Owens River were estimated by Inyo County (Jackson, 1994) based on several different methodologies. The primary method relied upon the observed losses during the experimental flows to the lower river in 1993. Channel losses (herein defined to include loss to alluvial aquifer and evapotranspiration) based on *instantaneous* stream flow measurements was estimated to average 0.79 cfs per mile, with a range of 0.49 to 1.53 cfs per mile. he *mean* channel loss along the river throughout the experiment were estimated to average 1.3 cfs per mile, with a range of 0.15 to 3.68 cfs per mile. Percolation is likely to be less than in 1993 if the flows in the river result in filling of the alluvial aquifers along the river over time. However, the evapotranspiration rate will increase over time as riparian vegetation cover increases.

Jackson (1994) also estimated evapotranspiration losses along the river by estimating average evapotranspiration of existing riparian vegetation types located along the river, multiplied by the area of the vegetation adjacent to the river. Based on this method, the evapotranspiration rate along the river under current conditions is about 0.2 cfs per mile. This method of estimating total channel loss does not include channel losses to deeper aquifers or lateral groundwater movement, nor does it take into account the increased evapotranspiration expected to occur along the river as new riparian vegetation increases. Rewatering the river is expected to increase riparian vegetation productivity and areal extent. As a conservative approach, it is estimated that the channel losses, consisting primarily of evapotranspiration, during steady state conditions along the river would be twice the calculated evapotranspiration of current vegetation, or about 0.4 cfs per mile.

Based on the above information and other estimations of channel losses (described in more detail in Section 10.5.1), it is estimated that channel losses (including percolation and evapotranspiration) during the initial rewatering (years 1 and 2) would be at least 1 cfs per mile. Channel losses from baseflows during steady state conditions are expected to be about 0.35 cfs (similar to observed losses downstream of Keeler Bridge), or slightly higher. The basis for this estimate is described in detail in Section 10.5.1. This is considered a very low or conservative estimate of steady state losses, as indicated in recent discussions with Inyo County (Randy Jackson, pers. comm., 10/1/01). LADWP recently estimated the channel losses along the river to be about 0.75 cfs based on flow measurements during the removal of beaver dams (B. Tillemans, pers. comm.). Nevertheless, the 0.35 cfs per mile loss rate is used for the analysis of losses during steady state conditions.

Seasonal habitat flows of up to 200 cfs may experience higher channel losses than baseflows because: (1) flows across the floodplain may encounter depressions where water could be detained, resulting in higher evaporation and percolation than in the channel; and (2) flows across the floodplain may encounter more dewatered storage conditions in the alluvium compared to the channel banks. No empirical data on channel losses during high flows are available. However, in the absence of such data, the estimated channel loss rate during seasonal habitat flows is estimated to be the same as channel losses during initial rewatering – 1 cfs per mile. The actual annual loss due to seasonal habitat flows will vary depending upon the maximum flow required based on the forecasted runoff in the valley, as well as climatic conditions, soil conditions, and aquifer conditions.

Recognizing the difficulty in predicting the channel losses during the seasonal habitat flows, a lower loss rate is also used in the following impact analysis identical to the predicted baseflow channel loss – 0.35 cfs per mile. However, the actual rate could be different than the estimate.

Estimated Seasonal Habitat Flows Reaching the Pump Station and Delta

The estimated amounts of water that would be bypassed to the Delta during a 200-cfs seasonal habitat flow are shown in Table 6-10 with a moderate channel loss assumption, and Table 6-11 with a lower channel loss assumption.

During a seasonal habitat flow of 200 cfs, flows of 12 to 88 cfs would be bypassed to the Delta for 5 days (totaling about 358 acre-feet above the baseflows) using a moderate channel loss rate estimate of 1 cfs per mile (Table 6-10). These bypass flows would occur in average and above average runoff years, or about every other year on average.

TABLE 6-10
ESTIMATE OF SEASONAL HABITAT FLOWS THAT REACH THE PUMP STATION
MODERATE CHANNEL LOSS ASSUMPTION

Day	Flows at the River Intake (Flows Prior to Day 1 are 40 cfs)		Seasonal Flows that Reach the Pump Stn After 62 cfs Channel Loss*	Total Flows at Pump Stn	Flows to the Delta During Seasonal Habitat Releases	
	Flow (cfs)	Seasonal Flows Above 40 cfs			Flows** (cfs)	Acre-feet above Baseflows***
1	50	10	0	40	5.3	0
2	63	23	0	40	5.3	0
3	79	39	0	40	5.3	0
4	99	59	0	40	5.3	0
5	124	84	22	62	12	13
6	155	115	53	93	43	75
7	200	160	98	138	88	164
8	160	120	58	98	48	85
9	128	88	26	66	16	21
10	102	62	0	40	5.3	0
11	82	42	0	40	5.3	0
12	66	26	0	40	5.3	0
13	53	13	0	40	5.3	0
14	40	0	0	40	5.3	0
Total quantity of water that reaches the Delta (acre-feet)=						358

1 cfs for one day = 1.98 acre-feet. * The estimate of channel loss is 1 cfs per mile. See text for explanation.
** Minimum daily baseflows to the Delta assumed to be 5.3 cfs. *** Does not include volume of water associated with 5.3 cfs baseflow.

Using a lower channel loss rate estimate of 0.35 cfs per mile, flows would be bypassed to the Delta for 9 days (totaling about 857 acre-feet above the baseflows), with flows of 7 to 128 cfs being released to the Delta during the 9-day ramping period (Table 6-11).

TABLE 6-11
ESTIMATE OF SEASONAL HABITAT FLOWS THAT REACH THE PUMP STATION
LOWER CHANNEL LOSS ASSUMPTION

Day	Daily Average Flows at the River Intake (Flows Prior to Day 1 are 40 cfs)		Seasonal Flows that Reach the Pump Stn After 22 cfs Channel Loss*	Total Flows at Pump Stn	Flows to the Delta During Seasonal Habitat Releases	
	Flows (cfs)	Seasonal Flows Above 40 cfs			Flows** (cfs)	Acre-Feet above Baseflows***
1	50	10	0	40	5.3	0
2	63	23	1	41	5.3	0
3	79	39	17	57	7	3
4	99	59	37	77	27	43
5	124	84	62	102	52	92
6	155	115	93	133	83	154
7	200	160	138	178	128	243
8	160	120	98	138	88	164
9	128	88	66	106	56	100
10	102	62	40	80	30	49
11	82	42	20	60	10	9
12	66	26	4	44	5.3	0
13	53	13	0	40	5.3	0
14	40	0	0	40	5.3	0
Total quantity of water that reaches the Delta (acre-feet)=						857

1 cfs for one day = 1.98 acre-feet. * The estimate of channel loss is 0.35 cfs per mile. See text for explanation. ** Minimum daily baseflows to the Delta assumed to be 5.3 cfs. *** Does not include volume of water associated with 5.3 cfs baseflow.

Hence, the total initial annual discharge to the Delta would range from 5,498 to 5,997 acre-feet. This estimate is based on 5,140 acre-feet released to the Delta from initial baseflows and from pulse flows, and a 200-cfs release at the River Intake. The flows to the Delta would be about 2,000 to 2,300 acre-feet per year less than the current (i.e., during the period 1986-2001) median annual discharge to the Delta (7,819 acre-feet).

6.3.2.3 Ecological Effects of Reduced Flows to the Delta

The magnitude and significance of the impacts of the proposed flow regime to the Delta on aquatic and wetland habitats are discussed in the following subsections based on the previous technical analyses concerning the amount of water discharged to the Delta, the channel capacity, and the potential for water spreading.

Mechanisms for Maintaining and Enhancing Delta Wetlands and Aquatic Habitats

In general, the desired benefits to habitats and habitat indicator species in the Delta due to new flow management would be achieved by one or more of the physical and biological mechanisms listed below. The occurrence and relative importance of each mechanism is directly related to the amount and timing of flows to the Delta Habitat Area.

- Mechanisms to Expand Wetlands. Properly managed flows could spread across areas that are not typically inundated. These flows could infiltrate or evaporate, and provide fresh water to the root zone of plants to support new growth or fill pore space to prevent upwelling of saline groundwater, which inhibits plant growth. These conditions may develop new wetlands, if conditions are favorable, as well as expand existing wetlands along their margins. An increase in vegetated wetlands would provide more opportunities for shelter, foraging, and nest sites for most of the waterfowl and riparian breeding birds that use the Delta.

- <u>Mechanisms to Increase Wetland Growth</u>. Properly managed flows could facilitate greater plant productivity by providing more volume of fresh water in the root zone, and/or a longer duration of available water to extend the growing season where it is limited by water. Wetlands in the floodplain of the Delta and riparian habitats along the east and west branches would benefit. An increase in wetland and riparian productivity would provide more opportunities for shelter, foraging, and nest sites for most of the waterfowl and riparian breeding birds that use the Delta.

- <u>Mechanisms to Expand Aquatic Habitat</u>. Properly managed flows could spread across areas that are not typically inundated, creating seasonal or semi-permanent ponds. The flows may also create more open water area within the east and west branches due to higher water surface elevations, and in the brine transition zone at the southern end of the Delta Habitat Area. An increase in open water in the channels and in isolated ponds would directly benefit various shorebirds and waterfowl that use the Delta, including the snowy plover, by creating more food and water.

- <u>Mechanisms to Promote Sustainability</u>. Properly managed flows could increase habitat diversity by causing more physical disturbance in the Delta channels due to higher velocities, more overbank flooding and spreading, and disturbance to beaver dams along the river upstream of the Delta. Increased physical disturbance would likely increase plant recruitment and succession, which in turn would increase sustainability of the ecosystem.

The GBUAPCD has conducted studies on shallow groundwater conditions and vegetation response to groundwater with varying depths and salinities. In addition, the GBUAPCD has conducted several studies on shallow groundwater conditions in and near the Delta. Through these studies, the GBUAPCD has postulated the following explanation for groundwater and wetland conditions in Owens Lake.

Owens Lake is underlain by a shallow groundwater aquifer that is highly saline. It is recharged from winter runoff, and as such, rises each winter. The shallow groundwater is too saline for plant growth. Hence, once it reaches the root zone, plant growth is precluded. In most areas of the lake, there is a gradient of increasing salinity from the groundwater to the surface due to capillary action from evaporation. The Delta contains a freshwater "lens" that occurs above the shallow saline groundwater that is maintained by the discharges to the Delta from the Owens River. The freshwater lens essentially floats above the saline groundwater due to its lower density, and mixing appears to be minimal. In contrast to other areas of Owens Lake, salinity decreases from the depth to the ground surface due to this freshwater lens. Plants thrive in these areas because they are protected from the highly saline groundwater. If the freshwater lens is depleted during the growing season and not replenished prior to the spring runoff, plants rooted in these areas will be exposed to potentially toxic levels of saline groundwater as they break dormancy in March and April.

Based on the above observations, it appears that spreading fresh water in the sparsely vegetated floodplain of the Delta would generally contribute to wetland growth in the Delta by filling pore spaces in the upper soil with fresh water that can be exploited by colonizing wetland plants, and by creating positive pressure from freshwater infiltration that could displace saline groundwater around the margins of the Delta. In general, any additional water to the Delta has the potential to benefit wetlands (by improving soil salinity conditions) and/or birds (by maintaining aquatic habitat and associated invertebrates).

Effect on Existing Aquatic and Wetland Habitats

Aquatic habitats and wetlands in the Delta are directly affected by the amount and timing of flows to the Delta. For these habitats to be maintained in their current conditions, the proposed flow regime to the Delta must: (1) be similar to current and recent historic flows; or (2) provide water resources in different, but more efficient manner compared to the current regime.

As described above, the proposed bypass flows to the Delta would discharge about 35 percent less water to the Delta than under current release regimes unrelated to the LORP. Under current conditions (i.e., the period 1986-2001), 7,819 acre-feet of water (median annual flow) is discharged to the Delta, following a pattern of low flows in the summer and higher flows in the winter (Chart 6-3). Under the proposed initial release regime, there would be a lower baseflow year-round and four discrete 5 to 10-day periods of higher flows. The total initial annual discharge to the Delta would range from approximately 5,498 to 5,997 acre-feet assuming annual average flows of 7.1 cfs released to the Delta. This estimate is based on 5,140 acre-feet released to the Delta from initial baseflows and from pulse flows, plus a 200-cfs seasonal habitat flow release at the River Intake (less channel losses). The additional flows to the Delta under this alternative would be closer in magnitude to the current (i.e., during the period 1986-2001) median annual discharge to the Delta of 7,819 acre-feet, but would still be 1,822 to 2,321 acre-feet per year less. Based on monitoring of the outflow, flow releases may be increased or decreased during the first year and therefore the total annual average discharge may be greater or less than the range described above.

The reduction in the overall amount of fresh water discharged to the Delta may result in adverse impacts to existing aquatic habitats and wetlands. The lower flows could reduce the total volume of fresh water in the root zone, which is critical in maintaining plant productivity in this highly saline soil environment by providing positive pressure in the upper soil to prevent upwelling of highly saline groundwater. The overall reduction in fresh water in the Delta could also reduce the amount of water available for plant uptake, thereby reducing the growth period compared to current conditions. Finally, the reduction in the overall amount of water discharged to the Delta may reduce the water depth in channels and the amount of surface water in seasonal and semi-permanent ponds and in the brine transition zone, which in turn would reduce aquatic habitat for fish, invertebrates, and water-associated birds. The reduction in water surface elevation in the Delta channels could also reduce the extent of lateral groundwater infiltration that supports wetlands along the margins of the channels.

The magnitude of potential adverse impacts of a net reduction in water discharged to the Delta on the condition of existing habitats cannot be accurately predicted. The amount and timing of flows under the proposed flow regime are substantially different compared to the current regime, and as such, an ecological effect (positive or negative) is anticipated. The proposed pulse flows follow the current seasonal flow pattern – that is, low flows in the summer, increasing through the winter, then decreasing in the spring (Chart 6-3). This flow pattern may or may not be optimal for aquatic habitats and wetlands. For example, the proposed lowest pulse flow would occur in the summer (see Chart 6-3) at the time when plants exhibit the highest water demand. In contrast, the high pulse flow in the early winter may fill depleted pore spaces in the soil with freshwater that can be readily used by plants when they break dormancy in the early spring.

It is important to recognize that the seasonal pattern of existing flows is not designed to maintain or enhance habitats in the Delta. The pattern shown in Chart 6-3 is a result of upstream releases for irrigation purposes and channel losses prior to reaching Keeler Bridge. Hence, the lower flows to the Delta in the summer are likely due to high upstream water demand, and should not be considered an optimal flow pattern for maintaining and enhancing wetlands in the Delta. Alternative pulse flow regimes designed specifically to benefit wetlands are described in Section 11.0.

There are no available data or analytic tools to definitively conclude that the revised regime would maintain existing aquatic and wetlands habitats. In contrast, there is a reasonable basis for postulating an adverse effect based on a substantial net reduction in flows to the Delta. Hence, absent compelling evidence to the contrary, it is concluded that a substantial reduction in the total amount of water released to the Delta may have an adverse ecological impact, even in light of the four pulse flows designed for ecological purposes. The proposed flow regime could possibly reduce the extent of existing aquatic and wetland habitats, and the productivity of vegetated wetlands.

It should be noted that a large fraction of the freshwater flows to the Delta pass through to the brine pool. Hence, one can postulate that existing flows can be reduced without adverse ecological effects because not all of these flows may contribute to aquatic and wetland habitats. For example, Ecosystem Sciences (Tables for the Addendum to Technical Memorandum 8, June 2000) estimated that water demand from existing wetlands in the Delta (as of 1996) to be about 3,366 acre-feet per year, well below the approximately 8,000 acre-feet per year discharged to the Delta under current conditions. Hence, some of the water currently discharged to the Delta may not have any ecological consequences within the designated boundary of the Delta Habitat Area.

An alternative viewpoint is that water that is not consumed by plants in the Delta has other benefits, which may not be obvious. For example, maintaining water levels in the Delta channels can provide positive groundwater pressure in areas adjacent to the channels, thereby increasing the height and volume of fresh water to support wetland plants in adjacent areas. The water in channels provides aquatic habitat for invertebrates and birds. The surface area of this habitat and the quality of the water could be adversely affected by a reduction in flow (and the associated reduction in water depth).

The reduction in flows to the Delta under the proposed flow regime can be fully offset by increasing the magnitude of the proposed baseflows and pulse flows, as well as modifying the number and timing of the pulse flows. If the average annual flows to the Delta are increased to the MOU specified maximum of 9 cfs, an additional 1,376 acre-feet would be discharged to the Delta during the year. With this modification, the total annual discharge to the Delta (including baseflows, pulse flows, and seasonal habitat flows) would be 6,874 to 7,372 acre-feet per year. This modified flow amount would likely avoid the impacts to Delta habitats despite being less than current flow amounts because the timing and amount of pulse flows can be adjusted over time through the monitoring and adaptive management program to meet habitat needs with less water.

Hence, the impact of reduced baseflows to the Delta is considered a potentially significant, but mitigable impact. The impact may be effectively mitigated by increasing the average annual flows to the Delta from 7.1 cfs to 9 cfs. Implementation of Mitigation Measure D-1 through the monitoring and adaptive management program would ensure that the existing aquatic and wetland habitats of the Delta are maintained. The impacts to aquatic and wetland habitats due to the reduction in overall water to the Delta could also be mitigated in part, by increased flows to the Delta during the seasonal habitat flows. An alternative to provide more water to the Delta from seasonal habitat flows is described in Section 11.0. Mitigation Measure D-1 was defined by URS as follows:

> Under the proposed monitoring and adaptive management program, LADWP shall make adjustments to the amount and timing of the baseflows and pulse flows up to an average annual flow of 9 cfs to reduce any possible adverse effects on the extent and condition of existing aquatic and wetland habitats in the Delta Habitat Area.

[Although presented in the Draft EIR/EIS as a Mitigation Measure, the actions described in D-1 are included as part of the project description for LORP (see Section 2.10.5). Adaptive management includes adjustments to baseflows and pulse flows up to an annual average of approximately 9 cfs. Therefore, D-1 is not identified as a Mitigation Measure for adoption by LADWP in the Final EIR/EIS.]

6.3.3 Potential for Bypass Flows to be Conveyed Away from the Center of the Delta

The river channel downstream of the pump station is clogged with cattails and bulrushes, facilitated by the low gradient of the river, the current flow regime, and the presence of several beaver dams. To determine if there is sufficient capacity in this channel to convey the seasonal habitat flows that would reach the Delta, LADWP measured six cross sections between the pump station site and the "Y" where the east and west branches diverge (Figure 6-1). The channel width ranges from 200 to 300 feet. The channel depth ranges from 2 to 4 feet.

Ecosystem Sciences conducted a hydraulic modeling analysis (HEC-RAS model) of this reach of the river (using measured cross sections at the transects described above) to determine channel capacity and water surface elevation (Appendix E). The analysis was completed using various flows (7.2, 25, 50, and 150 cfs) to represent different possible bypass flows to the Delta. The modeling assumed a range of gradients and roughness coefficients in order to represent current channel conditions with dense vegetation and a cleared channel.

There is a low-lying area along the western bank of the river channel, about 900 feet upstream of the "Y" (Figure 6-1). The bank appears to have been manually breached to allow flows from the river channel to move to the west. This overflow point is about 20 to 30 feet wide, and about 3 to 4 feet deep. It appears that periodic high flows are conveyed through the breach to form the overflow channel. Under most flows, it appears that the overflow channel only receives seepage flows. However, when the water surface elevation is increased in the river, due to higher flows or effects of beaver dams, surface water spills through the overflow point into the overflow channel. The water surface elevation during a site survey in August 2001 was only 1 foot below the top of the breach, when flows in the river were estimated to be 5 to 10 cfs.

The modeling results by Ecosystem Sciences were designed to identify what magnitude of flows would be likely to overtop the breach in the bank, and be conveyed into the overflow channel. The results are summarized below in Table 6-12. These modeling results indicate that flows between 25 and 50 cfs would overtop the bank and enter the overflow channel.

It is possible that the proposed winter pulse flows of 30 cfs could be partially diverted to the overflow channel. During flow releases by LADWP in August 2001 (for Aqueduct cleaning purposes) of up to 30 cfs, LADWP observed (from a helicopter) surface water in the overflow channel. No ground observations were made at the time; hence, it is uncertain if the flows in the overflow channel were derived from seepage or flows from the river channel.

TABLE 6-12
SUMMARY OF MODELED BREAKOUT FLOWS TO THE OVERFLOW CHANNEL

Flows (cfs) along the River Below the Pump Station	Will the Flows Overtop the Bank with a Clogged Channel?	Will the Flows Overtop the Bank with a Cleared Channel?
7.2	No	No
25*	No	No
50*	Yes	No
150*	Yes	No

Source: Ecosystem Sciences (unpublished data). *Flows above 25 cfs would occur for 3 to 7 days during the maximum seasonal habitat flows of 200 cfs (see Table 6-10 and Table 6-11). In addition, flows of 25 cfs will be released for 10 days during Period 1 and Period 3 pulse flows, and flows of 30 cfs will be released for 5 days during the Period 4 pulse flow (see Section 2.4.2).

Under the proposed seasonal habitat flow releases to the Delta, a peak flow of 88 to 128 cfs is predicted to bypass the pump station when 200 cfs is released from the River Intake (see Table 6-10 and Table 6-11). Based on the results of the HEC-RAS model described above, if these flows overtop banks over time, there is a potential for a large fraction of the river flows to be diverted to the west and outside the Delta Habitat Area (Figure 6-1). Continual flows to the overflow channel could cause a shift in the river, resulting in most of the river flows being diverted from the main Delta to the overflow channel. The latter is isolated from the main Delta area by a 10 to 20 foot high natural sand dune system. Hence, flows in the overflow channel are not likely to return to the main Delta area. As a result, an unknown portion of the seasonal habitat flows would not reach the center of the Delta.

The diverting of flows could result in the degradation of aquatic and wetland habitats in the center of the Delta over time. It is likely that these habitats would be replaced through natural colonization and succession processes along the new overflow channel. However, there may be a lag time for full replacement of habitat functions, which could affect wildlife populations. Eventually, the new habitats would likely be similar to those in the center of the Delta. However, it is not certain that the acreage of the new habitats would be the same as the original habitats because the landforms west of the Delta differ greatly from the center of the Delta. Hence, there is a potential for a net overall reduction in the areal extent of aquatic and wetland habitats due to flows being conveyed west of the Delta through natural hydraulic processes.

It should be noted, however, that release of flows higher than the maximum modeled flow (i.e., 150 cfs) has occurred in the river without causing substantial flows to breakout to the overflow channel. For example, in 2003, LADWP released flows in excess of 200 cfs from the Alabama Spillgate into the river due to a thunderstorm event that plugged the Aqueduct and required emergency releases from the Aqueduct to conduct repairs. This emergency release did not result in diversion of substantial flows to the overflow channel. Therefore, the probability that a large fraction of the flows to the Delta would be captured by the overflow channel may be lower than is indicated by the results of the HEC-RAS modeling.

Upon implementation of the project, LADWP does not propose to physically increase the channel capacity by excavating the channel or raising the western banks along the river upstream of the Delta. LADWP would allow flows to create new channels over time in response to hydrologic and physical conditions in the Delta, and allow habitats to respond to such natural changes. However, as described in Section 2.10.5, adjusting baseflows and/or pulse flows to the Delta (within the 6 to 9 cfs annual average) and/or physically increasing channel capacity are potential adaptive management measures that could be implemented if triggered by the exceedance of thresholds described in Section 2.4.2.2. With implementation of these adaptive management measures, **the potential diversion of flows from the center of the Delta is considered a less than significant impact (Class III)**.

6.3.4 Extent of Anticipated Water Spreading in the Delta from Seasonal Habitat Flows

In order to expand wetlands and create more aquatic habitat in the Delta, the additional flows to the Delta must exceed the capacities of existing channels and swales, and spread to areas that are not typically inundated. The following assessment of water spreading in the Delta assumes that the majority of the seasonal habitat flows do not break out to the western overflow channel described above. To assess the potential for flows to spread across the Delta, LADWP measured cross-sections in two transects across the center of the Delta Habitat Area. The length of each transect was 3,580 feet and extended across the entire Delta Habitat Area. The cross-sections were surveyed on May 9, 2001 when the flow in the Delta was measured at 5.5 cfs. Elevation data were collected to the nearest 10^{th} of a foot. The elevation data indicate the following:

- Under these low flows (5.5 cfs), the water in the west branch creates a wide wetted surface (1,000 feet or more), consisting of connected braided channels and isolated ponds connected by subsurface flow.
- The depth of the water under the low flows was about 1.5 feet. However, there are occasional in-channel "ponds" where the channel invert may be 3 to 4 feet deep.
- Not surprisingly, the topographic relief in the Delta is very low. The difference between the lowest point in the Delta where water is present and the highest point in the center of the area is only about 2 feet.
- The dunes on the west side of the Delta are about 5 to 6 feet high and represent a substantial barrier to flows. There is no topographic break on the east side, where the Delta slopes upward at a very small gradient. The high elevation at the eastern boundary of the Delta Habitat Area is only about 1.5 feet higher than the lowest point in the east branch.
- Under these low flows, water was not present in the east branch, and the difference in invert elevations between the two branches was about 1.5 feet. This indicates that the west branch is still the primary conveyance through the Delta and that the east branch is receiving much less flow at the "Y".
- The non-wetland playa between the two branches is only about 2 feet higher than the west branch invert. Hence, a rise in water surface elevation in the west branch of more than 2 feet could spread across the center of the Delta.

Dr. Ron Ryel conducted HEC-RAS modeling of the flows in the Delta using the two measured transects described above, and transects extrapolated from the field data for the remainder of the Delta. The modeling was conducted to determine water surface elevation and potential spreading under bypass flows of 50 and 150 cfs. The modeling assumed a range of river gradients and three roughness coefficients to represent different channel conditions (Ecosystem Sciences, unpublished data). The modeling analysis is appropriate for a screening level analysis. The modeling results indicated the following:

- The predicted water depth in the Delta channels would increase with a 50 cfs flow. The predicted increase is moderate (about 65 percent), which would translate into water depths of about 2.5 feet compared to conditions observed in May 2001 when water depths were about 1.5 feet with flows of about 5.5 cfs. Water depths observed in May 2001 are predicted to double under a 150 cfs flow, to about 3 to 4 feet. Existing channel depths in the Delta range from 1 to 4 feet; hence, if flows reach the Delta (estimated to be for up to 3 to 7 days), the projected increase in water depths under 50 and 150 cfs would cause flows to break out of the east and west branches in the Delta and spread over adjacent playa and alkali meadow areas.

- The width of the wetted channel would increase at a substantially higher rate than water depth and velocity as flows spread across the flat Delta. The width of the wetted channel would increase about 150 percent with a 50-cfs flow compared to 5-cfs baseflows, which would translate into a new wetted channel of up to about 2,500 feet. Significantly wider flows would be observed under a 150 cfs flow. There could be up to a 400 to 500 percent increase in the flow width, resulting in a wetted area of up to about 4,000 feet. The total width of the Delta (in the center) is about 5,000 feet.

- Velocities would increase at a much lower rate compared to water depth and width. Predicted velocities under all flows and channel conditions would be less than 0.5 feet per second, well below any scouring thresholds.

- The presence of dense in-channel vegetation when flows of 50 and 150 cfs are released to the Delta would cause slightly greater water depths and wetted channel widths, and slightly lower velocities.

In conclusion, the modeling results indicate that flows of up to 50 cfs and 150 cfs (if flows of that magnitude were to occur) would exceed the capacities of the existing west and east branches. The depth and areal extent of spreading cannot be accurately predicted based on the limited modeling conducted to date, but it appears that areas would be subject to shallow flows and flooding during these flows, particularly from 150 cfs flows.

Under the proposed flow regime, seasonal habitat flows would be bypassed to the Delta for 5 days to 9 days with peak flows of 88 to 128 cfs (see Table 6-10 and Table 6-11). These flows would be sufficient to result in water spreading in the Delta.

The modeling results described above also suggest that the four pulse flows to the Delta of 20 to 30 cfs would also flood new areas outside the existing wetted channels, although they would affect a much smaller area than the 50 or 150 cfs flows that were modeled.

6.3.5 Impacts to the Intermittently Flooded Playa within the Brine Pool Transition Area

The area at the southern end of the Delta Habitat Area where the east and west branches converge is generally referred to as the brine pool transition area (located between the vegetated portion of the Delta Habitat Area and the Owens Lake brine pool to the southwest). This area is intermittently flooded with shallow water spreading across the ground surface in broad meandering swaths; in contrast to the vegetated areas of the Delta to the north, the area is unvegetated or sparsely vegetated. As described in Section 6.1.3.2, mapping from aerial photographs indicates that the areal extent of this intermittently flooded playa in the brine pool transition area is approximately 58 acres, or approximately 2 percent of the total Delta Habitat Area (September 2000 conditions). [Note, these are 58 acres with topography suitable for shallow flooding; however, standing water was not present in this area as observed in the September 2000 aerial photograph].

When wetted, this area serves as habitat for waterfowl, wading birds, and shorebirds by providing invertebrate food supply, fresh water for ingestion and cleaning, and open expanses for sighting predators. Species observed in this area include western snowy plover, American avocet, black-necked stilt, spotted sandpiper, semi-palmated plover, black-bellied plover, greater yellowlegs, lesser yellowlegs, western sandpiper, whimbrel, least sandpiper, dunlin, marbled godwit, killdeer, willet, and long-billed curlew.

Based on field observations and review of aerial photographs by LADWP staff, outflow from the Delta Habitat Area is currently absent or minimal during summer. During the months of October to April, there is greater outflow since evapotranspiration demand is substantially less during the winter than during the summer growing season. The specific monthly and seasonal patterns of baseflows to the Delta under the proposed project cannot be determined until baseflows are established through outflow monitoring during the first year. However, since baseflows to the Delta Habitat Area will be managed to minimize outflow, the project is likely to decrease the volume of water reaching the brine pool transition area and, consequently, reduce the extent of sheet flow in the intermittently flooded playa habitat area during the months of October to April relative to existing conditions. This reduction will be partially offset by the releases of Period 1 pulse flow (25 cfs for 10 days in March or April) and Period 4 pulse flow (30 cfs for 5 days in November or December), which are expected to create an overflow to the brine pool transition area (in part for the benefit of wintering birds).

The area of the Delta brine pool transition area that would be affected by the project is small relative to the amount of similar habitat that is currently available in close proximity, i.e., the shallow flooding areas of the Owens Lake Dust Mitigation Program (see Section 12.3). In December 2001, LADWP began shallow flooding 11.9 square miles (7,639 acres) in an area along the northeast part of Owens Dry Lake referred to as Zone 2 (northeastern portion of the lake, immediately adjacent to the Delta Habitat Area; see Figure 6-1). By 2003, the Dust Mitigation Program included 15.4 square miles (9,823 acres) of shallow flooding. Shallow flooding areas are operated between October 1 and June 30 each year. In addition, as part of the CDFG Streambed Alteration Agreement for dust control activities in the southern portion of the lake, LADWP has committed to maintaining 1,000 acres of shorebird habitat within Zone 2 shallow flood area and up to 1,000 acres of additional shorebird habitat using naturally occurring water.

Surveys conducted by the Point Reyes Bird Observatory (PRBO) indicate that the number of shorebirds in the dust control shallow flooding areas have increased since flooding began, presumably due to the increase in brine flies and other insects associated with these areas. The total number of adult snowy plovers observed at the Owens Lake have increased from 167 in 2001, 272 in 2002, to 401 in 2003 (surveys conducted in May; PRBO, 2003). The largest population increase (15 in 2001, 152 in 2002, and 224 in 2003) was observed in the Zone 2 shallow flooding area of the dust control project (PRBO, 2003). In contrast, the number of adults observed within the Delta was 4 (approximately 2 percent of total) in 2001, 17 (6 percent) in 2002, and 20 (5 percent) in 2003, respectively (PRBO, 2003). Results of PRBO surveys in 2003 also indicate that over 90 percent of American avocets and over 70 percent of waterbirds are observed in the Zone 2 shallow flooding area; less than 1 percent of the total numbers of American avocets and waterbirds were observed in the Delta (PRBO, 2003). Based on the relative amount of similar habitat areas and number of birds currently present in the dust control areas and the Delta Habitat Area, project-related reduction in the intermittently flooded playa within the brine pool transition area would affect a very small portion of shorebird habitat available and overall population numbers present within the Owens Lake area as a whole.

Within the context of existing conditions in the Delta and the overall increase of shallow flooded playa habitat types created under LORP, the potential reduction in this type of habitat within the Delta brine pool transition area is considered less than significant. As described in Section 7.1, under the proposed project hundreds of acres of shallow flooded areas will be developed within the Blackrock Waterfowl Habitat Area. Overall, habitat for waterfowl, wading birds, and shorebirds (including the species currently present in the Delta brine pool transition area) will be increased after implementation of LORP.

6.3.6 Impact Summary

As described above, there are many uncertainties in predicting the effects of the proposed flows on wetland and aquatic habitats in the Delta. Due to the limited availability of reliable data (including information needed to accurately estimate existing flows into the Delta), there is incomplete understanding of the complex ecological and hydrologic processes.

Based on the analysis presented in Sections 6.3.1 (Impact Assessment No. 1 prepared by Ecosystem Sciences and White Horse Associates), 6.3.3, 6.3.4, and 6.3.5, LADWP, as CEQA lead agency, has determined that **impacts to existing aquatic and wetland habitats of the Delta would range from beneficial to less than significant (Class III).** LADWP concurs with the model of the Delta presented in Impact Assessment No. 1 which describes the Delta as a basin that fills to capacity then overflows and, consequently, that the water needs of existing vegetation (including and evapotranspiration and freshwater in the root zone) are met if there is an outflow from the Delta. Since the proposed baseflows will be established to ensure a minimal amount of outflow from the Delta throughout the first year (thereby exceeding the water demands of the Delta wetlands that exist at that time), per LADWP's analysis, the proposed baseflows will be sufficient to at least maintain the vegetated wetlands that exist at the time of project initiation. The release of the four pulse flows and the bypass of seasonal habitat flows would provide higher flows (thereby spreading water over a larger area than under baseflow conditions) at key times of the year to enhance vegetated wetlands and aquatic habitats.

The analysis presented in Section 6.3.2 (Impact Assessment No. 2 prepared by URS) was considered. However, LADWP does not concur with Impact Assessment No. 2 because it is based primarily on a comparison of the total annual inflow to the Delta under existing conditions and does not sufficiently take into account the seasonal changes in evapotranspiration demand. LADWP does not concur with the viewpoint that reduction in the outflow from the Delta would adversely affect habitat (except in the brine pool transition area as described in Section 6.3.5). It should also be noted that Impact Assessment No.2 concluded that, with implementation of the 50 cfs pump station and by adjusting the baseflows and pulse flows up to an average annual flow of 9 cfs under the proposed monitoring and adaptive management program (identified as Mitigation Measure D-1 in the Draft EIR/EIS but already included in the project description for LORP), impacts to the Delta wetland and aquatic habitats can be avoided. Therefore, for all intents and purposes, project impacts to the Delta wetland and aquatic habitats are less than significant under both Impact Assessment Nos. 1 and 2.

6.4 IMPACTS TO MINING OPERATION ADJACENT TO THE BRINE POOL

6.4.1 Background Information

The brine pool is located to the southwest of the Delta Habitat Area on the west central portion of Owens Lake, and encompasses about 25 square miles (16,000 acres). It consists of a body of crystalline salt deposits (trona ore) and lake bed sediments covered by a thin layer of concentrated brine. The thickness of the trona ore ranges from 1 to 9 feet, and the ore is saturated with concentrated brine. The brine level fluctuates from just below the surface to several inches above the surface, due to evaporation and runoff conditions.

There is an existing US Borax trona mining operation at the southern end of the lake adjacent to the brine pool. The trona is excavated from the surface deposits and stockpiled for dewatering before being trucked away. Mining is sensitive to fluctuations in the brine pool elevation. If the pool level rises, the mining operation must include construction of temporary berms composed of mined trona to prevent intrusion by the brine pool. A reduction in the brine pool would reduce brine concentrations in the mined material, making excavation and hauling easier.

As required by the court injunction regarding release of water to Owens Lake (No. 34042, amended September 29, 2000), LADWP will notify SLC staff and the lessee, at least annually, of planned releases of water onto or into Owens Lake for the purpose of implementing the LORP, and will implement reasonable measures to avoid damage to mining facilities on Owens Lake operated by the SLC lessee and/or to mineral deposits on Owens Lake.

6.4.2 Impacts

As shown in Table 6-9, the current estimated total annual discharge to the Delta from the Owens River is about 7,819 acre-feet (median annual flow). As described in Section 6.3.2.2, the average annual flows to the Delta and the lake under LORP would be about 5,498 to 5,997 acre-feet assuming annual average flows of 7.1 cfs released to the Delta. Hence, there could be an overall reduction in the amount of water passing through the Delta to the brine pool.

GBUAPCD provided an estimate of surface flows to the brine pool in the Final EIR for the Dust Mitigation Program (GBUAPCD, 1997). Surface flows to the lake are primarily derived from the Owens River, Sierra Nevada creeks, and periodic discharges from the Los Angeles Aqueduct. The total surface flow to the brine pool from these sources is estimated to be 40,000 to 50,000 acre-feet per year, which varies greatly from year to year based on runoff conditions. In addition to the surface flows, other sources that support the brine pool include direct recharge from precipitation on the playa and groundwater infiltration from adjacent alluvial deposits. Hence, the potential reduction in about 2,000 acre-feet per year under the proposed project would be minor compared to the overall water budget for the brine pool. The typical volume of the brine pool (with a surface area of about 16,000 acres) is about 40,000 acre-feet (Memorandum from Randy Jackson, 8-28-01).

The brine pool is very shallow, and as such, changes in volume will result in greater effects on the surface area. A change in 1,000 acre-feet of storage could increase or decrease the brine pool surface area by 2,200 to 2,700 acres (Memorandum from Randy Jackson, 8-28-01). Hence, the reduction in flows to the brine pool associated with the proposed flow regime to the Delta could measurably reduce the surface area of the brine pool. This impact may be offset in part, or wholly, by the groundwater infiltration due to rewatering of the river under the LORP and the water applied to the lake margins associated with the Dust Mitigation Program.

The reduction in flows to the brine pool could (1) reduce the size of the brine pool, or (2) have no effect on the size of the brine pool. Either condition would not adversely affect the existing trona mining operations in the brine pool. In fact, the reduction the flows to the brine pool may possibly result in a beneficial impact to the operations. Hence, the proposed flows to the Delta would not adversely affect the mining operations in Owens Lake.

6.5 IMPACTS - NOXIOUS PLANT SPECIES AND SALTCEDAR

The proposed flow release regime to the Delta could potentially increase the distribution and abundance of perennial pepperweed and other noxious plants, and stimulate the growth of saltcedar which is a non-native invasive plant that is spreading rapidly in the Owens Valley. The potential for the growth of saltcedar and other noxious plants is fully described in Section 10.4.

6.6 IMPACTS - MOSQUITOES

The LORP will result in new open water and marsh habitats at the Delta. These new habitats would provide more opportunities for mosquitoes to breed, which could result in increased nuisance and public health risks to communities and residents near these areas, and to the people engaged in outdoor recreation. The potential for the increase in mosquitoes is fully described in Section 10.3.

7.0 BLACKROCK WATERFOWL HABITAT AREA

7.1 WETLANDS AND RIPARIAN HABITATS

7.1.1 Existing Conditions

The Blackrock Waterfowl Habitat Area consists of four separate management units: Drew, Waggoner, Winterton, and Thibaut (Figure 2-15). Ecosystem Sciences (April 2002) estimated the potential area in which flooding could occur under the LORP in each management unit based on: (1) an evaluation of 2-foot contour maps for a portion of the area and maps of the distribution and spreading facilities within the four management units; (2) observations of the locations and elevations of roads, levees, spillgates, culverts, ditches; and (3) observations of the distribution of existing wetland vegetation and open water during winter and spring, when water was relatively abundant and evapotranspiration was low. The evaluation included observations of water released from spillgates and runoff from precipitation to locate watercourses and sinks. The delineation was intended to identify the maximum boundaries within which flooding could occur under the LORP. However, it is not proposed nor expected that the maximum extent would be flooded at any one time. The actual extent of flooding in any unit will be based in part on the extent of total flooding in all units, with the goal being to achieve a total of 500 acres of flooded area (see MOU goals, below). The proposed flooding regime for the first several years of project implementation is described below.

The total area within which flooding could potentially occur within the four units is approximately 1,342 acres (see Table 7-1 and Figure 7-1 through 7-3). Under the MOU, LADWP is required to flood 500 acres out of this 1,342-acre total, except in years when runoff is forecasted to be less than average. In addition, the areas within 300 feet of the flooded areas, called “adjacent zones,” are expected to benefit from the flooding and to provide important nesting, resting, and feeding habitat for waterfowl and many other wildlife species that use the Blackrock area. The total area of these adjacent zones in the four Blackrock management units is 1,241 acres (see Figure 2-15). Thus, the Blackrock Waterfowl Habitat Area consists of a total of 2,583 acres within four management units.

Portions of the management units currently include waterfowl habitat in various man-made lakes and seasonally flooded pastures. Over the past 40 years, the Blackrock area has been used for water spreading in high runoff years, grazing, and other activities. For example, when runoff has exceeded the Aqueduct capacity, it has been spread over extensive areas normally used for dry grazing that extend from Blackrock Ditch to Billy Lake. To facilitate spreading, LADWP has constructed miles of dikes, levees, ditches, roads, culverts, and basins. The water-spreading basins are connected by ditches, culverts, and spillgates. Significant areas were recontoured in the past to facilitate spreading and percolation and to reduce the need to release excess water to Owens Lake, which was limited by a court injunction to prevent flooding of mining operations on Owens Lake.

In 1986, LADWP began making continuous water releases to the area now called the Waggoner Unit to supply Goose Lake as an off-river lake and pond component of the Lower Owens River Rewatering Project. At the time, the Waggoner Unit consisted primarily of alkali meadow and saltbush scrub. For many years, the water releases created large expanses of open water, interrupted by islands of rush/sedge meadow and saltbush scrub, which attracted large numbers of resident and migratory waterfowl and shorebirds. After several years of continued flooding, the open water areas began to fill in with cattails and bulrushes until the Waggoner Unit became dominated by emergent vegetation, as it is today. LADWP has observed that once the area became dominated by emergent vegetation, its value to waterfowl and shorebirds was diminished.

In addition to the wetlands created by LADWP's water releases, natural wetlands are present in the Blackrock area at seeps and springs along the 1872 earthquake fault line or in areas with naturally high groundwater. Existing wetlands (both natural and created) in the Blackrock Waterfowl Habitat Area include open water, alkali marsh, rush/sedge meadow, and alkali meadow. The Blackrock area is currently grazed by livestock in various LADWP leases, as described in Section 2.8.

White Horse Associates mapped vegetation types in the Blackrock Habitat Area based on field surveys and aerial photography interpretation in 1997. Their results were documented in Technical Memoranda 4 (1998) and 15 (1998), which were prepared by Ecosystem Sciences. The classification system used in the memoranda represented a variation of the Holland system used in the Cooperative Vegetation Study by LADWP and Inyo County (1990 Green Book). The vegetation types described in the Ecosystem Sciences memoranda are used below. For convenience, the names of the vegetation types have been abbreviated in the text and tables of this section. See Figures 7-1 through 7-3 for the distribution of the vegetation types. A description of each vegetation type by Ecosystem Sciences is presented below.

Open water: This mapping unit represents areas of open water areas in Lacustrine and Palustrine wetlands. Some emergent vegetation is usually present along shorelines and in other shallow areas. Permanently and semi-permanently flooded habitat usually develops emergent vegetation within a short period of time. Many shallower areas are transformed into emergent wetlands such as transmontane marsh (alkali and freshwater) within a few seasons. Open water tends to be temporary habitat that persists in deep water areas, some "hard pan" areas and when water is manipulated to periodically desiccate the area and thus reduce the volume of emergent vegetation. Open water is considered a valuable and very rare "wetland habitat" in the Owens Valley. This mapping type generally corresponds to the Permanent Lakes & Reservoirs (Type 13100) in the Holland (1986) classification scheme. For the EIR/EIS, all areas mapped as open water are not considered vegetated wetlands.

Alkali marsh: This community combines elements of both "Transmontane Alkali Marsh" and "Transmontane Freshwater Marsh". Transmontane marsh occurs in areas of standing, more or less permanent water. The freshwater marsh usually occurs where the water flow provides more freshwater than in the Transmontane Alkali Marsh. The dominant vegetation consists of herbaceous plants, especially cattails (*Typha* spp.), and bulrushes (*Scirpus* spp.). Other common species include yerba mansa (*Anemopsis californica*), salt grass, sedges, rushes and along even drier margins common reed (*Phragmites australis*) saltbush (*Atriplex* spp.) and rubber rabbitbrush (*Chrysothamnus nauseosus*).

In some areas, plant species richness appears to be very low, consisting almost entirely of dense stands of cattail and bulrush. Along low gradient ecotones, this community provides a rich and diverse mixture of wetland types as it merges with wet meadow, alkali meadow, seep, and upland communities. In the Lower Owens Valley, this mapping unit develops very rapidly and tends to dominate areas provided with standing permanent to semi-permanent water with depth less than about 3 to 4 feet. Without some form of hydroperiod manipulation, this vegetation type becomes a very dense monoculture in only a few years. This vegetation type corresponds to Transmontane Alkali Marsh (Type 52320) and Transmontane Freshwater Marsh (Type 52400) in the Holland (1986) vegetation classification system and in the Green Book (LADWP and Inyo County, 1990). In the Blackrock area much of the existing and future marsh habitat should probably be considered freshwater marsh. For the EIR/EIS, all areas mapped as marsh are considered vegetated wetlands.

Rush/sedge meadow: Wet meadows usually have dense growth of perennial grasses (some resulting from the introduction of pasture crops), sedges (*Carex* sp.), and broad-leaved plants. This vegetation type occurs on fine-textured, permanently moist, alkaline soils throughout the study area. On some sites, supplemental irrigation maintains plant growth. Characteristic species include sedge, salt grass, Bermuda grass (*Cynodon dactylon*), Meadow fescue (*Festuca arundinacea*), rush (*Juncus* sp.), alkali sacaton, common reed (*Phragmites australis*), and nitrophila (*Nitrophila occidentalis*).

Wet meadows are frequently associated with and merge indistinguishably into "Alkali Seeps", "Transmontane Alkali and Freshwater Marsh", "Alkali Meadow" and "Alkali Shrub Meadow" vegetation types. Much of the wet meadow mapping unit in the Blackrock Waterfowl Habitat Area has developed as a result of water spreading and irrigation activities. For this EIR all areas mapped as rush/sedge meadow are considered vegetated wetlands. This vegetation type corresponds to Transmontane Meadow or more specifically a rush/sedge meadow (Type 45330) in the Holland (1986) vegetation classification system and in the Green Book (LADWP and Inyo County, 1990). For the EIR/EIS, all areas mapped as rush/sedge meadow are considered vegetated wetlands.

Alkali meadow: Alkali Meadow consists of dense to fairly open stands of perennial grasses and sedges, sometimes with scattered shrubs. Relatively few plant species form the community and grass species such as alkali sacaton (*Sporobolus airoides*) and saltgrass (*Distichlis spicata*) are consistently dominant. This type is associated with fine-textured, permanently moist, alkaline soils on valley bottoms. This vegetation type corresponds to Transmontane Alkali Meadow (Type 45310) in the Holland (1986) vegetation classification system and in the Green Book (LADWP and Inyo County, 1990). Alkali Meadow is a dominant mapping unit of the Lower Owens River floodplain. For the EIR/EIS, all areas mapped as alkali meadow are considered vegetated wetlands.

Greasewood scrub: This vegetation type includes sandy habitat dominated by alkali tolerant, facultative wetland shrub and herbaceous species. The shrub stratum typically includes Parry saltbush (*Atriplex parryi*) and Torrey seepweed (*Suada moquinii*); Torrey saltbush (*Atriplex lentiformis ssp. torreyi*), shrubby alkali aster (*Macoranthera carnosa*) and greasewood (*Sarcobatus vermiculatus*) are also common. Saltgrass is typically present, but with low cover. This vegetation corresponds to Desert Sink Scrub (Type 36120) in the Holland (1986) vegetation classification system and in the Green Book (LADWP and Inyo County, 1990). For the EIR/EIS, all areas mapped as greasewood scrub are considered uplands.

Tamarisk shrub: Tamarisk or salt cedar (*Tamarix ramosissima* and *T. chhinensis*) is the dominant species along with some scattered narrow leaf willow (*Salix exigua*), dusky willow (*S. melanopsis*) and occasionally Russian olive (*Elaeagnus angustifolia*), red willow (*Salix laevigata*) and wood rose (*Rosa woodsii* var. *ultramontana*). This mapping unit generally occurs in open scattered stands except localized very dense clumps of willow and rose. Stands are usually less than two to three meters in height, but at a few locations such as along the margins of permanent water, trees occur. In the Blackrock Habitat Area, much of this mapping unit is associated with roadsides, levees, old ditches, basins and other water spreading facilities. Tamarisk appears to be associated with soil manipulation and certain flooding (hydrologic) regimes. This mapping type corresponds to Tamarisk scrub (Type 63810) in the Holland (1986) classification system and in the Green Book (LADWP and Inyo County, 1990). For the EIR/EIS, all areas mapped as tamarisk shrub are considered uplands.

Alkali shrub meadow or Saltbush Scrub: Mixture of a low shrub overstory including saltbush (*Atriplex* spp. including allscale, fourwing saltbush, shadscale, etc.), rubber rabbitbrush (*Chrysothamnus nauseosus*) and some greasewood (Sarcobatus vermiculatus), with a perennial grass understory. Usually occurs on fine-textured alkaline or saline soils. Much of this mapping unit occurs between and adjacent to alkali marsh and alkali meadow or upland areas such as desert sink shrub. This mapping type generally corresponds to Transmontane Alkali Meadow (Type 45310) in the Holland (1986) vegetation classification system and in the Green Book (LADWP and Inyo County, 1990). For the EIR/EIS, all areas mapped as alkali shrub meadow are considered uplands.

Desert sink scrub: Desert sink scrub is a low very open shrub mapping unit with scattered grasses and forbs. Shrub species include saltbush (*Atriplex* sp.), greasewood, iodine bush (*Allenrolfea occidentalis*), as well as some alkali sacaton, salt grass, and others. Soils range from poorly drained to more course textured and drier soils and generally high alkalinity or salinity. Some of this mapping unit has a fairly dense shrub overstory and sparse understory. Shrubs are locally dominant and generally include a mixture of greasewood (*Sarcobatus vermiculatus*) and shadscale (*Atriplex confertifolia*), with other saltbush species scattered throughout. The herbaceous understory consists of clumps of widely scattered individual perennial and annual grasses and succulent shrubs and forbs. This vegetation type appears to be strongly influenced by land management practices especially construction and maintenance of extensive water spreading facilities. This vegetation corresponds to Desert Sink Scrub (Type 36120) in the Holland (1986) vegetation classification system and in the Green Book (LADWP and Inyo County, 1990). For the EIR/EIS, all areas mapped as desert sink scrub are considered uplands.

Great Basin scrub: This unit is restricted to the coarse to moderately coarse textured soils located in the northeastern portion of the mapping area (Figure 7-3). Characteristic species of this low, open shrub community include shadscale (Atriplex confertifolia), A. canescens, A. polycarpa, Nevada ephedra (*Ephedra nevdensis*), Mojave dalea (*Psorothamnus arborescens* var. *minutifolius*), and cottonhorn (*Tetradymia axillaris*). Great basin scrub generally corresponds to Great Basin Mixed Scrub (Type 32199) in the Holland (1986) vegetation system. For the EIR/EIS, all areas mapped as Great Basin scrub are considered uplands.

Playa: Areas mapped as playa usually occurs in relatively low laying areas on poorly drained soils with high salinity and/or alkalinity. Alkali playa often has a surface salt crust and very sparse open vegetation cover. Playas generally lack drainage and often accumulate and hold water for short periods following summer rainstorms. Dominants are usually low, small-leaved shrubs with wide spacing between them and includes iodine bush (*Allenrolfea occidentalis*), salt grass (*Distichlis spicata ssp. Stricta*), shadscale (*Atriplex confertifolia*), Parry's saltbush (*A. parryi*), and greasewood (*Sarcobatus vermiculatus*). Playa generally corresponds to Alkali Playa Community (Type 46000) in the Holland (1986) vegetation system. For the EIR/EIS, all areas mapped as playa are considered uplands.

Alkali weed: This mapping unit represents a mixture of areas that have been disturbed and now support mostly non-native vegetation although some areas are dominated by native species. Vegetation cover and composition is variable and includes greasewood (*Sarcobatus vermiculatus*), shadscale (*Atriplex confertifolia*), fourwing saltbush (*Atriplex canescens*), common reed (*Phragmites australis*), alkali sacaton (*Sporobolus airoides*), saltgrass (*Distichlis spicata*), ashy wild rye (*Leymus cinereus*), bermudagrass (*Cynodon dactylon*), meadow fescue (*Festuca arundinacea*), wheatgrass (*Agropyron intermedium*), various clovers (*Trifolium* sp.), bird's foot trefoil (Lotus corniculatus) Russian thistle (*Salsola kali var. tenuifolia*), bassia (*Bassia hyssopifolia*), ragweed (*Ambrosia acanthicarpa*), white bursage (*Ambrosia dumosa*), ink weed (*Suaeda torreyana*), and annual sunflower (*Helianthus annuus*). Alkali weed is a one of several mapping types located in disturbed areas and is included in the modified Holland (1986) "Non-Native Vegetation and Miscellaneous Lands" (Type 10000) classification system and in the Green Book (LADWP and Inyo County, 1990). For the EIR/EIS, all areas mapped as alkali weed are considered uplands.

Levee: Vegetation on levees is not floristically diverse. Many of the roads in the Blackrock Area are located on top of levees and included into this mapping unit. Levees are included in the modified Holland (1986) "Non-Native Vegetation and Miscellaneous Lands" (Type 10000) classification system and in the Green Book (LADWP and Inyo County, 1990). For the EIR/EIS, all areas mapped as levee are considered uplands.

Ditch: Ditches are water conveyance structures with fairly diverse plant species richness and composition. Inactive ditches generally support introduced annuals and are similar to the "Alkali weed" type above. Active ditches have fairly high plant species richness and variable composition although only a small portions the ditch support vegetation cover. Active ditches support parsnip, cut-leaf water (*Berula erecta*), water-hemlock (*Cicuta douglasii*), water-parsnip, hemlock (*Sium suave*), fern, fern-like mosquito (*Azolla filiculoides*), and several species of cattail (*Typha* sp), duckweed (*Lemna* sp), water-weed (*Eloea* sp), rabbit-foot (*Polypogon* sp), pond weed (*Potamogeton* sp), flatsedge (*Cyperus* sp), sedge (*Carex* sp), spikerush (*Eleocharis* sp), bulrush (*Scirpus* sp), horsetail (*Equisetum* sp), and rush (*Juncus* sp). The ditch mapping unit is included in the modified Holland (1986) "Non-Native Vegetation and Miscellaneous Lands" (Type 10000) classification system and in the Green Book (LADWP and Inyo County, 1990). For the EIR/EIS, all areas mapped as ditch are considered uplands.

Table 7-1 provides a summary of the vegetation types within the potential flooding areas and the adjacent habitat zones within 300 feet of the areas of potential flooding in the four management units (the "adjacent habitat areas" defined above). The extent of the potential flooding area in each unit approximates the largest extent that could reasonably be flooded under LORP management. This maximum extent of flooding is limited by the constraints as provided in the MOU (i.e., requiring approximately 500 acres to be flooded during average and above average runoff years), the water supply, and topography.

The relative values of wetland habitats in the Blackrock area are based on habitat characteristics and how they relate to the needs of the MOU indicator species. Based on these standards, wetland and water habitats in the Blackrock area are listed in order of their value to the MOU indicator species: open water, alkali marsh, rush/sedge meadow, and alkali meadow.

TABLE 7-1
EXISTING VEGETATION TYPES IN THE MANAGEMENT UNITES OF THE BLACKROCK WATERFOWL HABITAT AREA

Vegetation Type	Potential Flooding Area (area within which 500 acres would be flooded at any one time) and Adjacent Habitat Zones (see Figures 7-1 to 7-3)									
	Drew		Waggoner		Winterton		Thibaut		Total	
	Flood	Adjacent Area	Flood	Adjacent Area	Flood	Adjacent Area	Flood	Adjacent Area	Flood	Adjacent Area
Open water*	0	0	10	2	11	1	14	7	35	10
Alkali marsh*	34	4	107	65	6	0	7	0	154	69
Rush/sedge meadow*	0	0	0	7	53	5	75	43	128	55
Alkali meadow*	14	0	6	12	6	3	19	14	45	29
Greasewood scrub	0	0	0	1	6	93	10	35	16	129
Saltbush scrub	33	101	12	91	10	15	14	34	69	241
Desert sink scrub	23	5	4	57	0	62	62	123	89	247
Great Basin scrub	0	2	0	1	0	0	0	0	0	3
Tamarisk scrub	0	0	0	0	0	0	0	3	0	3
Alkali weed	0	1	8	4	72	61	107	0	187	66
Abandoned agriculture*	131	6	0	0	0	0	0	0	131	6
Playa	0	0	0	0	0	1	45	68	45	69
Levee	5	1	0	1	0	0	0	4	5	2
Ditch	6	0	0	0	0	0	0	44	6	0
Total open water	0	0	10	2	11	1	14	7	35	10
Total (all vegetated wetlands)*	48	4	113	84	65	8	101	57	327	153
Total (all open waters and wetlands noted * above)	48	4	123	86	76	9	115	64	362	163
TOTAL ACREAGE OF ALL MAPPING UNITS =	246	120	147	241	164	241	353	375	910	977

* Abandoned agriculture in the Drew management unit was classified as alkali meadow in the previous version of Table 7-1 presented in the Draft EIR/EIS.
Source: Ecosystem Sciences.

The dominant vegetation type within the potential flooded area in the four management units of the Blackrock Waterfowl Habitat Area is alkali weed, which is a primarily dry vegetation type, accounting for about 20 percent of the total potential flooded area. This vegetation type is dominated by non-native vegetation, with some native species. The next most abundant vegetation types are alkali marsh, alkali meadow, and rush/sedge meadow, which are all wetland types. Together, these three types account for over 40 percent of the potential flooded area.

The Drew and Waggoner management units currently exhibit the highest relative percent of wetlands, accounting for more than two-thirds of the potential flooded area of these units (Table 7-1). The Thibaut and Winterton management units contain the lowest percentage of wetlands within the area of potential flooding (about 24 and 30 percent, respectively). Riparian scrub is scarce in the Blackrock Waterfowl Habitat Area, as the Owens River does not pass through the area, and the drainages in the area are primarily man-made ditches and channels with minimal woody riparian vegetation. Playa vegetation is only present in quantity in the Thibaut Management Unit, where there is a large expanse of poorly drained alkaline soils with a salt crust near the Thibaut Ponds. (Note: Thibaut Ponds are considered part of the off-river lakes and ponds of the LORP and are discussed in Section 8.0). The potential flooded area within each management unit of the Blackrock Waterfowl Habitat Area is shown on Figures 7-1 to 7-3.

7.1.2 Proposed Project

MOU Goals

The MOU states:

"Approximately 500 acres of the habitat area will be flooded at any given time in a year when the runoff to the Owens River watershed is forecasted to be average or above average. In years when the runoff is forecasted to be less than average, the water supply to the area will be reduced in general proportion to the forecasted runoff in the watershed. (The runoff forecast for each year will be DWP's runoff year forecast for the Owens River Basin, which is based upon the results of its annual April 1 snow survey of the watershed.) Even in the driest years, available water will be used in the most efficient manner to maintain the habitat. The Wildlife and Wetlands Management Plan element of the LORP Plan will recommend the water supply to be made available under various runoff conditions and will recommend how to best use the available water in dry years. The amount of acreage to be flooded in years when the runoff is forecasted to be less than average will be set by the Standing Committee based upon the recommendations of the Wildlife and Wetlands Management Plan and in consultation with DFG."

General Management Strategy

Specific objectives for the Blackrock Waterfowl Habitat Area include the following: (1) provide a reliable and dependable source of water and wetland habitat that will attract resident and migratory waterfowl and shorebirds and the other MOU indicator species for this project element; (2) maintain a ratio of open water wetlands to emergent wetlands so that emergent wetlands do not exceed 50 percent of the flooded area of any management unit; and (3) create and maintain diverse habitats while minimizing the use, extent and frequency of intervention and manipulation.

The Blackrock Waterfowl Habitat Area will be an artificial wetland that would not exist without a considerable investment of resources. Continued intervention and manipulation of water resources is necessary to properly maintain a variety of wetland habitats. Under the project, portions of the Blackrock Waterfowl Habitat Area will be periodically flooded to increase wetland productivity and diversity. In addition, the water supply to the flooded portions of the area will be controlled to mimic seasonal, annual, and longer-term hydrologic and wetland patterns. To achieve the management goals and acreage requirements in the MOU, the Blackrock Waterfowl Habitat Area will be managed in the four separate management units: Drew, Waggoner, Winterton, and Thibaut (Figure 2-15). The proposed management of the Blackrock Waterfowl Habitat Area is described in Section 2.5.

During average and above average runoff years, a total of approximately 500 acres would be flooded in one or more management units on an annual average basis (subject to seasonal fluctuations). In below average runoff years, less than 500 acres may be flooded. The exact amount would be determined by the Standing Committee each year in accordance with the MOU. The flooded wetlands in the different units would be in stages of development (wet or active phase) or in stages of decline (dry or inactive phase).

As part of project implementation, LADWP will establish a system of gaging stations in the four Blackrock management units, which will serve as indicators of the area of flooding in each of the units. During the first several years of project implementation and during the initiation of active cycles in the management units, it will be necessary to closely monitor water levels and manage water releases to develop water release schedules to meet the MOU's requirements. To document compliance with the MOU's requirements for this project element, LADWP and the County will monitor water levels at the gaging stations and flows at spillgates and diversions that supply the units. The information will be reported to agency managers so that the flooded area can be evaluated and releases can be adjusted, if necessary, to ensure compliance with the MOU.

Any wetland that is maintained in the same condition over many years will decline in productivity. Impounding water year after year generally results in lower productivity in terms of waterfowl and shorebird use. Periodic disturbance is essential for long-term productivity and wildlife use of managed marshes (Smith and Kadlec, 1986). Disturbances, such as drawdown and fire, are commonly used in managed wetlands to manipulate plant communities in favor of waterfowl use. The Blackrock Habitat Area will be managed similarly by cycling the management units through repeated wet and dry phases.

The management units would be subject to periodic cycles of wetting and drying so that one to three management units would be wholly or partially flooded at any given time. This phase of the management is considered "wet" or "active." Management units not actively managed or flooded are considered "dry" or "inactive." The purpose of the dry phase is to control excessive cattail and bulrush growth, which reduces the value of the wetlands to the MOU indicator species for the Blackrock area. In practice, depending on the quality of habitat provided by each of the management units (e.g., the extent of emergent vegetation that develops in a given unit), some units could remain flooded indefinitely, while others could be left dormant, as long as the MOU requirements are met.

Units will be converted from a wet to a dry phase when the area of emergent vegetation in an active unit reaches approximately 50 percent of the flooded area. LADWP and the County will track the extent of emergent vegetation within the active units using remote sensing imagery, or other appropriate tools, and the estimates of flooded areas calculated from the gaging stations measurements.

Water will be conveyed through the Blackrock Waterfowl Habitat Area through a series of existing channels (Figure 2-15). The water supplied to the area from the Aqueduct will be independent of the releases to the river. Very little water will leave the Blackrock Waterfowl Area and return to the river. Therefore, water losses to the Blackrock Area will mainly be consumptive losses. Various physical improvements will be necessary to facilitate water movement, including replacement or repair of small spillgates, and reshaping of old ditches. These improvements are described below for each management unit. An overview of the areas subject to flooding under the proposed plan is provided on Figure 2-15.

LADWP and the County may also use controlled burns as a tool to manage vegetation in the Blackrock Waterfowl Habitat Area to maintain desired ratios of open water and emergent vegetation. Controlled burns may be used on a limited basis and only if necessary. Effective water management may reduce the need to use this management tool.

Proposed Flooding Regime

The Blackrock Waterfowl Habitat Area will be implemented in two flooding cycles that will occur during the first 10 to 15 years of the project. At this time, it is intended that the two cycles would be repeated, unless it is determined through adaptive management that the goals of the MOU would be better achieved by modifying the flooding regime. In addition, water releases to the active Blackrock management units will be controlled to induce seasonal fluctuations in water levels.

Cycle 1

1. Existing water releases to the Waggoner Unit will be discontinued and the unit will begin a dry phase to remove the emergent vegetation in this unit. During cycle 1, the open water and vegetated wetland habitat in the Waggoner Unit will be reduced from 268 acres (including the areas of open water and vegetated wetlands in the “adjacent habitat” area. See Table 7-1) to 0 (Table 7-3, cycle 1). Controlled burning may be used if needed to reduce the amount of standing dead cattails and bulrushes.
2. Approximately 354 acres will be flooded in the Thibaut Unit.
3. Approximately 165 acres of the Winterton Unit will be flooded to achieve 500 acres of flooded area.

Cycle 2

When the flooded area of the Winterton Unit develops 50 percent cover of emergent vegetation, cycle 2 will be implemented:

1. Flooding will be discontinued or reduced in the Winterton Unit. The unit is expected to revert to the existing 76 acres of open water and vegetated wetland within the area that will be flooded during cycle 1.
2. Depending on conditions in the Thibaut and Winterton units, between 100 and 150 acres (estimated at 147 acres in Tables 7-2 and 7-3, cycle 2) will be flooded in the Waggoner unit to achieve 500 acres of flooded area.

3. The Thibaut Unit will continue to be flooded at 354 acres, unless the area of emergent vegetation reaches 50 percent of the flooded area, at which time the unit would be shifted to a dry phase and flooded areas in one or more of the other three units would be increased to meet the MOU requirement.

The Drew Unit will not be flooded at any time, unless it is needed to create additional flooded area to achieve the 500-acre MOU requirement or to better meet MOU habitat goals amongst the four management units.

It should be noted that, when a unit is placed in a dry cycle, the water supply will be discontinued and the flooded area in that unit will remain for some time thereafter, slowly disappearing over time. At the same time, the unit transitioning into a wet cycle will receive water to start the flooding process. Thus, during the transitional period it is expected that more than 500 acres will be flooded. In addition, as the water level recedes in a drying unit, the same benefits will occur in the unit as will be provided during the seasonal fluctuations in water levels in active management units described below.

The existing vegetation within the areas to be flooded during the first two cycles of flooding and drying is shown in Table 7-2.

Seasonal Water Level Fluctuations

The extent of the flooded areas in all of the management units will fluctuate with the water supply and on a seasonal basis. Seasonal water level fluctuations are an important attribute of managed wetlands. Water level changes provide substrate for aquatic invertebrates and macrophytes, both of which are essential food resources for many migrant and resident waterbirds, especially brooding young.

The MOU states "approximately 500 acres of the habitat area will be flooded at any given time in a year when the runoff to the Owens River watershed is forecasted to be average or above average." In less than average runoff years, the water supply to the Blackrock area may be reduced in general proportion to the forecasted runoff and will be set by the Standing Committee. LADWP plans to meet the above goal for the Blackrock habitat area by maintaining an average annual flooded acreage of approximately 500 acres during average or above average years, and by maintaining on an annual average basis the acreage set by the Standing Committee for years that have less than average runoff. Within the annual average, the total area flooded at any time during a runoff year will vary seasonally as described below.

TABLE 7-2
EXISTING VEGETATION TYPES IN THE AREAS WITHIN WHICH FLOODING IS PROPOSED DURING THE FIRST TWO CYCLES OF THE LORP

Mapping Types	Waggoner Area Active Cycle 2			Winterton Area Active Cycle 1			Thibaut Area Active Cycle 1 & Cycle 2			TOTAL Cycle 1 & Cycle 2		
	Cycle 2 Flood Area	Adjacent Habitat Zone	Total	Cycle 1 Flood Area	Adjacent Habitat Zone	Total	Cycle 1&2 Flood Area	Adjacent Habitat Zone	Total	Cycle 1&2 Flood Area	Adjacent Habitat Zone	Total
Open water*	10	2	12	11	1	12	14	7	21	36	10	46
Alkali marsh*	107	65	172	6	0	6	7	0	7	119	65	184
Rush/sedge meadow*	0	7	7	53	5	58	75	43	118	129	55	184
Alkali meadow*	6	12	18	6	3	9	19	14	33	30	30	60
Greasewood scrub	0	1	1	6	93	99	10	35	45	16	129	145
Saltbush scrub	12	91	103	10	15	25	14	34	48	37	140	177
Desert sink scrub	4	57	61	0	62	62	62	123	185	67	241	308
Great Basin scrub	0	1	1	0	0	0	0	0	0	0	1	1
Tamarisk scrub	0	0	0	0	0	0	0	3	3	0	3	3
Alkali weed	8	4	12	72	61	133	107	0	107	187	65	252
Playa	0	0	0	0	1	1	45	68	113	45	69	114
Levee	0	1	1	0	0	0	0	4	4	0	5	5
Ditch	0	0	0	0	0	0	0	44	44	0	44	44
Open water	10	2	12	11	1	12	14	7	21	36	10	46
All vegetated wetlands	113	84	197	65	8	73	101	57	158	278	151	428
TOTAL all open water and wetlands (* above)	123	86	209	76	9	85	115	64	180	314	161	474
TOTAL=	147	241	388	164	241	405	353	375	728	666	858	1,524

Source: Ecosystem Sciences. Note: Changes to Drew Unit are not proposed during the first two cycles.

TABLE 7-3
TEMPORARY AND LONG TERM WETLANDS CONVERSIONS (ACRES)
EXPECTED FROM FIRST TWO FLOODING AND DRYING CYCLES

(+/- Indicates Increase or Decrease in Area from Existing Conditions)

	Waggoner Unit (acres)	Winterton Unit (acres)	Thibaut Unit (acres)	Totals (acres)
Existing Conditions				
Open Water	12	12	28	52
Vegetated Wetland	197	73	158	428
Total =	209	85	186	480
Cycle 1 Conversions: Winterton and Thibaut Active, Waggoner Dry				
Temporary Conversions				
Open Water	0	165	354	519
Vegetated Wetland	0	0	0	0
Total =	0	165	354	519
Temporary Change from Existing Conditions				
Open Water	-12	153	326	467
Vegetated Wetland	-197	-73	-158	-428
Total =	-209	80	168	39
Cycle 2 Conversions: Waggoner and Thibaut Active, Winterton Dry				
Temporary Conversions				
Open Water	147	12	354	513
Vegetated Wetland	0	73	0	73
Total =	147	85	354	586
Temporary Change from Existing Conditions				
Open Water	135	0	326	461
Vegetated Wetland	-197	0	-158	-355
Total =	-62	0	168	106
Long Term Conversions (50 percent open water, 50 percent vegetated)				
Open Water	73	83	177	333
Vegetated Wetland	74	82	177	333
Total=	147	165	354	666
Net Change from Existing Conditions				
Open Water	61	71	149	281
Vegetated Wetland	-123	9	19	-95
Total =	-62	80	168	186

Source: Ecosystem Sciences. Note: Drew Unit is not included, as no change is currently proposed.
[1]Current conditions for Waggoner Unit include open water and vegetated wetland in “adjacent habitat” area summarized in Table 7-1 since the water supply to these wetlands will be discontinued during Cycle 1.
[2]Vegetated Wetland = alkali marsh, rush/sedge meadow, and alkali meadow
[3]Temporary change from existing conditions = temporary conditions – existing conditions
[4]Assumes that flooded areas will convert to 50 percent open water and 50 percent emergent vegetation. When the unit reaches this stage, the next cycle will be initiated.
[5]Net future change from existing conditions = “long-term conversions” - existing conditions

Seasonal fluctuations are expected to occur in active management units between winter and summer seasons, as evaporation and plant transpiration rates vary with changing temperatures. For example, in the winter, transpiration and evaporation rates are low and minimal fluctuations in water levels are anticipated, given a constant water supply. In the summer, as temperatures rise, evaporation and transpiration rates increase, which results in higher demands on the applied water. If the water supply is not increased to meet these greater demands, the flooded area will shrink. The resulting seasonal fluctuation creates wetlands around the perimeter of the flooded area that serve as productive feeding areas for the Blackrock area indicator species. Flooded acreage would not be reduced below 450 acres or exceed 550 acres in average and above average runoff years (unless runoff exceeds Aqueduct capacity). The fluctuations will not displace wildlife and will add to the habitat diversity available to the indicator species by promoting establishment of a variety of wetland vegetation types.

Beginning April 1 of each year, up to 550 acres will be flooded in the Blackrock area. Once the area has been flooded, water releases will be held steady and water levels will be allowed to recede as summer evaporation and plant transpiration increases. As a result, flooded acreage will be temporarily reduced to less than 500 acres (but no less than 450 acres at any one time). If the flooded area approaches 450 acres, water supplies will be increased, and over the course of each runoff year, water supplies to the Blackrock area will be managed to achieve an annual average of no less than 500 acres of flooding in average and above average runoff years.

Controlled Burning

Controlled burning may be used to reduce or eliminate the emergent vegetation during the dry phase, if needed. Water, time and land management will be the main tools for wetland management, and fire will only be used as a last resort if needed to achieve habitat goals. It is expected that proper wetland management should preclude the need to use fire for vegetation management. Burning and other active vegetation management will be done very prudently and carefully to avoid potential direct and indirect impacts to plants and wildlife in the vicinity. In general, the LORP will be managed to avoid the use of controlled burns. Once the management unit is dry, the condition of the residual emergent vegetation can be assessed. Depending on the extent and condition of the vegetation and surrounding habitat, a determination can be made as to whether fire should be used to remove some of the biomass. (See Technical Memorandum #18, Implementation of the Blackrock Waterfowl Habitat Area, for additional precautions for using fire in the management unit)

Construction of Berms, Ditches, and Spillgates

As described in Section 2.5.10, various construction works would occur throughout portions of the Blackrock Waterfowl Habitat Area to convey water and create new impoundments. Approximately 3.3 miles of earthen berms would be established by constructing new berms and repairing existing ones. Most of the existing berms are 10 to 30 feet wide. New berms would be 1 to 3 feet high and about 15 feet wide, sufficient for vehicle passage. About 1.7 miles of new or repaired ditches would be constructed. New ditches would be trapezoidal earthen channels about 3 feet deep and 5 feet wide and would also include an adjacent 15-foot wide maintenance road. New berms and ditches would be constructed using small earthmoving equipment and on-site material. Work would occur within a 50-foot corridor. Seven spillgates or culverts would be installed in new upland areas or replaced in existing irrigation ditches.

Proposed Actions by Management Unit

The proposed management for the four Blackrock Waterfowl Habitat Area management units during the first two flooding cycles is described below.

<u>*Waggoner Management Unit*</u>

The Waggoner Unit is south of the Blackrock Ditch and east of the Winterton Unit. The Waggoner Unit is presently used as a conveyance for several off-river lakes and ponds. Several improvements to water supply and control facilities will be completed prior to implementing the project, as described in Section 2.5.1.1. During the first 6 to 12 months of project implementation (the beginning of cycle 1), the water supply to the unit will be discontinued and the area of open water and vegetated wetland in the unit will be reduced from about 268 acres (including the "adjacent habitat" area) to 0 acres (Table 7-3). This reduction of the flooded area in this unit is proposed to promote the reduction of the biomass of emergent vegetation (i.e., cattail and bulrush) that has accumulated over the past 15 to 20 years. (It should be noted that the water supply to Goose Lake will be maintained while the Waggoner Unit is in a dry cycle. An alternate route will be used to convey water to Goose Lake, which requires the construction of a new ditch that will begin at the south end of Lower Twin Lake and connect with an existing ditch that flows into the north end of Goose Lake. Hence, water will by-pass the majority of the Waggoner Unit when it is in a dry phase.) Over a period of several years, the Waggoner Unit will dry out. Controlled burns may be conducted to help reduce residual vegetation and persistent cattails and bulrush. The condition of the emergent vegetation in the Waggoner Unit will determine the need for fire.

The second cycle of flooding will be initiated when emergent vegetation in the Winterton Unit reaches about 50 percent of the flooded area of that unit. At that time, the water supply to the Winterton Unit will be discontinued and approximately 147 acres will be flooded in the Waggoner Unit. The unit will continue to be flooded until the area of emergent vegetation reaches about 50 percent of the flooded area in the unit.

<u>*Winterton Management Unit*</u>

The Winterton Unit is south of the Blackrock Ditch and west of the Drew and Waggoner units. An artesian well at the upper end of the unit sustains approximately 76 acres of existing open water and vegetated wetlands within the area proposed for future flooding (Tables 7-2 and 7-3). The area supported by the artesian well will remain wet even during dry phases in the Winterton Unit. Upon implementation of the LORP (cycle 1), a total of about 165 acres (including the existing 76 acres of wetland) will be flooded in this unit, for a net gain of 89 acres (Tables 7-2 and 7-3). The 165 acres of flooded wetlands will be monitored to document overall species composition, cover, and structure. When the flooded area of the unit (165 acres) has developed approximately 50 percent cover of emergent vegetation, the water supply to the unit will be reduced or discontinued and flooding will be increased in the Waggoner Unit (cycle 2).

<u>*Thibaut Management Unit*</u>

The Thibaut management unit is south of the Blackrock Springs Fish Hatchery and east of the Aqueduct. The Thibaut Unit is adjacent to an area designated as "off-river lakes and ponds" known as Thibaut Ponds (see Section 8.0). Existing wetlands in the Thibaut Unit are comprised of open water, alkali marsh, rush/sedge meadow, and alkali meadow. Under the LORP, 354 acres will be flooded in this unit, for a net gain of 239 acres of open water and vegetated wetland (Table 7-3). This unit will be flooded during both cycle 1 and 2, unless it is determined through adaptive management that the unit should be converted to a dry phase.

Drew Management Unit

The Drew Unit will only be flooded if it is needed to meet project objectives, including MOU obligations to flood 500 acres or to meet habitat goals. The Drew Unit totals about 397 acres (Table 7-1). The area is adjacent to and north of the Blackrock Ditch. Many characteristics of Drew Slough are reminiscent of an old field, both from the standpoint of its flat terrain and existing vegetation composition and physiognomy. In fact, historically the area was periodically flooded and used as a field.

Dry Year Water Supply

The management strategies for different types of runoff years are summarized below:

- **Forecasted Average to Above Average Runoff Year (100 percent or more of the average annual runoff).** The MOU requires that approximately 500 acres of habitat be flooded at any given time under these runoff conditions. This acreage requirement would be met through flooding operations in one or more of the four management units at any one time to achieve an annual average of approximately 500 acres in average and above average runoff years (see above). The area of the existing off-river lakes and ponds, which are included in the "Off River Lakes and Ponds" feature of the LORP (see Section 2.6), is not included in the calculation of flooded acreage in the Blackrock area.

- **Forecasted Below Average Runoff Year (below 100 percent of average annual runoff).** The MOU states that water for the Blackrock Waterfowl Habitat Area will be reduced in general proportion to the reduction in the forecasted runoff. The amount of acreage to be flooded in years when the runoff is forecasted to be less than average will be set by the Standing Committee based on recommendations in the LORP Plan and in consultation with the CDFG. Under these conditions, the duration of the dry phase of a management unit then in a dry phase would be extended, and water supply to units then in a wet phase would be reduced. Hence, there would not be a rapid and substantial change in water conditions in these years. Instead, there would be small incremental changes in the amount of water in the area, reflecting the general reduction in runoff throughout the valley.

Reductions in the planned flooding of the Blackrock Waterfowl Habitat Area during dry years could potentially reduce the overall extent of expected additional open water and vegetated wetlands, but are not expected to reduce the extent of flooded wetlands to a greater degree than would occur under current conditions. Currently, LADWP typically reduces diversions to the Blackrock area for stockwater and wildlife habitat during below average runoff years.

7.1.3 Potential Impacts

7.1.3.1 Wetland Management

During the first year of the active or flooded phase, the newly flooded areas would consist of mostly open water. Over time, emergent wetland plants are expected to colonize the margins of the newly flooded areas until emergent wetlands (i.e., cattail and bulrush marsh) would occur throughout much of the flooded areas. When the proportion of open water to emergent wetlands reaches approximately 50 percent, water will be removed from these areas for a dry cycle, and other wetland plants and annuals are expected to colonize the newly exposed substrate.

It is anticipated that vegetation within about 300 feet of the edge of flooded areas, or "adjacent habitat areas," would receive greater soil moisture from elevated groundwater and seepage, resulting in higher plant productivity and potential colonization by wetland plants. These areas are expected to develop into a mosaic of wet meadows, emergent vegetation, mesic meadows, and seasonally flooded areas. The degree of influence that flooding will have on these areas will depend on soil types and water holding capacities of adjacent area soils, as well as seed dispersal or vegetative reproduction of wetland plants. The higher plant growth and vegetative density in these adjacent areas will provide high quality habitat for nesting waterfowl.

In the short term, existing vegetated wetlands would be converted to open water when a management unit is flooded. Eventually emergent vegetation would develop in part of the open water, although the timing of the changes and the types of vegetation that will be developed cannot be predicted with accuracy. Simultaneously, some cattails and bulrush wetland areas will dry out and are expected to convert to other wetland or upland types. For example, in cycle 1, the Winterton unit will initially gain 154 acres of open water as it is flooded, converting 65 acres of vegetated wetlands and 89 acres of upland habitat types (11 acres is currently flooded), and the Thibaut unit will gain 340 acres of open water, converting 101 acres of vegetated wetlands and 239 acres of upland habitats (Tables 7-2 and 7-3). At the same time, the Waggoner unit will be dried out, which will result in the short-term loss of 18 acres of open water and 250 acres of vegetated wetland (including the "adjacent habitat" area). Over the long term, it is expected that the wetting and drying cycles will approximately mimic a natural wetland, with about 50 percent of the flooded areas remaining open water and 50 percent remaining vegetated wetlands (Table 7-3). This target ratio will create greater diversity in wetland habitats and attract more habitat indicator species to management units in the wet cycle.

While the MOU calls for of 500 acres of flooded area (with some reductions in below-average runoff years, as determined by the Standing Committee), the types and extent of vegetated wetlands that will develop over the long term cannot be estimated precisely. Actual conditions may vary from this estimate, and some changes may be needed in the wetting and drying scheme to encourage high-value wetlands and discourage either monocultures of cattails and bulrushes or extensive areas of open water.

The vegetation types within the areas proposed to be flooded during the first two cycles of implementation of the LORP are presented in Table 7-2. Approximately 314 acres of wetlands (nearly 90 percent vegetated wetlands) are currently present in the three Blackrock Waterfowl Habitat Area management units where the proposed flooding would occur during the first two cycles of project implementation (see Table 7-2). These wetlands do not include off-river lakes such as Lower Twin Lake, Goose Lake, or Thibaut Ponds, which are discussed in Section 8.0.

Seasonal flooding is expected to provide high quality feeding and cover habitat between open water and the upland shoreline.

7.1.3.2 Habitat Conversion

Most of the created and enhanced flooded wetlands will be managed as semi-permanent wetlands that are flooded for several years then dried to remove emergent vegetation. When full, these waterbodies would have depths ranging from a few inches to several feet. These wetlands will primarily consist of seasonal ponded water and cattail/bulrush marsh. The lands adjacent to the flooded areas will be hydrologically influenced by the flooding.

During the first year of the active phase, the newly flooded areas would consist of mostly open water. Over time, emergent wetland plants would colonize the margins of the newly flooded areas until emergent wetlands (i.e., cattail and bulrush marsh) would occur throughout much of the flooded areas. As the water is removed from these areas for a dry cycle, other wetland plants and annuals would colonize the newly exposed substrate. These areas are expected to develop into a mosaic of wet meadows, emergent vegetation, mesic meadows, and seasonally flooded areas. The degree of influence that flooding will have on these areas will depend on soil types and water holding capacities of adjacent area soils. The higher plant growth and vegetative density in these adjacent areas will provide high quality habitat for nesting waterfowl.

During the course of the flooding and drying cycles, wetlands and flooded areas will increase in some management units and decrease in others compared to current conditions. With the exception of the Waggoner Unit (which is currently flooded), during the wet cycle, when water is being supplied for flooding, the acreage of vegetated wetlands in a management unit would be greater than under current conditions. The increased water supply will result in the conversion of uplands to wetlands and from drier wetlands to wetter types. New vegetated wetlands will be established within and adjacent to the flooded areas. During dry cycles when water is removed from a unit, the amount of vegetated wetlands would be reduced compared to current conditions.

Flooding of existing upland and wetland habitats in the Blackrock Waterfowl Habitat Area would result in the direct conversion of one habitat to another, and would primarily affect wetlands that occur in the low-lying areas that can be readily inundated. The project would result in the conversions of non-emergent wetlands (such as alkali meadow and rush/sedge meadow) temporarily to open water, and eventually to a combination of open water and emergent wetlands (alkali marsh). Although the exact mix of future wetlands types cannot be precisely predicted, the long growing season, shallow flooding and mild winters will favor development of more emergent wetlands. The most common habitats that would be created due to the proposed flooding regime are expected to be open water and alkali marsh. Some areas of upland vegetation, including greasewood scrub and desert sink scrub, would be converted to wetlands. Existing wetland types in the management units would also be converted to other types during flooding, such as conversion of alkali meadow to alkali marsh or open water habitat. The project calls for flooding 500 acres on an annual average basis, which will result in some temporary conversions of existing vegetated wetland to open water. Over the long term (i.e., as a result of the implementation of cycle 1 and cycle 2) throughout the Blackrock Waterfowl Habitat Area, 43 acres of existing open water and 416 acres of vegetated wetland are expected to be converted to about 333 acres each of open water and vegetated wetland, which will result in a net gain of 290 acres of open water and a net loss of 83 acres of vegetated wetland (see Table 7-3). This impact is considered neutral because the mixture of open water and wetlands will vary greatly from year to year, and because there will continue to be an abundance of wetlands in the Blackrock area even under the proposed flooding regime.

It should be noted that the creation of various habitats over time in the Blackrock area would be monitored, and that LADWP has the ability to modify flooding regimes and resultant habitat types through adaptive management in the event that the observed habitat conversions are not achieving the goals of the MOU.

The potential conversion of vegetation types within the four management units to be utilized during the first two cycles of the LORP are described below.

Waggoner Management Unit

Flooding will be discontinued in the Waggoner Unit to reduce the amount of living and residual emergent vegetation that now covers approximately 205 acres (alkali marsh mapping type in the flooded and adjacent area; see Table 7-1). The temporary change will result in a loss of 18 acres of open water and 250 acres of vegetated wetland, including the "adjacent habitat" area (Tables 7-1 and 7-3). Rewatering in the second cycle will initially add 147 acres of open water, which are expected to eventually convert to about half vegetated wetland, for a net long-term gain of about 55 acres (73 – 18) of open water and a net loss of about 176 acres of vegetated wetland (250 – 74).

Winterton Management Unit

In this unit, approximately 165 acres will be flooded during the first cycle of the project, resulting in a temporary loss of 65 acres of vegetated wetland and a temporary gain of 154 acres of open water (Tables 7-2 and 7-3). This is eventually expected to convert to about 83 acres each of open water and vegetated wetlands, suggesting a net long-term gain of about 72 acres of open water, and 17 acres of vegetated wetland during the first and second cycles (Table 7-3). Along approximately 11 miles of shoreline, a variety of vegetated and open water wetlands are expected to develop over a period of years. Food availability and valuable cover habitat is expected to be abundant along most of the shoreline and island edge habitats. As the area continues to develop, a variety of shallow emergent wetlands and, to a lesser extent, deep-water emergent wetlands will develop and eventually cover about half of the management unit.

Thibaut Management Unit

About 354 acres of the Thibaut Unit would be flooded during the first two cycles. Flooding would temporarily convert 101 acres of vegetated wetland to open water, and add 340 acres of open water to the unit. Over the long term, it is expected that the flooded acres would convert to 177 acres each of open water and vegetated wetland, resulting in a net gain of 163 acres of open water and 76 acres of vegetated wetland. The flooded area is expected to eventually develop a mosaic of shallow flooded wetlands and emergent and herbaceous wetlands. Some of these shallow basins will evolve into semi-permanent wetlands and some will be seasonal open water ponds and lakes.

The extended duration and frequency of flooding in this unit is expected to result in an increase in the extent and type of herbaceous wetlands such as rush/sedge meadows, alkali meadows, and several ephemeral or seasonal wetlands dominated by annuals and facultative wetland species. There are a series of large playa sink areas extending the length of the Thibaut Unit which currently maintain open water in the spring and early summer. These areas appear to be less susceptible to encroachment by homogeneous stands of cattails and tules, which may be due in part to an old spring complex that may have formed a calcium hardpan layer below the surface of fine sediments. Large playa sink areas with open water are uncommon in the Owens Valley. Wildlife use of the area is expected to increase with the increased availability of water and the conversion of upland types to wetlands and mesic meadows. The amount of shoreline (water to upland interface) will be at least 29 miles. This extensive ecotone should provide an abundant array of feeding and cover opportunities for resident and migratory birds and resident mammals.

Drew Management Unit

Because the current proposal does not include active management of the Drew Unit, no changes and therefore no impacts are expected. This could change in the future if monitoring information suggests that habitat goals would be better achieved if Drew Unit were flooded.

7.1.3.3 Construction of Berms, Ditches, and Spillgates

All berms and ditches would be constructed or repaired in upland habitats. It is estimated that construction work would disturb about 20 acres for berms and 11 acres for ditches, consisting primarily of desert sink scrub. The berms would be allowed to revegetate naturally, although the tops of the berms would be used for vehicular access. Ditches would be used for conveying water, and as such, would be converted to open water or vegetated wetland habitat. The construction-related disturbance zone around the margins of berms and ditches would be allowed to revegetate naturally. The success of natural revegetation of new berms and construction related disturbance zones is uncertain. There is potential for invasion of non-native exotics in dry areas, and saltcedar in moist areas. Hence, habitat disturbance related to the construction of new berms and ditches in the Blackrock Waterfowl Habitat Area **is considered a significant, but mitigable impact (Class II).** This impact can be mitigated by post-construction seeding with native plants and weeding to prevent an infestation of exotics (see Mitigation Measure B-1).

The repair of existing spillgates and the installation of new spillgates would temporarily disturb upland and wetland habitats in man-made ditches. **This impact is considered adverse, but not significant (Class III)** because the impacts would be very small in area (less than 3,000 square feet at any single site), and temporary. Wetlands in the affected ditches would recover quickly after construction. No mitigation is considered necessary for this impact.

7.1.3.4 Potential Impacts—Noxious Plant Species And Saltcedar

Supplying water to the Blackrock area could potentially increase the distribution and abundance of perennial pepperweed and other noxious plants, and stimulate the growth of saltcedar, a non-native invasive plant that is spreading rapidly in the Owens Valley. The potential for the growth of saltcedar and other noxious plants is fully described in Section 10.4.

7.1.3.5 Potential Impacts—Mosquitoes

The LORP will results in new open water and marsh habitats in the Blackrock area. These new habitats would provide more opportunities for mosquitoes to breed, which could result in increased nuisance to communities and residents near these areas, and to the people engaged in outdoor recreation. The potential for the increase in mosquitoes is fully described in Section 10.3.

7.1.4 Mitigation Measures

B-1 Temporarily disturbed upland habitats in the Blackrock Waterfowl Habitat Area shall be seeded with native or naturalized grasses and shrubs common to the valley, as available, after construction of berms and ditches to facilitate restoration of vegetative cover and species compatible with the surrounding vegetation. The colonization by non-native weeds shall be inhibited by weed control for three years after construction.

7.2 FISH AND WILDLIFE

7.2.1 Existing Conditions

The Blackrock Waterfowl Habitat Area contains a diverse mixture of upland and riparian habitats, vegetated wetlands, playa, and lakes. As such, it supports a variety of wildlife, including resident and migratory birds. Migratory and over-wintering waterfowl and shorebirds use portions of the Blackrock Habitat Area. Non-native game fish occur in the lakes and ponds.

7.2.2 Potential Impacts

The proposed flooding of portions of the Blackrock Waterfowl Habitat Area would increase wetland productivity by periodic wetting and drying, which will promote nutrient cycling. In addition, these cycles would create greater diversity in wetland types and vegetative structure compared to current wetlands. Many of the current wetlands in the Blackrock area consist of dense, impenetrable cattail/bulrush marsh habitats that support only a small group of avian species. The drying of wetlands would provide new forage for migratory birds that is not present in the Blackrock area. Finally, the LORP would increase the amount of open water wetlands in the Blackrock area. These actions would increase opportunities for resident, migratory, and overwintering birds (primarily shorebirds and waterfowl). The establishment of a permanent waterfowl area that is intensively managed for the benefit of waterfowl and other water-associated birds along the Pacific Flyway **is considered a beneficial impact to wildlife (Class IV).**

No adverse direct or indirect impacts to wildlife species are anticipated with the proposed management actions at the Blackrock Waterfowl Habitat Area because no high quality wildlife habitat or area supporting sensitive wildlife species would be displaced by the proposed flooding regime.

The proposed management actions in the Blackrock area do not include creation of habitat for native or game fish, introduction of such species, or any plans to manage fish species in the event that they colonize the area.

7.2.3 Mitigation Measures

No adverse impacts to wildlife are anticipated. Hence, no mitigation is required.

7.3 CULTURAL RESOURCES

A description of the two cultural resources inventories conducted for the EIR/EIS is provided in Section 4.8.3. Field surveys were performed in the Blackrock area as part of the first cultural resources inventory conducted in 2000 (Far Western, 2001) to search for evidence of cultural resources within and near the sites for the proposed construction and modification of berms, ditches, and spillgates.

As described in Table 4-14B (Section 4.8.3.2), the Area of Potential Effect (APE, field survey area) for the Blackrock area was defined as the 50-foot wide corridor for 3.75 miles of new berms, spillgates and other flow control structures to be newly constructed or modified, and 1.5 miles of new or enlarged ditches. Precise locational information is not provided in the EIR/EIS, as it is considered sensitive and confidential (see Section 4.8.1 for additional information on confidentiality of cultural resources technical information).

7.3.1 Prehistoric Sites

Two prehistoric sites, a large flaked and ground stone scatter and an extensive artifact scatter, were identified during the cultural resources field survey in Blackrock. Existing disturbance from nearby dirt roads, road construction, and recreational activities appears to be minimal. These two sites maintain a moderate amount of structural integrity and manifest relatively complex surface assemblages, and remain unevaluated with respect to eligibility for the National Register of Historic Places (NRHP).

One of the proposed ditches will be located in proximity of these sites. Several active dirt roads also border these sites, and will be used during project construction. **Disturbance of these sites would be considered a potentially significant, but mitigable impact (Class II).** This potential impact will be avoided through the placement of temporary protective fences, if construction work occurs near the site, as described in Mitigation Measure B-2.

7.3.2 Historic Resources

Four historic structures, all located on LADWP lands, were documented in the Blackrock Waterfowl Habitat Area, as described below. None are considered significant resources eligible for listing on the NRHP. **There is potential for disturbance to one or more of these features, which would represent an adverse, but not significant impact (Class III)** because none of the resources is considered significant, nor eligible for inclusion on the NRHP, as explained below.

Blackrock/Drew Slough

LADWP constructed the Blackrock/Drew Slough System in 1950, as a part of their effort to control the flow of water in the Drew Slough area. The main Blackrock spillgate replaced an earlier construction apparently built during World War II that allowed water into the natural sloughs and channels east of the aqueduct in that area. The spillgates, ditches, berms, and control structures in the area were constructed to keep water from flowing to the north of the Drew Slough area. The water thus controlled was used to promote stock watering and recreation and helped supply several small ponds containing a warm water fishery.

While the system performs an important function in providing water to the Drew Slough area, it is comprised of structures of common construction. Its spillgate and control structures are of a design commonly found in the Owens Valley, although the spillgate is comparatively large, located as it is on the side of the Los Angeles Aqueduct. It was designed by an employee of LADWP. The control structure on the system is currently abandoned and unusable. The ditch has been cleaned on a regular basis to remove tules, and thus does not retain its original shape or configuration.

The system does not appear to meet the criteria for listing in the NRHP. While it is a feature of the Los Angeles Aqueduct system, it is not an original part, having been built only 50 years ago. It is not associated with the story of Los Angeles' use of Owens River water and thus does not appear to be eligible under Criterion A, which includes events that "have made a significant contribution to the broad patterns of our history." Its designer was not associated with the original design of the aqueduct and thus the system does not appear to be eligible under Criterion B (association with persons significant to our past). Finally, it does not appear to be eligible under Criterion C (a unique or special design, or an engineering feat, or innovative in terms of its construction).

Structure 98

The culvert at site 98 (Figure 2-15) was constructed to allow for the passage of water from one side of the road and berm to the other. The date of its installation is unknown, but the fact that it is constructed from a riveted rather than corrugated metal pipe suggests that it may have been installed some time ago; however, it is also possible that an older pipe was simply reused at a new location. Culverts are common on roads, and there is nothing about this structure that makes it significant. Little is known about it. While it serves an important function, it has neither associations with events or persons significant in our past (National Register Criteria A and B), nor does it contain distinctive characteristics of a type, period, or method of construction (Criterion C). It does not, therefore, appear to meet the criteria for listing in the NRHP.

Structure 99

The flow control structure at Site 99 (Figure 2-15) was constructed to manage the passage of water through a water-spreading ditch in the area east of the Los Angeles Aqueduct. It was apparently built in the early 1950s. The exact date of its installation is unknown, but the materials used (milled redwood lumber, wire nails, etc.) appear to be consonant with that period of construction; it also does not appear on early USGS maps of the area dating from the early 20th century through 1951. It is currently unusable and has not been operated for several years.

Flow control structures are common on ditches in the Owens Valley and elsewhere in California, and there is nothing about this structure that suggests that it might be significant. Little is known about it. While it once served an important function, it has neither associations with events nor persons significant in our past (National Register Criteria A and B), nor does it contain distinctive characteristics of a type, period, or method of construction (Criterion C). It does not, therefore, appear to meet the criteria for listing in the NRHP.

Structure 105

Like the control structure at Site 99, the gate/bridge at Site 105 (Figure 2-15) was constructed to manage the passage of water through a water-spreading ditch in the area east of the Los Angeles Aqueduct. It was apparently built in the early 1950s. The exact date of its installation is unknown, but the materials used (milled redwood lumber, wire nails, etc.) appear to be consonant with that period of construction; it also does not appear on early USGS maps of the area dating from the early 20th century through 1951. It is currently a functioning structure on the Waggoner Ditch.

As noted above, flow control structures are common on ditches in the Owens Valley and elsewhere in California, and there is nothing about this structure that suggests that it might be significant. Little is known about it. It continues to serve an important function, but it has neither associations with events nor persons significant in our past (National Register Criteria A and B), nor does it contain distinctive characteristics of a type, period, or method of construction (Criterion C). It does not, therefore, appear to meet the criteria for listing in the NRHP.

7.3.3 Mitigation Measures

B-2 LADWP shall implement the following management actions to avoid impacts on cultural resources during construction of the proposed ditch to be located in proximity of the two known prehistoric sites in the Blackrock area:

- LADWP shall notify representatives of regional Native American Tribes prior to beginning construction of the proposed ditch to be located in proximity of the two known prehistoric sites. Interested Tribal representatives shall be invited to be present (on a volunteer basis) during the construction of the ditch.
- LADWP shall work with a qualified archaeologist to locate the proposed ditch to avoid the two known prehistoric sites identified in the field survey by Far Western (2001).
- Temporary protective fencing shall be placed between the known prehistoric sites and proposed ditch areas if construction work will occur within 100 feet of these sites. A qualified archaeologist shall supervise the placement of temporary protective fencing.
- All vehicles shall remain on the road in the vicinity of the known prehistoric sites.
- If construction must occur within 25 feet of these sites, an archaeologist shall monitor construction activities.

7.4 AIR QUALITY

7.4.1 Existing Conditions

Under the federal Clean Air Act, the US Environmental Protection Agency (EPA) has set ambient air quality standards to protect public health and welfare. Air quality standards have been set for the following pollutants: particulate matter less than 10 microns in diameter (PM10), carbon monoxide (CO), nitrogen oxides (NOx), sulfur dioxide, and lead. The State of California has also set air quality standard for these pollutants, which are generally more stringent than federal standards.

The southern Owens Valley occurs in the Great Basin Unified Air Pollution Control District (GBUAPCD). Owens Lake has been designated by the State and EPA as a non-attainment area for the state and federal 24-hour average PM10 standards. Wind-blown dust from the dry bed of Owens Lake is the primary cause of the PM10 violations. The area has been designated as attainment or unclassified for all other ambient air quality standards. Air quality is considered excellent for all criteria pollutants with the exception of PM10. Large industrial sources are absent from Owens Valley. The major sources of criteria pollutants, other than wind-blown dust, are woodstoves, fireplaces, vehicle tailpipe emissions, fugitive dust from travel on unpaved roads, prescribed burning, and gravel mining.

7.4.2 Potential Impacts

The water conveyance improvements at the Blackrock Waterfowl Habitat Area include installation of about 3.3 miles of new berms and 1.7 miles of new or rehabilitated ditches. Work on berms and ditches would require a front end loader, backhoe, or smaller tracked dozer. Only limited material hauling would occur, as most of the material would remain on site. Construction of new berms and ditches is expected to require about 6 months. A daily crew of about five people would typically be involved with 3 or 4 light trucks at the construction site.

These activities would generate emissions of pollutants. In addition, fugitive dust could be generated from travel on unpaved roads and from certain earth-disturbing activities. These emissions would contribute to the degradation of air quality conditions in the Owens Valley. As noted above, the region exhibits very good air quality conditions except for PM10. Construction work at the Blackrock Waterfowl Habitat Area would cause negligible emissions because the work would be performed with small equipment (e.g., auger truck or backhoe), require only several days to weeks, and involve few worker trips (two to three vehicles per day).

An estimate of the combined daily and total emissions from the above activities is provided below in Table 7-4. Note that these activities may or may not occur concurrently, and that the activities are located at great distances from one another. Hence, the daily estimates provided below are considered worst case.

Emissions from construction activities are considered an adverse, but not significant impact (Class III). They would contribute to degradation of air quality conditions in the valley, but are unlikely to cause air quality violations. The primary impact is emissions of fugitive dust due to the PM10 non-attainment status for the region. Fugitive dust emissions can be reduced by the application of dust control measures (see Mitigation Measure AQ-1).

Emissions associated with routine maintenance of the Blackrock Waterfowl Habitat Area are expected to be negligible, and similar to emissions associated with current LADWP operations in the area (e.g., inspection of fences, water facilities, etc) As such, no adverse air quality impacts are anticipated to result from operations in the Blackrock Waterfowl Habitat Area.

Emissions from occasional controlled burns would be considered an adverse, but not significant impact (Class III). The burns would contribute to degradation of air quality conditions in the valley, but are unlikely to cause air quality violations because they would be implemented under a permit from the Great Basin Unified Air Pollution Control District, which only allows burns to occur when meteorological conditions will ensure sufficient dispersion to avoid violations.

TABLE 7-4
ESTIMATED CONSTRUCTION EMISSIONS FOR THE BLACKROCK WATERFOWL HABITAT AREA

Activity	Carbon Monoxide	Reactive Organic Gases (hydrocarbons)	Nitrogen Oxides	Particulate Matter (PM10)
Maximum Daily Construction Emissions (lbs per day)				
Blackrock berms and ditches	5.5	7.5	20	4.5
Total Construction Emissions (lbs)				
Blackrock berms and ditches	400	600	1,400	<200

* See Section 5.2 for a description of emissions associated with all LORP construction activities, including installation of the gate at the River Intake, initial channel clearing, and construction of the pump station and power line. Emissions calculated by URS Corporation for the EIR/EIS.

7.4.3 Mitigation Measures

AQ-1 (See Section 5.3.3)

8.0 OFF RIVER LAKES AND PONDS

8.1 BACKGROUND INFORMATION

As described in Section 2.6, LADWP will maintain the existing water supply to the following lakes: Upper and Lower Twin Lakes, Goose Lake, and Billy Lake. The management objectives for the off-river lakes and ponds are as follows:

- Upper and Lower Twin Lakes: Existing staff gauges will be maintained between 1.5 and 3.0, which represents maintenance of existing conditions.

- Goose Lake: Goose Lake must be kept full in order to spill over and provide a continuous flow to the river. Therefore, Goose Lake will always be full. Typical staff gage readings reflecting Goose Lake at full capacity are between 1.5 and 3.0.

- Billy Lake: Billy Lake will remain full in order to maintain a continuous spill to the river. A staff gage was never placed in Billy Lake because it has always been operated at a spillover level.

- Thibaut Ponds: One or more gaging stations will be installed to monitor pond levels. The Thibaut Ponds, which are delineated on Figure 2-15, will be kept full.

Water from the Aqueduct would be provided through the existing network of spillgates and ditches. Lake levels will be maintained by either maintaining existing flows, or by controlling lake levels at the outlet weirs. Flows to all but Upper Twin Lake and Thibaut Ponds will be part of the riverine-riparian enhancement program in which corridors will be established for non-native game fish between the river and off-river lakes and ponds.

8.2 FISH AND WILDLIFE

Several off-river lakes and ponds are connected by canals that have been enhanced to improve recreational opportunities in the area. Many of these lie along the earthquake fault running through the valley. It has been hypothesized that off-channel lakes and ponds were historically spring- fed and not connected to the river. Many decades ago, warmwater game fish were introduced to these waters to provide recreational angling. During some years, these lakes and ponds would dry up and eliminate the game fishery until they were restocked by CDFG (P. Pister, pers. comm. 2000). Over the last few decades, LADWP has provided water from the Aqueduct to these lakes and ponds to maintain the fishery.

Introduced fish planted by CDFG have now colonized the connecting corridors between lakes and ponds. Fish are also introduced into the area from the Aqueduct via the spillgates. There are no known populations of native fish in the off-river lakes and ponds (GANDA, 2000a; D. Sadder, pers. comm. 2000).

The off-river lakes and ponds provide habitat for introduced warmwater fish, especially largemouth bass, bluegill, brown bullhead, carp and channel catfish. Brown trout and smallmouth bass inhabit some of the corridor ditches, which provide conditions more typical of a stream environment. These latter species are not as common in the lake and pond environments. Information on the fish assemblage in the off-channel lakes and ponds has been gathered from CDFG (1959, 1967); Ecosystem Sciences (1999); Lone Pine Warmwater Fishing Association (2000); and GANDA (2000b). Six fish species can be positively identified as inhabiting the off-channel lakes and ponds (Table 8-1).

Information on fish distribution and relative abundance for select off-channel lakes and ponds was obtained from the Lone Pine Warmwater Fishing Association (2000). According to this information, largemouth bass are in high abundance at Upper and Lower Twin Lakes, Blackrock Ditch, Coyote-Grass Lake, Goose Lake and Billy Lake. Smallmouth bass are found in low abundance in both Upper and Lower Twin Lakes. Bluegill are in high abundance in Upper and Lower Twin Lakes, Goose Lake and Billy Lake and in moderate abundance in Long Pond. Catfish are in moderate abundance at Upper and Lower Twin lakes, Goose Lake and Billy Lake and are in low abundance in Coyote-Grass Lake and Long Pond. Brown trout are present in low abundance in Blackrock Ditch. Mosquitofish are in moderate abundance throughout the off-channel lakes and ponds surveyed by fishermen.

Off-channel lakes and ponds are characterized by dense stands of tules along the perimeters, with depths of 6 to 12 feet. Saltcedar is present at several sites. Although summer water temperatures are within the range for warmwater fishes, winter conditions are relatively cold for warmwater fish.

TABLE 8-1
FISH IN OFF-RIVER LAKES AND PONDS

	Large-mouth Bass	Small-mouth Bass	Bluegill	Catfish	Brown Trout	Carp	Mosquitofish
Upper Twin Lake	H	L	H	M	N	H	M
Lower Twin Lake	H	L	H	M	N	H	M
Coyote-Grass Lake	H	N	L	L	N	H	M
Goose Lake	H	N	H	M	N	H	M
Long Pond	M	N	M	L	N	H	M
Billy Lake	H	N	H	M	N	H	M
Blackrock Ditch	H	H	H	M	L	N	M
Locust Ditch	M	H	H	L	L	H	M

N = Species not present, L = Species in low abundance, M = Species in moderate abundance, H = Species in high abundance. Source: GANDA (2000b) based on data from Ecosystem Sciences, local anglers, CDFG, and field observations in 2000.

Local birders and ornithologists have noted that special status bird species that breed in the Off-River Lakes and Ponds area include least bittern (state Species of Special Concern; known to breed at Billy Lake) and northern harrier (state Species of Special Concern; known to breed at nearby Cartago Marsh) (Appendix J, Letter No. 16).

8.3 WATER QUALITY

The water quality of three off-river lakes was characterized by Inyo County Water Department in a study by Jackson (1997). These lakes include South Twin Lake, Goose Lake, and Billy Lake. Five water quality parameters were measured monthly at one or three foot increments to the bottom of each lake – dissolved oxygen, turbidity, electrical conductivity, pH, and temperature. Key results are summarized below.

Dissolved Oxygen

For all three lakes, dissolved oxygen levels decrease slightly with depth, and summer concentrations (about five mg/l) were lower than winter concentrations (seven to eight mg/l). Dissolved oxygen levels are suitable for aquatic life.

Turbidity

In South Twin Lakes and Goose Lake, turbidity decreases slightly with depth in the summer, and increases with depth in the winter. Turbidity is slightly higher in the summer than in the winter. No pattern with depth was discernible at Billy Lake.

pH

The pH values for South Twin Lake ranged between 7.5 and 8.5, with no depth-associated pattern associated with water depth. Goose Lake exhibited a wider range of pH – 7.5 to 10.0, while the range of pH in Billy Lake was 6.6 to 9.0. There was no consistent pattern in pH with season for the three lakes.

Electrical Conductivity

Electrical conductivity (EC) varied with the input from the spillgates feeding the lakes. EC values were converted to estimates of total dissolved solids (TDS) in the study. Low TDS values at South Twin and Goose Lake were around 200 mg/l when water was provided from Blackrock Ditch, and around 300 mg/l during periods of evaporation. Billy Lake exhibited a lower TDS value of 95 mg/l with a similar maximum value.

Temperature

Temperatures in the summer and winter at all three lakes were about 77 degrees F and 45 degrees F, respectively. All three lakes showed a general decrease in temperature with depth, except during mixing periods. South Twin Lake is mixed throughout the year due to wind; hence, the temperature profile varied considerably. Goose Lake is thermally stratified most of the year, except for windy periods in the fall and spring. When stratified, temperature decreased with depth. Billy Lake was thermally mixed most of the time, with little evidence of stratification. In general, temperatures are at the lower range for a warmwater fishery (GANDA, 2000b).

8.4 POTENTIAL IMPACTS

The proposed flows to the off-river lakes and ponds would not result in any adverse hydrologic conditions at the water bodies because the current water levels would be maintained. The lake surface areas would not increase or decrease, and the existing shoreline conditions would be maintained. Hence, the existing angling access points to the lakes and shoreline fishing spots would not be affected.

Continued maintenance of the water in these lakes under the LORP will not alter the increasing problem of cattail and bulrush marsh around the perimeter of the lakes. The increasing abundance of the marsh vegetation could potentially degrade fish habitat, and is currently adversely affecting access to the lake for recreational fishing (access for both shoreline fishing and for boat launching). This impact is not considered a part of the LORP, but instead is a management issue associated with ongoing practices of LADWP.

Under the proposed program for off-river lakes and ponds, water to supply Coyote/Grass Lakes Complex and Goose Lake will now be alternating between the Lower Twin Lakes Diversion and Waggoner Diversion. A description of the impacts of installing new ditches and spillgates, and modifying other spillgates to transfer the point of diversion is provided in Section 7.1.3, and is considered an element of the Blackrock Waterfowl Habitat Area.

Under the proposed program for off-river lakes and ponds, the amount of water provided to Coyote/Grass Lakes Complex and Goose Lake may be greater than under existing conditions due to the need to create flows in the channels downstream of Goose Lake that will connect to the river. There will be an inflow and outflow from these lakes sufficient to sustain the artificial corridor below the lake, but the lake elevations will remain unchanged from current conditions. **The greater inflows and outflows at these lakes may improve water quality and increased turnover rates in the lakes -- a potentially beneficial impact (Class IV).**

The establishment of permanently watered fish corridors between Goose Lake and the river, and Billy Lake and the river, as part of the riverine-riparian enhancement program (Section 2.3) could increase fish production in the lakes by allowing recruitment of fish from the river, as well as providing opportunities for lake and pond fish to feed and reproduce in the ditches between the lakes and the Aqueduct, and between the lakes and the river. **The potential increase in available fish habitat and possible enhanced production of the warmwater fishery in the lakes and ponds are considered beneficial impacts (Class IV).**

9.0 LAND MANAGEMENT PLAN

The discussion of impacts related to the LORP land management plan includes:

- Impacts on rangeland conditions and grazing practices (Section 9.1)
- Impacts on biological resources, including sensitive species (Section 9.2)
- Impacts on adjacent public lands due to changes in livestock distribution (Section 9.3)
- Other impacts considered to be negligible (Section 9.3)

The leases covered by the LORP land management plan overlap with other areas of the LORP. Additional discussion of impacts for these areas is provided in Sections 4 (Riverine-Riparian System), 6 (Delta Habitat Area), 7 (Blackrock Waterfowl Habitat Area), and 8 (Off-River Lakes and Ponds).

9.1 RANGELANDS

9.1.1 Existing Conditions

A description of current grazing practices is presented in Section 2.8.2 for the seven affected leases: Twin Lakes, Thibaut, Blackrock, Island, Lone Pine, Delta, and Intake. Prior to 2002, LADWP leases within the LORP area did not have formal protocols for quantitative monitoring and evaluation of rangeland conditions. However, using the monitoring protocols described in Section 2.8.1.5, a rangeland trend monitoring program was initiated in 2002 on all leases within the LORP area. Minimally, the first two years of rangeland trend monitoring will be considered baseline.

9.1.2 Impacts – Rangelands / Grazing Operations

The LORP land management plan will modify grazing practices in riparian and upland areas on seven LADWP leases in order to complement the habitat enhancements anticipated with the re-watering efforts under the Riverine-Riparian System. Under the proposed land management program, the intensity, location, and duration of grazing will be managed by establishing new riparian pastures, forage utilization rates, and prescribed grazing periods as described in Section 2.8.1.3 and 2.8.2. Other actions include protection of rare plant populations, establishment of off-river watering sources to reduce use of the river and off-river ponds for livestock watering, and monitoring of utilization and rangeland trend throughout the leases to ensure that grazing rates maintain the long-term productivity of the rangelands.

The establishment of pastures with seasonal restrictions and exclosures proposed under LORP will result in a reduction of acreage available for grazing over existing conditions. Initially, this reduction in available acreage will temporarily reduce the amount of forage available for livestock grazing. However, once the river is rewatered under LORP, available forage will increase and improve in condition. In addition, the establishment of utilization rates, modification in timing and duration of grazing, and changes in livestock distribution will also improve rangeland conditions by improving plant vigor and seedling recruitment of forage species. **Plant and soil conditions on the leases would improve due to these actions, resulting in a beneficial impact to rangelands (Class IV).**

9.2 BIOLOGICAL RESOURCES

9.2.1 Existing Conditions

The primary sensitive biological resources that occur on the leases are the riparian and aquatic habitats of the Lower Owens River; seasonal and perennial wetlands such as alkali meadows and freshwater marsh;

elk herds; and rare plant populations. Currently, the riparian and aquatic habitats along the river are mostly degraded due to the lack of flows; grazing has also had adverse effects on riparian understory in some areas.

9.2.1.1 Sensitive Plant Species

There are three sensitive plant species known to occur within the LORP area and on LADWP leases. These species are described below.

- Inyo County star-tulip (*Calochortus excavatus*). This herb occurs in grassy meadows and moist places with alkaline soils in the Owens Valley, primarily in alkali meadow and alkali shrub meadow. Populations are scattered throughout the valley, from Round Valley to Olancha. Populations occur on the Thibaut and Blackrock leases. The Inyo County star-tulip is included in the California Native Plant Society (CNPS) rare plant inventory as rare, threatened, or endangered in California and elsewhere (List 1B) (Skinner and Pavlik, 2001). It has no state or federal status.

- Owens Valley checkerbloom (*Sidalcea covillei*). The Owens Valley checkerbloom is a state listed endangered species. It has no federal status. This species is considered rare, threatened, or endangered in California and elsewhere (List 1B) in the CNPS rare plant inventory (Skinner and Pavlik, 2001). When the Owens Valley checkerbloom was nominated for endangered species status in 1979, there was only one known population of this plant. Several new populations were found soon after the plant was listed, bringing documented populations to ten by 1981. This plant is endemic to the Owens Valley, occurring in scattered populations west of the river. It occurs in moist to wet alkali meadows. Based on long-term monitoring by LADWP, there are over 40 known populations throughout the Owens Valley. One population of Owens Valley checkerbloom has over one million plants, and several populations have more than 100,000 plants. The sites that contain populations of this species have been and are currently grazed. Within the LORP area, populations occur on the Thibaut and Blackrock leases.

- Nevada oryctes (*Oryctes nevadensis*). This species is restricted to sandy soils in desert sink scrub and shadscale scrub habitats. Known populations in the Owens Valley occur from near Lone Pine to Bishop. The plant occurs on the Twin Lakes, Blackrock, Lone Pine and Delta leases. This species is considered rare, threatened, or endangered in California, but more common elsewhere (List 2) in the CNPS rare plant inventory (Skinner and Pavlik, 2001). It has no state or federal status.

The following sensitive species occur on LADWP property outside the LORP area. These species are included in the CNPS rare plant inventory (Skinner and Pavlik, 1994), but have no state or federal status.

- Sagebrush loeflingia (*Loeflingia squarrosa*) (List 2)
- Inyo phacelia (*Phacelia inyoensis*) (List 1B)

In addition, Geyer's milk-vetch (*Astragalus geyeri*) is known to occur in Owens Valley, but has not been recorded on LADWP lands and is not expected based on habitat preferences and the lack of sightings by LADWP, County, and Ecosystem Sciences personnel over many years of field investigations. This species is included in the CNPS rare plant inventory as List 2 (Skinner and Pavlik, 1994), but has no state or federal status.

9.2.1.2 Owens Valley Pupfish

The area near Well 368 in the Blackrock lease supports a population of Owens pupfish (*Cyprinodon radiosus*), a federally listed endangered species. In the past, protective fencing was installed around the area where the pupfish population was originally located. However, as the local vegetation and hydrologic conditions of the area near Well 368 changed through natural processes over time, the pupfish population migrated to a location outside of the fenced area. Based on a field visit to this site conducted in May 2003, CDFG and USFWS concluded that this pupfish population and its habitat are doing well without fencing and that modifications are not needed (S. Parmenter, CDFG, and D. Threelof, USFWS, pers. comm., 2003). Therefore, LADWP does not propose any management action with regard to the existing pupfish population.

9.2.2 Impacts – Biological Resources

9.2.2.1 Riparian Resources

New riparian pastures will be established via fencing that are either excluded from grazing or, in most cases, used only from December through April and with a maximum allowable utilization rate of 40 percent. The riparian pastures to be established under LORP are listed below in Table 9-1. Overall, approximately 900 acres would be removed from grazing year-round (the 847-acre exclosure at Thibaut Lease will not be grazed for at least 10 years). Approximately 24,700 acres of riparian pastures will be fenced and grazed under prescribed grazing periods and utilization rates to promote a healthy riparian ecosystem (Sections 2.8.1.3 and 2.8.2).

TABLE 9-1
SUMMARY OF RIPARIAN PASTURES AND RARE PLANT AND REFERENCE EXCLOSURES

Lease	Current Lease Area (acres)	Proposed Riparian Pastures* (acres)	Proposed Rare Plant and Reference Exclosures (acres)
Twin Lakes	4,912	1,667	▪ Reconstruction of an existing 0.25-acre rare plant exclosure for the Nevada oryctes
Blackrock	32,674	14,540	▪ Four new rare plant exclosures for the Inyo County star-tulip and the Owens Valley checkerbloom ▪ Two riparian exclosures (ungrazed reference areas to be used for evaluating rangeland trend)
Thibaut	5,259	847	▪ A 847-acre riparian exclosure (excluded from grazing for at least 10 years) ▪ A 211-acre pasture along the east side of the Aqueduct to protect Inyo County star-tulip and the Owens Valley checkerbloom populations ▪ A 247-acre pasture within the Blackrock Waterfowl Management Area in the northwest corner of the lease (to be grazed every other year)
Island	18,970	1,638	▪ A riparian exclosure (size TBD - ungrazed reference area to be used for evaluating rangeland trend)
Lone Pine	8,274	6,016	▪ A 8.5-acre riparian exclosure (ungrazed reference area to be used for evaluating rangeland trend)
Delta	7,110	0	▪ A 30-acre riparian exclosure (ungrazed reference area to be used for evaluating rangeland trend)
Intake	284	N/A	▪ No new fencing is proposed.

* Riparian pastures include areas of upland vegetation.

In general, implementation of the proposed grazing management actions (i.e., creation of riparian pastures; modification of utilization rates in both riparian and upland pastures; and creation of rare plant, wetland, and waterfowl exclosures) would reduce current grazing impacts to existing biological resources. Beneficial impacts include increased plant production and cover in riparian areas, which would provide more food for small mammals and birds, and cover for ground- and understory-nesting birds. Cattle will graze riparian areas for a shorter period of time, resulting in less frequent disturbance to ground- and understory-nesting birds; **hence, the proposed management actions would result in beneficial impacts to riparian biological resources (Class IV)**. The application of appropriate grazing strategies in the LORP project area would complement the habitat enhancements anticipated along the river and in the Blackrock and Delta areas where a greater diversity and abundance of aquatic and terrestrial species are anticipated.

9.2.2.2 Sensitive Plant Species

Fences will be installed in the Twin Lakes, Blackrock and Thibaut leases to create rare plant exclosures for populations of Inyo County star-tulip, Owens Valley checkerbloom, and Nevada oryctes. Grazing will be excluded from the Twin Lakes rare plant exclosure and one of the four Blackrock exclosures. In the other three Blackrock exclosures and the 211-acre Thibaut Rare Plant Pasture, grazing will be prohibited during the flowering, fruiting, and seeding period of the species (April - July). These populations have been subjected to grazing for decades and have persisted, despite removal of plants by grazing and trampling effects. The proposed grazing strategies are expected to improve the reproductive success and long-term survival of these rare plant populations. **Therefore, impacts to these populations from future grazing strategies are considered beneficial (Class IV).**

9.2.2.3 Owens Valley Pupfish

As described above, USFWS, CDFG and LADWP have determined that no management action is required with regard to the Owens Valley pupfish population located near Well No. 368 on the Blackrock Lease since current conditions of the site appear to be suitable for the population's continued existence. **Therefore, implementation of LORP would not have any adverse impact on this pupfish population.**

9.3 ADJACENT BLM AND SLC LANDS

9.3.1 Existing Conditions

9.3.1.1 BLM Lands

Management of BLM Lands

BLM's Bishop Resource Area of the Bakersfield District surrounds the LORP project area. The resource area is divided into nine management areas, three of which are lands surrounding the LORP (i.e., Owens Valley, South Inyo and Owens Lake management areas). The Owens Valley Management Area (OVMA) encompasses 153,750 acres containing the Alabama Hills, three developed campgrounds, and areas of dispersed recreation use. Wildlife resources include mule deer, several springs and streams, and tule elk calving habitat. The South Inyo Management Area (SIMA) consists of 65,000 acres. There is important wildlife habitat, including potential bighorn sheep habitat, and small stands of bristlecone pine. The Owens Lake Management Area (OLMA) contains 15,790 acres of BLM land near Owens Lake. It includes important tule elk calving grounds and habitat for several special status wildlife species.

Guidelines for managing the various resources and activities in the resource area are derived from the Bishop Area Resource Management Plan (RMP) (BLM, 1991), and BLM's Standard Operating Procedures. One of the primary activities on BLM lands is grazing. Grazing allotments are established throughout the Resource Area, and leased to non-federal parties. Livestock grazing occurs on 69 allotments in the Bishop Resource Area, with annual licensing of 35,261 AUMs. Allotment management plans are prepared for each allotment to establish grazing utilization rates and protection of other resources. These plans are developed based on federal grazing regulations and BLM rangeland policies contained in the RMP.

Plant phenology of key forage species of livestock and wildlife is considered in determining grazing schedules. The average annual livestock utilization of key forage species is not allowed to exceed 60 percent unless there is an Allotment Management Plan that specifies a different level. When monitoring verifies that utilization levels exceed 60 percent, a change in livestock management practices is implemented, such as changes in grazing preference, season of use, or location of use.

Salting and supplemental feeding locations are not located within ¼ mile of riparian zones, sensitive plant habitats, or sites that are highly susceptible to soil erosion. Livestock grazing is prohibited in unallocated areas or areas outside of existing allotment boundaries. Annual utilization checks are conducted during the grazing season on selected meadows and key wildlife habitats. Trampling of soils is monitored in conjunction with forage utilization to determine whether the limit of allowable grazing has been achieved.

BLM's National Rangeland Management Policy established standard criteria for determining selective management categories for grazing allotments on public lands. An allotment's selective management category may change as resource conditions change or new information becomes available. The goal is to have as many allotments in the Maintain (M) category as possible.

- Maintain (M) Category Criteria – present range condition is satisfactory; the allotment has moderate to high resource production potential and is producing near that potential, with no serious resource use conflicts or controversy. Opportunities may exist for positive economic return from public investments; present management is accomplishing the desired results, and any other appropriate criteria.

- Improve (I) Category Criteria – present range condition is unsatisfactory; the allotment has moderate to high resource production potential but is not producing near that potential, and serious resource use conflicts or controversy exist. Opportunities exist for positive economic return from public investments; opportunities exist to achieve the allotment's potential through changes in management, and any other appropriate criteria.

- Custodial (C) Category Criteria – present range condition is not a factor, the allotment has low resource production potential and is producing near that potential, limited resource use conflicts or controversy exist.

BLM Lands Adjacent to LADWP Leases in the LORP Area

Most allotments on BLM land are adjacent to or intermingled with lands controlled by LADWP or the Inyo National Forest. On several allotments, the boundaries are not fenced. Numbers of stock, seasons of use, and range facilities and treatments are often cooperatively handled by means of MOUs, cooperative agreements, and other less formal arrangements between the agencies and the permittees.

BLM lands located adjacent to LADWP leases within the LORP area are as follows:

- **Twin Lakes Lease.** BLM Black Mine Allotment (# 6023) assigned to 4-J Cattle Co. (Mark Johns) adjoins the Twin Lakes lease.

- **Blackrock Lease.** Approximately one-half section (at Black Jack Mine Section 1) of the BLM Allotment # 6023 adjoins the Blackrock Lease. The BLM lands adjoining this lease are partially unallocated for livestock grazing and have been for over 20 years. In addition, the West Santa Rita Allotment #6048 abuts the Blackrock Lease.

- **Thibaut Lease.** BLM lands adjacent to the Thibaut Lease are unallocated for grazing.

- **Lone Pine Lease.** The Ash Creek Allotment #6042 is located adjacent to this lease west of U.S. Highway 395.

- **Delta Lease.** There are scattered parcels of BLM land within the Delta Lease that are unallocated for livestock grazing.

Under existing conditions, livestock drift onto adjacent BLM land from LADWP leases is known to occur occasionally, particularly in early spring in years with high precipitation and resultant growth of annual forage species on BLM uplands. Quantification of livestock drift is currently not conducted.

9.3.1.2 State Lands Commission Lands

The southern boundary of the Delta Lease has an unusual shape. A long narrow parcel (361 acres) of Delta Lease (LADWP land) extends 2.5 miles along the west side of the Delta Habitat Area (Figure 2-23), which is surrounded by state-owned lands under management by the State Lands Commission (SLC). No fence separates LADWP and SLC lands.

9.3.2 Impacts – Adjacent BLM and SLC Lands

Under LORP, forage on LADWP leases would improve from the rewatering of the river and would become more attractive to livestock than the upland areas (poorer forage) in public lands. In addition, the proposed grazing management strategies will require lessees to manage livestock distribution more intensively than the current practice. The proposed maximum allowable utilization rates for the riparian and upland areas would result in improved management of cattle distribution. Areas where drift occurs on the east side of the Owens River will now have a utilization criteria of 40 percent in the riparian areas. When the utilization criteria is met, the cattle will be moved from the riparian pasture to the next fields in rotation, therefore reducing the chance of drift. Therefore, LORP implementation is generally expected to reduce livestock drift onto adjacent public lands. Lease-specific actions proposed under LORP that may affect livestock drift are described below.

Twin Lakes Lease: Grazing period in the proposed riparian pasture (located on the eastern portion of the lease adjacent to BLM land) will be restricted to approximately 2.5 months (March to mid May), which is shorter than the existing practice (late October to May). Therefore, the potential for livestock drift would be reduced compared to existing conditions.

Blackrock Lease: Grazing period in the proposed riparian pastures (located on the eastern portion of the lease adjacent to BLM land) will be restricted to approximately 2 months (late March to May), which is shorter than the existing practice (early October to June). Therefore, the potential for livestock drift would be reduced compared to existing conditions.

Thibaut Lease. The establishment of Thibaut Riparian Exclosure, which will not be grazed for a minimum of 10 years, will eliminate livestock from the portion of the lease adjacent to BLM lands (east side of the river). Therefore, livestock drift onto BLM land from Thibaut Lease would be reduced upon LORP implementation.

Island Lease: The establishment of the Carasco and Depot Riparian Pastures (less than 10 percent of total lease area) is expected to result in negligible, if any, increase in cattle drift onto BLM lands. The proposed maximum allowable utilization rates for the riparian and upland areas in the River Pasture would result in improved management of cattle distribution, and would likely contribute to decreasing cattle drift onto adjacent areas.

Lone Pine Lease: The establishment of the River Riparian Pasture (located on the eastern portion of the lease adjacent to BLM land) will be restricted to approximately 3 months (January to March), which is shorter than the existing practice. Therefore, the potential for livestock drift would be reduced compared to existing conditions.

Delta Lease: The only fencing proposed in the Delta lease is for the 30-acre Riparian Exclosure, which will be excluded from grazing (see Section 2.8.2.5). This riparian exclosure represents less than 0.5 percent of the total lease area. Therefore, establishment of the Riparian Exclosure is anticipated to result in negligible, if any, increase in cattle drift onto SLC lands. The proposed maximum allowable utilization rates for the riparian and upland areas would result in improved management of cattle distribution, and would likely contribute to decreasing cattle drift onto adjacent areas.

Intake Lease: No new fencing is proposed for the Intake Lease. The proposed maximum allowable utilization rates for the riparian and upland areas would result in improved management of cattle distribution, and would likely contribute to decreasing cattle drift onto adjacent areas.

LADWP expects that the grazing management actions proposed under LORP, combined with the increase in forage in riparian areas from rewatering the river, will result in no change or a net reduction in livestock drift onto public lands. However, the potential for localized increase in livestock drift under LORP cannot be eliminated (e.g., from establishment of stockwater areas closer to public lands). **Therefore, this impact is considered adverse, but not significant (Class III).** If it is determined by BLM and SLC that the rangeland management actions proposed under LORP are resulting in a substantial increase in cattle drift, LADWP will implement Mitigation Measure LM-1. Under Mitigation Measure LM-1, LADWP will consult with BLM and SLC in determining lease-specific measures to reduce potential unauthorized drift.

9.3.3 Mitigation Measures

LM-1 If it is determined by BLM or SLC that the rangeland management actions proposed under LORP are resulting in a substantial increase in cattle drift, the grazing management plan(s) for the relevant lease(s) shall be modified to incorporate herd and grazing practices to reduce drift. These lease-specific measures shall be developed in consultation with BLM (Blackrock, Twin Lakes, Island, Lone Pine, Intake, and Thibaut Leases) or SLC (Delta Lease) and shall include specific measures to discourage unauthorized drift, such as strategic placement of watering troughs and salt blocks/supplements and coordination of grazing rotation patterns between LADWP and BLM pastures. The effectiveness of these measures shall be evaluated in the LORP monitoring and adaptive management program.

9.4 OTHER IMPACTS THAT ARE CONSIDERED NEGLIGIBLE

Installation of fencing to establish riparian pastures would have a negligible effect on native vegetation. Posts would be installed by hand crews working from small trucks that travel overland. No new roads would be constructed, nor would any grading or excavation be required. Minor mowing and brush clearing may be required at fence post sites, and along the alignment. The footprint of disturbance for each post would be several square feet. No permanent or irreversible damage to vegetation would occur, nor would the type of surface disturbance facilitate weed colonization. Stringing the fence would also occur by hand crews.

Fence installation is also not expected to adversely affect movement by elk or deer, as the grazing management plans include provisions to create specialized fences (Figure 2-17) to accommodate elk/deer passage along known elk/deer trails.

Fence installation will require use of small trucks; however, air pollutant emissions from the fence installation are not expected to be substantial. Emissions would be short-term and similar to those caused by current routine rangeland management activities on the leases.

The new fences are not expected to cause any visual impacts, as they will be difficult to see from paved public roads. Fencing is a common visual feature in the Owens Valley, and wire fencing presents a very diffuse visual image that does not generally detract from the landscape.

Upon initial implementation of the LORP, most existing roads and trails on the leases that have been used by the public to access the river and off-river lakes for recreation (e.g., fishing and bird watching) will continue to provide access. Gates or cattle guards will be installed to control cattle movement, and access for the public will be provided (see Section 2.8.1.3); hence, no adverse impacts to public access and recreational uses are anticipated. (See Section 10.1 for additional discussion of recreation-related impacts.)

Various cultural resources occur on the leases, including prehistoric and historic archaeological sites. The modification of grazing practices would generally reduce the overall intensity of grazing, and thereby reduce any ongoing disturbances (if any) to archaeological sites. The installation of fence poles was deemed an insignificant impact by the State Office of Historic Preservation (Far Western, 2001) because the physical damage from post installation is very limited and diffuse; hence, no adverse impacts to cultural resources are expected.

10.0 IMPACTS ASSOCIATED WITH THE LORP AS A WHOLE

10.1 RECREATION

10.1.1 Existing Conditions

10.1.1.1 Existing Recreational Uses in the LORP Area

With minor exceptions, the public has mostly unrestricted access for recreational uses during the day on City of Los Angeles-owned land within the LORP planning area. Virtually all City-owned lands in the Eastern Sierra outside the towns, including those within the LORP area, are part of ranch leases. The City requires its ranch lessees to leave approximately 75 percent of their lands open to the public for recreational uses.

Fishing is the primary recreational use on the river. In Blackrock and other off-channel lakes and ponds, hunting, birding, and fishing are the primary recreational uses. Hunting and birding are the main activities in the Delta. Other recreational uses that occur in the project area include hiking, walking, sightseeing, running, bicycling, tubing, picnicking, horseback riding, OHV/4-wheeling, photography and wildlife appreciation.

With the exception of the Interagency Visitor Center located in Lone Pine, there are no existing facilities in the LORP area that specifically support recreational uses (e.g., camp grounds, sanitation facilities, regular trash collection services, interpretive centers, wildlife viewing areas, parking lots, etc.). Existing roads and trails within the project area are generally available to recreation users, but are primarily maintenance or access roads used by lessees and LADWP staff.

These descriptions of existing recreational uses are based on LADWP staff observations, and are considered the best currently available information. Other more quantitative information on recreation and the distribution of recreational uses is not available.

10.1.1.2 LADWP Policies for Recreational Uses of City-owned Lands in the Eastern Sierra

Official LADWP policies for recreational uses of City-owned lands in the Eastern Sierra are summarized below and published in brochures available at LADWP offices, the Interagency Visitor Center in Lone Pine, and on LADWP's website. While LADWP does not employ rangers or law enforcement officers, other LADWP staff (e.g., aqueduct and reservoir keepers) do patrol and monitor for violations of LADWP recreational use policies on City-owned lands within the Owens Valley. Since LADWP does not have any authority for law enforcement, LADWP staff cooperate with the Inyo County Sheriff's Department.

Camping and campfires are restricted to designated campgrounds, which are located outside the LORP area. Vehicular travel, including Off-Highway Vehicles (OHVs), All-Terrain Vehicles (ATVs), and Recreational Vehicles (RVs), is limited to existing roads and trails and away from residential areas. (Figure 2-24) show the existing roads in the LORP Area.) An interagency OHV Management Group, consisting of BLM, Forest Service, LADWP, and Inyo County, provides a means for member agencies to coordinate efforts to manage vehicle access within their respective lands in the Owens Valley. Hunting and fishing are allowed except in areas that are posted. All hunting and fishing activities are under the jurisdiction of the California Department of Fish and Game (CDFG) and subject to the Fish and Game Code.

10.1.1.3 Impacts from Existing Recreational Uses

Currently, quantitative information on the number of recreational users in the Owens Valley and their impacts is not collected. LADWP and Inyo County staff involved in construction, survey, and other field work as well as lessees report to LADWP when violations of recreational use policies are observed or high concentrations of recreational uses are noted. LADWP personnel also receive calls from recreational users themselves or local residents. Based on these information sources, current recreational usage of the LORP area is characterized by LADWP staff as light and low-impact; few recreationists are observed. Within the LORP area, the currently wetted reach of river and the off-river lakes and ponds receive higher recreational use than other areas due to the availability of fishing spots. LADWP personnel occasionally observe and receive complaints regarding camping and campfires outside of designated areas, vehicle traffic outside of existing roads, and illegal use of firearms. These complaints are not formally documented. Unauthorized artifact gathering (pot hunting) has also been noted by an area resident (Ecosystem Sciences, Technical Memorandum 6). To date, LADWP has received few reports of recreation-related problems in the dry reach of the river or the Delta Habitat Area. LADWP lands in the Owens Valley outside of the LORP area (e.g., Owens River north of the River Intake, Pleasant Valley Reservoir, Owens Gorge, Crowley Lake, and Haiwee Reservoir) experience higher recreational uses and therefore generate more frequent complaints involving recreation impacts.

10.1.2 Potential Impacts

10.1.2.1 Beneficial Impacts on Recreation

Upon initial implementation, the LORP does not include construction of specific new facilities to support new or expanded recreational uses (e.g., roads, trails, campgrounds, interpretive centers, sanitation facilities, parking lots, etc.). Similarly, the project does not include any actions to restrict existing recreational uses (e.g., fencing to restrict access, road closures, etc.). Existing access to the river and the off-river lakes and ponds will be maintained. New fencing proposed under the LORP Land Management Plan will be designed to accommodate existing public access to these areas (e.g., installation of cattle guard fence crossings, cross stream fencing that accommodates kayak and canoe navigation). **The LORP would result in an improvement of ecological conditions in the project area, which is expected to have beneficial effects on recreational uses and opportunities in the southern Owens Valley, as listed below (Class IV impact):**

- Increase in the warmwater game fishery in the river will improve the fishing experience and potentially attract more anglers to the area.
- The increased riparian cover along the river and portions of the Delta is expected to increase habitat, improve the aesthetics of the area, and make hiking, bird watching, and photography more enjoyable.
- The increase in the amount and variety of various aquatic, wetland, and riparian habitats along the river, at Blackrock Waterfowl Habitat Area and at the Delta Habitat Area, would increase bird use and variety, which would expand and improve the bird watching experience for amateurs and professionals.
- Increased vegetative cover and increased surface water areas would increase wildlife populations and therefore increase hunting opportunities.
- Increased flows in the river would increase the area suitable for kayaking, canoeing, and tubing.

10.1.2.2 Impacts of Increased Recreational Uses

Potential Adverse Impacts Associated with Increased Recreational Uses. The increase in recreational opportunities described above would likely attract a greater number of recreational users to the LORP area over existing conditions, although the magnitude of this increase is speculative. The increase in the number of recreational users is expected to occur gradually over many years as the ecological conditions in the project area are improved by the LORP and there is a greater interest in recreation.

An increase in the number of people engaged in outdoor recreation in the LORP area could result in the following adverse impacts:

- An increase in the number of vehicles in the LORP area could degrade existing dirt roads, causing an increase in erosion and some localized increase in fugitive dust related to driving on unpaved roads.
- An increase in visitors could cause more trampling of wetland and riparian vegetation due to vehicles parked near lakes and river access points, increased overland travel to by-pass potholes or impassable roads, informal trailblazing to reach fishing spots, increased foot traffic, and off-highway travel (particularly in the remote Delta area).
- An increase in visitors could increase the dispersion of some noxious weeds (e.g., perennial pepperweed and Russian knapweed), whose seeds can be transported by attaching to vehicles or people. Although the primary means of increased seed dispersion for these species under LORP is by water, the increase in the number of potential carriers may result in introduction of noxious weeds in previously unaffected locations, which would have adverse impacts on native vegetation (see Section 10.4.3).
- An increase in visitors could accelerate the spread of the New Zealand mud snail, an exotic mollusk, to the LORP area (see Section 10.4.3).
- An increase in visitors could increase the potential for inadvertent and incidental disturbances to sensitive species (possibly including threatened and endangered species), such as nesting birds and rare plants. (The exclosures proposed as a part of LORP would minimize potential impacts from recreational users on rare plants (see Section 2.8)).
- An increase in visitors could increase the potential for disturbance of recorded and unrecorded cultural resources (prehistoric and historic sites; traditional cultural properties) located within the LORP area. These disturbances may include unauthorized artifact collection, site vandalism, and damage to sites by OHV use in non-designated areas.
- An increase in visitors could increase the potential for disturbance of grazing practices and facilities (e.g., disturbance to fences and gates and harassment of livestock).
- An increase in visitors could decrease the quality of solitude at existing recreational sites (e.g., increased use of local fishing spots).

Recreation Management Approach under LORP. A goal of the LORP is the management of recreation that is sustainable and consistent with the primary project goal of habitat restoration. As part of the overall LORP adaptive management approach, LADWP will implement their existing recreation management strategies within the LORP area (see Section 2.9). While initial LORP implementation does not include construction of any specific facilities to restrict existing recreational uses (e.g., fencing to restrict access, road closures, etc.), recreational uses that disturb the environment or conflict with other uses may be prohibited and/or regulated to certain areas and/or times of the year.

Recreation Monitoring Under LORP. The LORP monitoring program will include surveillance for recreation impacts or the potential for such impacts in the LORP area (see Section 2.10). In addition, other monitoring and maintenance activities conducted as part of LORP will increase surveillance for potential recreation impacts. Both LADWP and Inyo County personnel will be routinely present in the field to collect water quality, hydrology, habitat and other types of information (see Section 2.10). Staff from both agencies will be instructed to report recreation impacts or recreation-related threats to resources that they observe, with the intent of recognizing and addressing problems before significant impacts occur (also see Mitigation Measures RC-1 and RC-2). Monitoring reports prepared for the project will document observed recreational activities and impacts.

Since LORP includes monitoring for recreation impacts and implementation of management strategies to address these impacts, **the potential impacts of future recreational uses on biological resources, grazing operations, cultural resources, existing recreational uses, and roadways are considered adverse, but not significant (Class III).** Mitigation Measures RC-1 and RC-2 would further reduce the magnitude of this impact. Mitigation Measure RC-1 commits LADWP to continue existing recreation management practices specifically within the LORP area. Under Mitigation Measure RC-2, LADWP and Inyo County personnel who are routinely in the field within the project area will be trained to recognize and report cultural resources.

10.1.3 Mitigation Measures

The potential impact of future recreational uses on biological resources, grazing operations, cultural resources, existing recreational uses and roadways is considered less than significant. To further reduce impacts, LADWP will implement the following mitigation measures:

RC-1 When LADWP and Inyo County personnel observe and/or receive complaints or concerns about negative impacts related to recreational activity, LADWP or Inyo County shall review the issue and investigate as necessary. For verified impacts or concerns for potential impacts related to recreation in the LORP area, LADWP and/or Inyo County shall implement recreation management strategies as relevant (see Section 2.9).

RC-2 LADWP shall conduct a training program for LADWP and Inyo County personnel working within the LORP area on identification and reporting of cultural resources or potential threats to cultural resources at LAWDP or Inyo County facilities in the Owens Valley. Personnel will be instructed on how to identify and report cultural resources encountered in the field, and will also receive an overview of the procedures that must be implemented should impacts or threats to cultural resources be documented. The training will be accomplished through either a multi-media (e.g., video) presentation or a seminar conducted by a professional archaeologist in consultation with local Tribes (as listed in Section 4.8.2) and other methods as deemed appropriate. As new personnel are hired or when training is updated, a refresher course will be provided. Visual aids such as photographs or sample artifacts, if available, will be used to familiarize LADWP and Inyo County personnel with cultural resources that may be present in the project area.

10.2 SOCIOECONOMICS

The LORP would not result in any adverse impacts to socioeconomic conditions in the Owens Valley. Instead, it is anticipated to improve economic conditions due to: (1) increased expenditures for local labor and materials for the construction of the pump station and long-term maintenance activities; and (2) an increase in visitors due to improved recreational opportunities that will create a need for more outdoor recreation services and suppliers.

Land management actions proposed under LORP would restrict the acreage available and the timing of grazing by LADWP lessees. Upon initiation of these measures, more active management by both LADWP staff (related to water distribution, salt, fencing, monitoring, etc.) and by lessees (monitoring, herding/rotation) would be required. Optimization of the grazing practices may alter existing grazing patterns (increasing use on currently lightly used areas and the converse). However, improved vegetation management (utilization rates, seasonal restrictions, etc.) is expected to improve grazing over the long-term. Protection of rangeland integrity is expected to ensure the sustainability of grazing operations - an overall economic benefit for lessees.

10.3 PUBLIC HEALTH AND SAFETY

The main public health concern related to implementation of the LORP is creation of additional mosquito habitat and the resultant health effects on wildlife and human populations. Another public safety issue is the sudden increase and volume of river flows proposed under the project.

10.3.1 Existing Conditions

Under existing conditions, the upper reach of the Lower Owens River (approximately 30 miles from the River Intake to Mazourka Canyon Road) contains no flow most of the time and therefore has minimal mosquito breeding potential. The lower reach of the river (south of Mazourka Canyon Road) currently contains low flows with slow-moving water. In addition, tules and beaver dams create stagnant water conditions in this reach. Off-river lakes and ponds and the open water and wetland areas of the Delta Habitat Area are also existing mosquito habitat areas in the project area. In the Blackrock area, water releases to the Waggoner and Thibaut wetlands and artesian flow to the Winterton wetland create extensive mosquito habitat areas. In addition, mosquitoes (particularly the non-standing water species) breed in irrigated pastures in the Owens Valley.

10.3.1.1 Mosquito Life Cycle

Many mosquito species require standing water to breed and complete their life cycle, which takes about 7 days during warm weather. There are also other non-standing water species, whose eggs lay dormant in damp soil for many years and hatch when flooded by water. The life cycle of these non-standing water species can be less than 7 days. Although the standing water species pose the largest health risk, the non-standing water species feed in the daytime, rather than only at dawn and dusk, and can therefore be a major nuisance to humans (R.L. Hurd, pers. comm., August 2003). The mosquito season in the Owens Valley is from April to October (E. Poncet, pers. comm., September 2003).

10.3.1.2 Mosquito-borne Diseases of Concern

Uncontrolled populations of mosquitoes can result in nuisance and public health threats to communities and residents, and to people engaged in outdoor recreation. In California, there are several species of mosquitoes known to transmit diseases such as western equine encephalitis, St. Louis encephalitis, and malaria. Since the introduction of the West Nile virus into the Western Hemisphere in 1999, there has been rising public awareness of this mosquito-borne virus. To date, there has been one reported human case of West Nile virus in California (a positive laboratory test result) (CDC, 2003a and 2003b). West Nile virus has not been detected in the Owens Valley. However, federal, state, and Inyo County public health officials anticipate the eventual spread of West Nile virus to the Owens Valley by way of infected birds that migrate to or through the valley. Mosquitoes that feed on infected birds become carriers of the disease and can transmit the disease to humans. The added public health threat posed by the potential occurrence of West Nile virus in the Owens Valley, including the LORP area, necessitates a heightened response to existing and new mosquito sources. St. Louis encephalitis and western equine encephalitis are also of concern, although there are no known cases of these mosquito-borne diseases in the Owens Valley (R.L. Hurd, pers. comm., May 2003).

In addition, mosquito-borne diseases can affect some wildlife and domestic animals (e.g., horses). For example, West Nile virus may have an adverse impact on wild birds. West Nile virus is known to cause deaths in many species of birds including those from the corvid family (crows, jays, magpies, and ravens) (CDC, 2003c). Based on a fact sheet prepared by the Nevada Department of Wildlife (2003), the virus affects different species and groups of birds differently. Once infected, some species of birds develop antibodies and show no clinical symptoms of the disease. Other species, particularly hawks, falcons, and owls, show symptoms of the disease, and if they survive, show chronic neurological dysfunction. Many corvids suffer acutely from the disease, and often do not survive the disease after infection. Bird mortality events can be an important indicator of the presence of West Nile virus. Among mammals, horses (including wild horses) have been affected by the disease across North America, and appear to be especially susceptible to the disease. However, vaccinations have been found to be effective in protecting domestic horses.

10.3.1.3 Owens Valley Mosquito Abatement Program

Mosquito control in the LORP area is under the jurisdiction of the Owens Valley Mosquito Abatement Program (OVMAP), which is a part of Inyo County Environmental Health Services.

Mosquito Control Methods Currently Used by OVMAP. OVMAP currently uses a combination of methods to prevent and control mosquitoes in the Owens Valley as described below. The Lower Owens River area is included in OVMAP's mosquito monitoring and control area.

Monitoring. Currently, OVMAP conducts mosquito monitoring between April and October. Technicians drive along a mapped route to monitor and detect mosquito breeding in areas determined to be at risk, and each site is visited every other week at minimum. Known mosquito breeding sources are sampled using the dip count method to determine the quantity of larvae. In addition, light traps set up throughout the Owens Valley (thirteen locations, mostly near population centers) are inspected once a week to monitor for adult mosquitoes (E. Poncet, pers. comm., August 2003). The light traps are used by OVMAP to determine the success of their control efforts and the need to increase treatment. Additionally, in 2003, OVMAP began a program to test blood samples from sentinel flocks of chickens for West Nile virus and other mosquito-borne diseases (R.L. Hurd, pers. comm., May 2003). As part of the West Nile virus monitoring, OVMAP installed encephalitis virus surveillance (EVS) traps in several locations in the valley. OVMAP collects the mosquitoes caught in the traps and tests them for the presence of West Nile virus and encephalitis.

OVMAP is also implementing a monitoring program for the Owens Lake Dust Mitigation Program, with funding from LADWP, which includes sampling of ponded areas for mosquito larvae and monitoring light traps for adult mosquitoes (R.L. Hurd, pers. comm., May 2003). According to monitoring by OVMAP, the Owens Lake Dust Mitigation Program so far has not been a significant mosquito breeding source (E. Poncet, pers. comm., August 2003). OVMAP expects that the extent of the mosquito impact at Owens Lake will not be known until after the 2004 and 2005 field seasons (E. Poncet, pers. comm., September 2003).

Biological Control. The mosquito fish, a predator of mosquito larvae, is a widely-used biological agent for mosquito control. OVMAP stocks mosquito fish in known standing water areas (including off-river lakes and ponds in the LORP area). Areas that do not have year-round ponding of water are re-stocked every spring. Insectivorous bats are another potential biological control method. OVMAP has installed bat houses on an experimental basis. While their effectiveness is unknown at this time, bat house installation is a possible control method that may be used in conjunction with mosquito fish and larvicides.

Currently, the use of the microbial larvicide, *Bacillus thuringiensis* var. *israelensis* (Bti), is the preferred method of mosquito larvae control by OVMAP. Bti is a bacterium that affects the larvae's digestive system, ultimately leading to death. Bti can be broadcast onto the water surface by a hand crew or by a herd seeder mounted on an ATV or a boat, depending on environmental conditions and site access. Bti is species-specific and does not pose risks to wildlife, non-target species, or the environment (EPA, 2002).

Adulticides. If control of adult mosquitoes becomes necessary, OVMAP uses chemical adulticides (pyrethrin or pyrethroid), which are applied by truck-mounted or aircraft-mounted sprayers near population centers (i.e., Lone Pine and Independence). While pyrethrin and pyrethroid adulticides are less deleterious to the environment than other alternatives (e.g., organophosphates), adulticides are not species specific and can have adverse effects on non-target insects (R.L. Hurd, pers. comm., August 2003). Therefore, adulticides are used only when other methods cannot sufficiently control mosquito populations.

Funding for OVMAP. OVMAP's primary source of funding is from a benefit assessment charged to parcels in the Owens Valley and collected annually with property taxes. The amount of the assessment depends on land use and property size. OVMAP has the authority to propose an increase in the benefit assessment on all of the parcels throughout its area in order to obtain additional funds for its program. However, any proposed increase must first be analyzed by a qualified engineer at OVMAP's expense and approved by the Inyo County Board of Supervisors. Then, under the provisions of Article 13D of the California Constitution, the increase must be approved by a majority vote of all of the property owners throughout the OVMAP area. As the landowner that would bear the greatest financial obligation under such an assessment, LADWP could prevent the levy of an assessment. Therefore, the process of increasing OVMAP's benefit assessment is time consuming, requiring a year or longer, and its success is uncertain.

In addition to the benefit assessment, OVMAP currently receives funding from LADWP to monitor and control mosquitoes for the Owens Lake Dust Mitigation Program (Section 12.3). However, use of this funding is restricted to the areas affected by the Dust Mitigation Program because the mosquito control at Owens Lake is a mitigation measure for that project adopted by the Great Basin Air Pollution Control District. The purpose of the mitigation is to minimize impacts to local residents from a potential increase in mosquitoes resulting from construction and operation of the dust control measures at the lake (GBUAPCD, 2003).

10.3.2 Potential Impacts

10.3.2.1 Potential for Mosquito Habitat Creation under LORP

The LORP will result in hundreds of acres of new open water and marsh areas that could serve as new mosquito breeding habitat along the river, at Blackrock, and at the Delta. Under LORP, management of off-river lakes and ponds will remain essentially the same as existing practices. Therefore, little or no change in mosquito breeding conditions is expected at the off-river lakes and ponds.

Lower Owens River. As described in Section 4.3.2, the width of the wetted reach of the river is expected to increase by up to 40 feet under the proposed maximum seasonal habitat flow releases. Once the 40-cfs baseflow is established, mosquito breeding conditions in the river would likely increase since some of the flow would infiltrate into adjacent oxbows, old river channels, and the floodplain, and create new areas of still or stagnant water. In addition to the baseflows, the seasonal habitat flows would spread water outside of the river channel and temporarily create areas of still or stagnant water in the floodplain. Additionally, the initial establishment of the baseflow and the release of seasonal habitat flows would flood damp soils within the floodplain, allowing emergence of non-standing water mosquito species.

Delta. The proposed baseflow to the Delta (6 to 9 cfs annual average) could increase mosquito breeding conditions in the Delta since the proposed baseflow will be higher than existing flow during the summer months (mosquito breeding season). In addition, Period 1 (March/April), Period 2 (June/July), and Period 3 (September) pulse flows (see Table 2-11) would be released during mosquito breeding season. Water from the pulse flow releases is anticipated to remain in the Delta for several weeks, resulting in increased mosquito habitat. The seasonal habitat flows (to be released in late spring/early summer) that bypass the pump station are anticipated to remain in the Delta for up to a few weeks (or months in some small depressions), also resulting in increased mosquito habitat.

Blackrock. The creation of large flooded areas in Blackrock Waterfowl Habitat Area may create the greatest potential for increased mosquito populations. Under LORP, approximately 500 acres (or less in less than average runoff years – See Sections 2.5.3 and 7.1.2) of the Blackrock area will be flooded at any given time. The Blackrock management units would be subject to periodic cycles of wetting and drying so that one to three management units would be wholly or partially flooded at any given time. As shown in Table 7-3, in the short-term, the proposed flooding regime in Blackrock is estimated to increase open water areas by approximately 500 acres, mostly by flooding existing vegetated wetland areas. Over the long-term, the open water areas in Blackrock will increase by 290 acres compared to existing conditions.

10.3.2.2 Potential Biological, Mechanical, and Flow Management Controls for Mosquitoes under LORP

To some extent, mosquito fish and other existing non-native fishes (e.g., bass fry) that feed on mosquito larvae are anticipated to serve as biological controls for reducing the magnitude of increase in mosquito populations associated with LORP. Mosquito fish currently exist in the Owens River system (including Blackrock Ditch) and are expected to colonize the Lower Owens River and the Blackrock area under LORP. In Blackrock, however, the proposed flooding and drying cycle may limit the abundance of mosquito fish. The number of insectivorous birds and bats present in the project area is also anticipated to increase as ecological conditions improve under LORP and may provide additional mosquito control. However, the extent of reduction in mosquitoes that may be achieved by these biological control mechanisms is unknown.

According to Ecosystem Sciences, LORP implementation will maintain and create suitable habitat for Owens pupfish in the river (see Section 2.3.11), the Delta Habitat Area (see Section 2.4.1), and in the off-river lakes and ponds (see Section 2.6.3). The potential for creating suitable habitat for Owens pupfish in the Blackrock Habitat Area is considered to be uncertain by Ecosystem Sciences but could become feasible in the future (see Sections 2.5.3 and 11.4.6). If substantial populations of pupfish were established within suitable areas of the LORP, they would provide an additional biological control for mosquitoes. While not proposed as part of the project, introduction of pupfish or creation of pupfish sanctuaries in the LORP area for ecosystem restoration and mosquito control purposes will be considered by LADWP and may be implemented in the future under the provisions of an Endangered Species Act Section 10(a) permit and Habitat Conservation Plan (HCP) (see Section 2.7).

In manmade and highly managed surface water bodies (e.g., sewage ponds, recharge basins, and constructed wetlands) mosquito breeding habitat can be minimized by removing emergent vegetation and through flow management (e.g., providing good circulation). Under LORP, vegetation removal for mosquito control is not feasible since it would conflict with the project goals of establishing wetland vegetation. Providing mechanical circulation is also not feasible under LORP because the potential mosquito habitat areas are extensive and dispersed (e.g., oxbows along the river). However, in Blackrock, the emergence of non-standing water species of mosquito may be minimized by flooding the units before March 15 or after November 1 to avoid the mosquito breeding season.

10.3.2.3 Impact Significance Related to Mosquitoes

An increase in mosquitoes resulting from the LORP that is confined to the river channel area, the Delta, and the Blackrock area, is considered to be a less than significant impact. The numbers of mosquitoes will increase when the currently dry areas of the river channel, the Delta, and Blackrock are wetted under the project, and are expected to be similar to currently-wetted areas in the LORP area, where mosquitoes are now present in abundance. Impacts to human visitors to these areas can be avoided if the visitors take protective measures, such as wearing mosquito repellant and covering exposed skin areas.

However, the substantial increase in potential mosquito breeding habitat described above in Section 10.3.2.1 could result in a noticeable increase in mosquitoes in areas where humans reside. In addition to impacts to human populations, an increase in mosquito populations could adversely affect birds and other wildlife and some domestic animals (e.g., horses) that are susceptible to mosquito-borne diseases (CDC, 2003c). **The potential increase in public health threat and public nuisance caused by an increase in mosquito populations due to the LORP would be significant, but mitigable (Class II).** This impact can be reduced by implementation of Mitigation Measure PS-1, which is a program for mosquito monitoring, control, and public education.

The intent of this mitigation measure is to minimize mosquito populations related to the project from reaching areas where humans reside. To determine whether mosquitoes resulting from the project are reaching nearby communities, OVMAP will monitor mosquito traps located between potential LORP mosquito sources and the communities of Aberdeen, Fort Independence, Independence, Lone Pine, Olancha, and Keeler. Monitoring efforts will take into consideration mosquito hatches related to weather patterns, irrigation activities, aqueduct flooding, and other events unrelated to LORP. OVMAP anticipates that if Mitigation Measure PS-1 is implemented as described in Section 10.3.3 and Appendix H, under routine LORP operating conditions, there should not be a noticeable increase in mosquitoes in areas where humans reside. However, even with the implementation of Mitigation Measure PS-1, some mosquitoes that exist because of the LORP may reach these populated areas. If one of these mosquitoes carries a disease, and the mosquito infects a human with the disease, the impact would clearly be significant to the infected human.

Secondary impacts related to the implementation of Mitigation Measure PS-1 are possible. First, application of adulticides could result in the loss of other insects in the affected area. To reduce this impact, OVMAP limits its use of adulticides to only treat mosquito populations that pose a public health threat or public nuisance in nearby communities. Second, OVMAP uses vehicles such as pick-up trucks and ATVs to access and treat mosquito sources. OVMAP staff members are trained to limit vehicle usage to avoid damaging riparian, wetland, and upland vegetation. In view of the protective measures practiced by OVMAP, the secondary impacts related to implementation of Mitigation Measure PS-1 are anticipated to be less than significant.

10.3.2.4 Safety Impacts Related to Flow Increases

Concerns have been raised regarding safety issues associated with a sudden increase in river flows under LORP (i.e., seasonal habitat flows). However, the seasonal habitat flows will be ramped up and down typically over 8 to 14 days, depending on the amount of seasonal habitat flow to be released that year, and will not be a sudden release of water. Furthermore, the gradient of the river is small (1 foot per mile on average), and the river has a meandering channel. Therefore, flow velocity of the baseflows and seasonal habitat flows will not create hazardous conditions for recreational users along the river. However, the depth of the water during seasonal habitat flow releases would be similar to existing conditions in the Owens River above the intake during winter flows, and may be too deep for wading. **Overall, the safety impacts related to flow increases under LORP would be less than significant (Class III).**

10.3.3 Mitigation Measure

PS-1 LADWP shall enter into an agreement with OVMAP to abate the potential increase in mosquitoes resulting from the LORP. Mitigation Measure PS-1 has three components:

- Pre-project and post-implementation surveillance, monitoring, and control (to be performed by OVMAP)
- Agency coordination and LORP management adjustments (to be performed by LADWP)
- Public education, program administration, and reporting (to be performed by OVMAP)

These components are described in greater detail in Appendix H. The agreement between LADWP and OVMAP will include the provisions in Appendix H. In addition, the agreement will describe the areas to be monitored and treated, the range of control methods to be used, and reporting requirements. As the impacts from mosquito production created by the LORP are better understood and as methods for mosquito control improve, LADWP and OVMAP may agree to modify the provisions of the scope of work, as long as LORP-related mosquito populations continue to be prevented from reaching nearby communities.

OVMAP estimates that the annual cost to fully implement Mitigation Measure PS-1 could be approximately $109,000, depending on the severity of the impact (L. Kirk, pers. comm., December 2003). This is considered an ongoing post-implementation cost that will continue for the life of the project. Post-implementation costs are to be shared equally by LADWP and the County as described in Section 2.2.2.2.

10.4 DELETERIOUS SPECIES

Deleterious Animal Species. Deleterious animal species of concern for the project area include New Zealand mud snails, beavers, and cowbirds. New Zealand mud snails are discussed below. Removal of beaver dams and beaver control under LORP are discussed in Section 2.3.7. Cowbirds are discussed in Section 11.4.5.

Noxious Weeds. Terms such as invasive weed or noxious weed are often used interchangeably to refer to unwanted, non-native plants that infest large areas or cause economic and ecological damage to an area. In this document, the term noxious weed is used broadly to mean any non-native plant species that is highly competitive, difficult to control, and destructive to native plants and habitats or agriculture.

The noxious weeds of primary concern related to implementation of the LORP are perennial pepperweed, Russian knapweed, and saltcedar due to their existing presence in the Owens Valley and the potential for economic and ecological damage. Other noxious weeds are present in the Owens Valley, but are not discussed specifically since they do not pose the same level of ecological and economic threat as saltcedar, perennial pepperweed and Russian knapweed. A fourth invasive species, Russian olive, also occurs in the LORP area and is described below.

10.4.1 Existing Conditions

10.4.1.1 New Zealand Mud Snail

The New Zealand mud snail (*Potamopyrgus antipodarum*) is an exotic mollusk that has become a global pest. The New Zealand mud snail is about 0.25 inches in size and reproduces asexually. It can be found in various aquatic habitat types from mud-bottom ponds to clear rocky streams, and can tolerate a wide range of environmental conditions. It can survive passage through the digestive tracts of many fish species. The mud snail feeds on dead and dying plant and animal material, algae, and bacteria, and there is no known natural biological control agent that can reduce population numbers. Certain parasites have been known to infect this species and make it vulnerable to predation, but this control is lacking in North America. The snails are known to spread by attaching to people, animals, and equipment of recreational users such as boots, waders, and watercraft. These snails can rapidly become the most dominant species and displace native aquatic macroinvertebrates (CDFG, no date). There is concern that the species will impact game fish, although its overall ecological impacts are still under investigation.

Since the late 1980s, New Zealand mud snails have been found in various locations in the United States, including the Snake River in Idaho, the Madison River in Wyoming, throughout the Greater Yellowstone ecosystem, the Columbia River in Oregon, and the Yellowstone River in Montana. In 2000, this species was found in the upper Owens River in Long Valley, Mono County. They have also been found in Bishop Creek Canal. To date, New Zealand mud snails have not been found in the Lower Owens River.

10.4.1.2 Perennial Pepperweed

Perennial pepperweed (*Lepidium latifolium*) is an herb that grows up to 6 feet in height. It is a widespread, noxious weed in the western United States. Pepperweed flowers from May through September, producing abundant small seeds. It reproduces from both seed and creeping roots. Seeds and root fragments are readily carried by flowing water to new sites. Plants become established in vegetated areas, displacing native vegetation. Aboveground parts die each fall and winter, and new stems sprout from the basal rosette each spring. It typically occurs in moist areas and tolerates saline and alkaline conditions. Typical conditions include wetlands, riparian areas, roadsides, irrigation ditches, irrigated fields and pastures, and orchards. The plant forms dense monocultures, displacing native plants. It provides minimal wildlife benefit, as it does not generally provide foraging habitat for native birds or mammals; however, there is some use of pepperweed by insects. It is an aggressive weed that expands rapidly and is difficult to control.

Perennial pepperweed is well established in northern Owens Valley, and is becoming an increasing problem as it invades wetland areas and irrigated pastures in the northern portion of the Owens River watershed. Its current distribution in the LORP area includes: a few isolated areas of the dry river channel below the River Intake, south of Manzanar Reward Road on the eastern side of the river in the wetted reach, and in the area of Mazourka Canyon Road and the Aqueduct (G. Milovich, pers. comm., July, 2003). Pepperweed in Georges Ditch was successfully treated by LADWP in 2003. This area will continue to be monitored for at least 5 years. In addition, pepperweed was found on the east side of the river near the confluence with Gorges Ditch; this site was treated by LADWP in early 2004.

10.4.1.3 Russian Knapweed

Russian knapweed (*Centaurea repens*) is a creeping, herbaceous perennial native of Eurasia. It is a widely established noxious weed in the western United States, and colonizes cultivated fields, orchards, pastures, roadsides, and rangelands. The adult plant is about 3 feet tall. Plants exhibit allelopathic effects (produce biochemicals that inhibit the growth of other plants) and are aggressively competitive, facilitating rapid colonization and development of dense stands. Stems dieback after flowering in summer, and new shoots are generated in spring. Its primary method of reproduction is from vegetative propagation, and severed root pieces as small as 1 inch can generate new shoots. Plants flower between May and September and usually produce small quantities of viable seeds, which disperse passively near the parent plant or with the seed head. Seeds can remain viable for 2 to 3 years (CDFA, 2001). Seeds can also be carried by flowing water to new sites. Russian knapweed can invade and persist in numerous ecosystems, and has been found in saline, alkaline, low lying areas, but prefers deeper soils with more available moisture. The plants are toxic to horses when sufficient quantities are consumed. Under most circumstances livestock will avoid grazing Russian knapweed because of its bitter taste (CDFA, 2001).

Currently, populations of Russian knapweed are present in the Bishop area and along the western LORP boundary south of Independence (G. Milovich, pers. comm., July 2003). No known populations of Russian knapweed are present within the LORP area (G. Milovich, pers. comm., February 2004).

10.4.1.4 Saltcedar

Saltcedar (*Tamarix ramosissima*) is a non-native invasive plant that spreads rapidly in the Owens Valley where conditions are favorable for its establishment. It was introduced into the United States in the early 1800s as a windbreak and ornamental. Since that time, it has invaded most major drainage systems in the Southwest, including the Owens Valley. It colonizes moist areas that have been disturbed by land clearing, grading, or other disturbances that remove native plants. Once established, saltcedar is a very hardy plant that can withstand adverse soil and weather conditions. It displaces native plants as it grows in size and reproduces, creating dense stands of tall shrubs. Saltcedar is undesirable because it threatens native plant communities and the associated wildlife.

Several adaptive features contribute to the success of saltcedar as an invasive weed. The high water use by saltcedar often leads to reduced water availability for native plants. Saltcedar is a prolific seed producer; a single plant can produce over 500,000 seeds per year. The seeds are small and easily dispersed by wind. They are produced from April to October and remain viable for several weeks. Saltcedar is also capable of reproducing vegetatively, even when severely damaged. Saltcedar is very resilient to a wide variety of stress factors including fire, drought, flooding, and high salinity. In addition, saltcedar exudes salts from its leaves, suppressing germination of native vegetation.

Saltcedar generally provides poor or unsuitable habitat for most wildlife because neither the leaves nor flowers and seeds have any significant forage value. However, saltcedar does provide cover for some bird species, including roosting and nesting habitat. Saltcedar invasion has serious consequences on the structure and stability of native plant communities. It can result in the decline and elimination of native riparian woodlands, which in turn, adversely affects the abundance and variety of wildlife. A secondary effect of saltcedar invasion is the increased frequency of fire because the high plant density and thick litter layer of saltcedar contributes to a higher fuel load. Saltcedar has no economic value (e.g., grazing).

In general, saltcedar invades areas where native plant cover has been removed or disturbed, exposing soils to allow the germination of saltcedar seeds. The most common disturbances that lead to saltcedar invasion are associated with man-made disturbances, such as construction and land clearing. However, saltcedar can colonize barren or lightly vegetated areas that are disturbed by natural processes, such as scouring by river flows, wind erosion, and small mammal activity. In these situations, the infestations are usually small and sparse.

Saltcedar occurs mainly in disturbed areas of the central and southern Owens Valley, including the LORP area. Approximately one-half of the saltcedar populations in the river channel and floodplain of the LORP have been treated and removed by the ongoing Inyo County Saltcedar Control Program (see Section 10.4.1.6). Along the currently dry reach of the Lower Owens River, dense stands of saltcedar previously occurred in the river channel and within the historical floodplain. These stands have all been removed by the Inyo County Saltcedar Control Program. Below the Five Culverts area where flow is present, saltcedar stands are less dense than in the dry reach, and are mostly limited to the riverbanks. Saltcedar is widespread within the Blackrock area, but there the plants form bushes rather than tall stands. In the Delta Habitat Area, saltcedar is present primarily along the east and west branches. Saltcedar in the Delta area is not present in dense stands as it has elsewhere in the Valley; however, many large trees are present.

10.4.1.5 Russian Olive

Russian olive *(Elaeagnus angustifolia)* is a non-native tree that has invaded portions of the wetted reach of the river channel, as well as the Blackrock Habitat Area and the Off-River Lakes and Ponds. Russian olive has also invaded native pastures within the LORP area. Like saltcedar, this plant was imported intentionally as an ornamental tree. It is a fast-growing tree of 10 to 25 feet in height, with 1- to 2-inch thorns on branches and trunks. Russian olive reproduces by seed, which is usually produced after trees are 4 to 5 years old. Seeds are ingested with the fruit by birds and small mammals and dispersed in their droppings. Seeds can remain viable for up to 3 years and are capable of germinating over a broad range of soil types. It can also resprout from the root crown (Bossard et al., 2000). While the fruit of the plant provides a source of food for wildlife, Russian olive habitats are less diverse than the native community they replace. When allowed to spread, Russian olive has the potential to become a serious weed problem (Whitson, et al., 1991).

10.4.1.6 Existing Noxious Weed Control Programs

There are several existing agencies and programs for control of noxious weeds in the Owens Valley, including the Inyo-Mono County Agricultural Commissioner's Office, the Eastern Sierra Weed Management Area, Inyo County Saltcedar Control Program, and LADWP activities.

Agricultural Commissioner and Eastern Sierra Weed Management Area. The California Department of Food and Agriculture (CDFA) designates ratings for exotic pest plants (Cal-IPC, 1999):

- "A" CDFA policies call for eradication, containment or entry refusal.
- "B" Includes species that are more widespread, and therefore more difficult to contain. Agency allows county Agricultural Commissioners to decide if local eradication or containment is warranted.
- "C" Includes weeds that are so widespread that CDFA does not endorse state or county-funded eradication or containment efforts except in nurseries or seed lots.
- "Q" Temporary "A" rating pending determination of a permanent rating.

These ratings reflect CDFA's view of the statewide importance of the pest, the likelihood that eradication or control efforts would be successful, and the present distribution of the pest within the state. The ratings are not laws, but are policy guidelines that indicate the most appropriate action to take against a pest under general circumstances. Local conditions may dictate more stringent actions at the discretion of the county Agricultural Commissioners, and the rating may change as circumstances change (CDFA, 2004).

The Inyo-Mono County Agricultural Commissioner (Agricultural Commissioner) is the local enforcement agent for the CDFA and the Department of Pesticide Regulation. The Agricultural Commissioner manages agricultural programs and enforcement activities at the county level including weed control and pesticide use enforcement. In addition, the Agricultural Commissioner works with landowners and lessees to monitor and treat weeds that are considered a priority both in Inyo and Mono Counties.

The Agricultural Commissioner also facilitates the Eastern Sierra Weed Management Area (ESWMA), which is a group of agencies and organizations that coordinate efforts to control noxious weeds in a 2.5 million-acre area of Inyo and Mono Counties from Bridgeport to Little Lake. In accordance with a Memorandum of Understanding, ESWMA member organizations contribute personnel and equipment, and cooperate in procuring grants and aid. (A copy of the Memorandum is available at the Agricultural Commissioner's office.) In addition, ESWMA has a public outreach program, which educates the public on how to identify weeds and who to contact if they find them. ESWMA consists of the following organizations:

- Inyo-Mono County Agricultural Commissioner's Office
- Bureau of Land Management
- Natural Resource Conservation Service
- Inyo National Forest
- Toiyabe National Forest
- California Department of Food and Agriculture
- California Department of Forestry
- California Department of Transportation
- Inyo/Mono Resource Conservation District
- Inyo County Water Department
- Los Angeles Department of Water and Power
- Inyo/Mono Counties Cattlemen's Associations

Within the LORP area, ESWMA has contributed the following:

- Approximately $2,500 of grant funds to the Inyo County Saltcedar Control Program to purchase herbicide for the treatment of saltcedar in the dry reach of the river.
- Grant funds to support the treatment by the Agricultural Commissioner of perennial pepperweed within the LORP area.
- Approximately $200 of grant funds to the Inyo County Saltcedar Control Program to support the development of a training video, which was taped in the LORP area. The video is used to train saltcedar crews each year.

ESWMA's Strategic Management Plan (Appendix I) outlines the actions that ESWMA and its member organizations will take in order to control noxious weeds in Inyo and Mono Counties. The current plan was last revised in 2001, and ESWMA member organizations are in the process of reviewing and updating the document. The Strategic Management Plan includes a list of priority weed species, which was developed based on their economic and ecological impacts, CDFA's plant pest ratings, California Invasive Plant Council's (formerly known as the California Exotic Pest Plant Council) list of exotic pest plants, and historical occurrence and eradication efforts. The priority species are for the two counties as a whole; not all are equally problematic in all areas. Weed control activities are not limited to species on the priority list, but the list is intended to help prioritize weed control projects and may be modified or amended as needed. The priority weed species listed in the ESWMA Strategic Management Plan include the following (order does not denote importance; CDFA's rating is indicated in parentheses):

- Canada thistle (*Cirsium arvense*) (B)
- Scotch thistle (*Onopordum acanthium ssp. acanthium*) (A)
- Yellow starthistle (*Centaurea solstitialis*) (C)
- Perennial pepperweed (*Lepidium latifolium*) (B)
- Russian knapweed (*Centaurea repens*) (B)
- Spotted knapweed (*Centaurea maculosa* Lam.) (A)
- Halogeton (*Halogeton glomeratus*) (A)
- Dalmatian toadflax (*Linaria genistifolia ssp. dalmatica*) (A)
- Camelthorn (*Alhagi pseudalhagi*) (A)
- Puncture vine (*Tribulus terrestris*) (C)
- Saltcedar (*Tamarix ramosissima*) (no CDFA rating)

While it is not listed in the existing Strategic Management Plan, hoary cress (*Cardaria draba)* is another weed species that occurs in the Owens Valley (CDFA B-rated species) and is treated by the Agricultural Commissioner.

Inyo County Saltcedar Control Program. The 1991 Inyo County/Los Angeles Long Term Water Agreement includes a program for saltcedar control on LADWP lands in the Owens Valley. Under Section II-XIV-A of the Agreement, LADWP provided to Inyo County payments of $350,000, $200,000 and $200,000 in 1997, 1998, and 1999, respectively. Under the same provision of the Agreement, LADWP has provided $50,000 a year (with adjustments for inflation) to the County since 2000 for annual maintenance and control efforts. These annual payments will continue unless the Inyo County Board of Supervisors and LADWP agree that the saltcedar control program is to be reduced in scale or terminated. With the funds provided by LADWP, the County initiated the Inyo County Saltcedar Control Program. Since 1997, the program's efforts have been focused on treating existing saltcedar within the Lower Owens River channel and the adjacent floodplain. Although the saltcedar control program is a separate project from LORP, continuation of the program's work within the LORP area will improve the overall success of the project.

The extent of the Inyo County Saltcedar Control Program as funded by LADWP under the Agreement has not been sufficient to control all of the saltcedar populations in the LORP area. Therefore, the County has sought and received grant funding for saltcedar control along the Lower Owens River channel in the amount of $740,000 from the California Department of Transportation and the California Wildlife Conservation Board (WCB). As of April 2004, these grants were fully expended. In February 2004, the WCB awarded a second grant to the County in the amount of $560,000 to continue the saltcedar control program along the Lower Owens River channel and floodplain. The County intends to seek additional funds to continue the saltcedar control program. As described in Mitigation Measure V-3 (see Section 10.4.4), LADWP has agreed to provide matching funding for LORP saltcedar control equal to the amount obtained by the County up to a total of $1.5 million (not to exceed $500,000 in any given year). This matching funding will be in addition to the funds provided by LADWP for saltcedar control under the Agreement. LADWP will commence providing funding by matching the $560,000 WCB grant. It should be noted that the WCB grant funds must be used for saltcedar control along the channel of the Lower Owens River. In contrast, the matching funds provided by LADWP can be used anywhere within the LORP area and can also be used to fund mitigation of saltcedar impacts. (Funds provided by LADWP under the Agreement may be used on LADWP land anywhere in the Owens Valley.) Thus, if the County successfully obtains a total of $1.5 million (including the $560,000 WCB grant), there will be a total of $3 million available for LORP saltcedar control.

By April 2004, the Inyo County Saltcedar Control Program reached Mazourka Canyon Road on the Lower Owens River Channel, about 25 miles from the River Intake where saltcedar control efforts began. As funding allows, the saltcedar control program will continue treating existing saltcedar within in the LORP area according to the following order of priority:

- The river channel and floodplain from Mazourka Canyon Road to and including the Delta Habitat Area
- Portions of the LORP area at greatest risk of experiencing new saltcedar infestations caused by the project, including:
  - currently dry areas that will be wetted under LORP
  - areas with limited native vegetation cover
  - areas with greatest potential for revegetation to occur
- Currently wet areas such as the Off-River Lakes and Ponds and portions of the Blackrock Habitat Area
- Saltcedar populations that serve as seed sources for new saltcedar infestations

The saltcedar control program uses the cut stump treatment to treat adult plants. The program conducts annual follow-up treatments of previously treated saltcedar plants until the plants stop generating new sprouts. Where applied, saltcedar controls have been effective.

LADWP Activities. As a member organization of the ESWMA, LADWP currently spends $60,000 to $70,000 a year for noxious weed management efforts on its lands in the Owens Valley in addition to the funds provided to the Inyo County Saltcedar Control Program described above. LADWP’s funds for noxious weed control are used as matching funds when ESWMA receives outside grants. LADWP has also conducted outreach programs to educate the lessees and the general public on identification and reporting of noxious weeds. LADWP has three staff members certified in treatment of noxious weeds, who conduct treatment in known weed infested areas mapped by the Agricultural Commissioner, monitor previously treated areas for resprouting, and respond to reports by lessees, LADWP field staff, and the general public. Lessees also carry out treatment of noxious weeds on their leases.

10.4.2 General Methods of Deleterious Species Prevention and Control

10.4.2.1 New Zealand Mud Snails

To date, no method of eradication for New Zealand mud snails has been successfully applied to large, open river systems (CDFG, 2003). Chemical control methods are currently not available since there are no pesticides that specifically target the species. The risk of new infestations can be reduced by informing anglers and other recreationists who enter infested waters to inspect and clean their equipment before moving to a new stream. Precautionary measures for anglers and other recreational users include: scrubbing and rinsing waders, boots, watercraft, and equipment before leaving the water (using hot water or drying will enhance this measure); disposing fish entrails in proper trash receptacles; and reporting to the Non-indigenous Aquatic Species Toll Free Hotline if this species is observed. LADWP currently has an agreement with CDFG, which allows CDFG to post informational signs on LADWP lands in areas of high human/recreational uses to help prevent the spread of these snails. LADWP and County staff also wash their equipment after working in infested areas.

10.4.2.2 Noxious Weeds

Management of noxious weeds requires a combination of preventative measures to reduce the introduction and spread of weeds, early detection of new infestations, and timely treatment. Noxious weed control measures that have been used in the Owens Valley are described below.

Prevention through Flow and Land Management

Concerns have been raised regarding the potential for deleterious species to colonize habitats in the LORP and prevent attainment of LORP goals. LADWP and Ecosystem Sciences have undertaken restoration projects in the Mono Basin, Long Valley (Hill, et al., 2002) and the Owens River Gorge (Hill and Platts, 1998). In several of these previous projects (e.g., Parker Creek, Walker Creek, Lee Vining Creek, Rush Creek, and Owens River Gorge), dry channels lacking healthy riparian systems were restored without incurring any significant exotic weed problems. The approach used in these projects was to apply a flow regime that mimics natural hydrology while applying grazing and recreational management strategies to minimize disturbance. The intent and actual results of this combined approach are to provide conditions that support establishment of native riparian species over exotics. This approach is the basis for the flow and land management actions proposed under the LORP and described in Section 2.0. Based on these past restoration experiences, it is anticipated that LORP's restoration approach will also favor establishment of native species and thus minimize new infestations of exotic species.

Early Detection

Early detection of noxious weeds enables timely treatment of weeds and prevents large-scale weed infestations that become costly to treat. Through existing public education, outreach and training in weed identification and reporting, local residents and visitors are asked to help locate previously unknown weed populations and supplement the monitoring efforts by formal weed management programs. ESWMA has developed and distributed a weed identification handbook, which includes photos and descriptions of weeds. ESWMA also conducts public outreach at various local events through use of informational booths, posters, brochures, and handouts (G. Milovich, pers. comm., May 2003). The Agricultural Commissioner's Office is conducting an ongoing mapping program to document the locations of known populations of noxious weeds in Inyo and Mono Counties. The Inyo County Saltcedar Control Program also conducts monitoring of previously treated saltcedar populations to identify and treat re-sprouting. Currently, if other noxious weeds are found during these surveys, the saltcedar control crew documents their locations and reports to the Agricultural Commissioner and LADWP.

Treatment

Treatment of noxious weeds requires species-appropriate methods and involves a combination of mechanical and chemical means. Current treatment methods are discussed below. If new effective methods become available in the future, they may be incorporated into the weed management program under LORP.

Perennial Pepperweed. The primary treatment method for perennial pepperweed is application of chemical herbicide such as Telar® (G. Milovich, pers. comm., May 2003). Plants may be removed by hand when infestations are limited in size and herbicide use is not appropriate (i.e., in the vicinity of open water or rare plants). No biological control agent is currently approved for perennial pepperweed. Many valuable crop species belong to the same family as perennial pepperweed; therefore, the impact of a prospective biological control organism on agricultural crops and other closely related native species must be established before its use will be allowed (Krueger, 1999).

Russian Knapweed. The primary treatment method for Russian knapweed is application of chemical herbicide such as Garlon 4®, Banvel, and 2,4-D (G. Milovich, pers. comm., January 2004). Plants may be removed by hand when infestations are limited in size and herbicide use is not appropriate (i.e., in the vicinity of open water or rare plants). Currently, there are no biological controls for Russian knapweed.

Saltcedar. Saltcedar treatment methods used in the Owens Valley include the following:

- Hand pulling of small plants
- Cut stump treatment (The plant is cut at the base, then Garlon 4®, a chemical herbicide, is applied to prevent re-sprouting.)
- Basal bark applications of herbicide (The lower portions of smaller plants are sprayed with Garlon 4®.)
- Foliar applications of herbicide
- Cutting and submerging the plants under water for extended periods, typically 2 weeks (The required duration of submersion depends on environmental conditions such as turbidity of the water, since availability of light promotes saltcedar re-sprouting.)

In addition, use of the Chinese tamarisk leaf-eating beetle, a natural insect predator to saltcedar, is currently being studied in the Owens Valley under the direction of U.S. Department of Agriculture.

Russian Olive. Treatment methods for Russian olive include hand-pulling of seedlings and sprouts and application of herbicides (e.g., glyphosates such as Roundup®) to cut stumps. The cut-stump method consists of cutting the stem close to the ground and painting a mixture of herbicide and vegetable oil to the stump within 15 minutes. In some cases, follow up treatment consisting of additional herbicide application is needed for a few years. LADWP has applied the cut-stump method to Russian olive populations in the Owens Valley. Goat grazing is another method that has been successfully applied in Idaho and New Mexico. Goats kill plant stems by removing the bark. The Agricultural Commissioner currently does not conduct treatment for Russian olive (G. Milovich, pers. comm., March 2004).

Treatment of Noxious Weeds in the Vicinity of Known Locations of Rare Plants. If noxious weeds are found during LADWP's annual rare plant surveys, the survey crew notifies LADWP and appropriate treatment is administered jointly by staff with expertise in identifying rare plants and staff qualified for noxious weed treatment. Noxious weed treatment in the vicinity of rare plants is conducted using a weed wipe (equipment designed to apply herbicides only to plants that come into contact with the applicator) or by hand, as necessary, to prevent any adverse effects of herbicide application on the rare plants. As described in Section 2.8.1.2, this existing practice will be continued under LORP.

10.4.3 Potential Impacts

The MOU includes the following goal: "Control of deleterious species whose presence within the Planning Area interferes with the achievement of the goals of the LORP. These control measures will be implemented jointly with other responsible agency programs."

10.4.3.1 New Zealand Mud Snail

With implementation of LORP, there is potential for the New Zealand mud snail to spread to the project area due to increased recreational uses and the hydrologic connection to the Owens River upstream of the

River Intake, where the snails currently exist. Continuation of existing CDFG outreach programs and precautions taken by LADWP and County staff as described in Section 10.4.2.1 are anticipated to slow the spread of New Zealand mud snail colonization throughout the river, but it is anticipated that the species will eventually be present in the Lower Owens River. Implementation of LORP may allow for colonization of New Zealand mud snails, but would not be the only cause of the colonization. **Hence, the potential introduction of the New Zealand mud snail into the Lower Owens River is considered an adverse, but not significant impact (Class III).** Implementation of Mitigation Measures V-4, V-5, and V-6 below would further reduce this impact.

10.4.3.2 Noxious Weeds other than Saltcedar

Russian Olive. Rewatering the Lower Owens River and supplying water to the Delta and to the Blackrock areas could potentially increase the distribution and abundance of Russian olive by distributing seeds from existing populations. It should be noted that Russian olive provides a source of food and habitat for wildlife and stabilizes channel banks. Unlike saltcedar, Russian olive allows for development of understory and therefore provides some structural diversity.

Perennial Pepperweed. Rewatering the Lower Owens River and supplying water to the Delta and to the Blackrock areas could potentially increase the distribution and abundance of perennial pepperweed by distributing seeds from upstream sources. The rewatering of the river would create new wetted channel areas (e.g., river channel and banks upstream of Mazourka Canyon Road). Once wetted, these areas would be susceptible to pepperweed infestation. The creation of new wetted areas in the Delta and in the Blackrock areas will make those areas susceptible to pepperweed infestation. The anticipated increase in recreation as a result of LORP implementation may also contribute to an increased risk of pepperweed infestation from seed dispersion by foot and vehicular traffic.

Russian Knapweed. Rewatering the Lower Owens River and supplying water to the Delta and to the Blackrock areas could potentially increase the distribution and abundance of Russian knapweed by distributing seeds from upstream sources. The anticipated increase in recreation as a result of LORP implementation may also contribute to an increased risk of Russian knapweed infestation from seed dispersion by foot and vehicular traffic.

As described above, **the potential increase in perennial pepperweed, Russian knapweed, and other noxious weeds would be deleterious to native habitat and is considered significant, but mitigable (Class II).** Implementation of Mitigation Measures V-1, V-2, and V-4 would control potential new infestations of perennial pepperweed, Russian knapweed, and other noxious weeds resulting from the LORP to less than significant levels.

The potential for noxious weed infestation is expected to be greatest in the initial years after LORP implementation when changes in environmental conditions are favorable to noxious weeds. If infestations of noxious weeds are controlled during the initial years, native species will be given the opportunity to establish in the rewetted areas. Once the native species have been established, the risk of noxious weed infestation is anticipated to stabilize. Based on experiences from past restoration projects implemented by LADWP (see Section 10.4.2.2), 7 years after LORP implementation is considered a reasonable estimate of the time frame during which concentrated monitoring and treatment program (to be implemented under Mitigation Measure V-2) is needed. After 7 years, if continuation of non-saltcedar noxious weed control is necessary, it will be a post implementation cost (Section 2.2.2.2).

10.4.3.3 Saltcedar

The rewatering of the river will create new wetted channel areas, including areas that are currently barren of riparian vegetation. For example, much of the river channel and banks upstream of Mazourka Canyon Road lack riparian vegetation due to the lack of flows in the river since 1913. Once wetted, these areas will be susceptible to saltcedar infestation from existing saltcedar populations within the LORP area. The proposed flooding of the Blackrock area will also potentially create additional areas for saltcedar colonization. Under LORP, the proposed baseflows to the Delta would result in increased flows during the summer (saltcedar growing season) over existing conditions, which would create areas susceptible to saltcedar colonization. The proposed pulse flows to the Delta and any seasonal habitat flows that bypass the pump station during the summer would also result in conditions that may be conducive to saltcedar infestation. An increase in saltcedar infestations in the LORP area would result in increased water consumption, and could also result in displacement of existing native riparian vegetation, which would have adverse impacts on the abundance and variety of wildlife. In addition, an increase in saltcedar within the LORP boundary would increase the seed source throughout the region, potentially resulting in increases in saltcedar outside the project area. In view of the extent of existing saltcedar populations within the LORP area that could serve as seed sources, the invasiveness and persistence of saltcedar, and the new areas that could be susceptible to saltcedar infestation as a result of LORP, **the potential increase in saltcedar resulting from the project is considered significant, but mitigable (Class II).**

Implementation of Mitigation Measures V-1, V-3, and V-4 below in combination with the WCB grant to the Inyo County Saltcedar Control Program (see Section 10.4.1.6) would control potential new saltcedar infestations resulting from the LORP to less than significant levels. From 1998 to June 2004, the Inyo County Saltcedar Control Program has been funded sufficiently to successfully control, treat, monitor, and maintain over one-half of the Lower Owens River channel and floodplain saltcedar populations. Based on this past experience, the potential for a significant increase in saltcedar is considered to be mitigable through the additional guaranteed funding of the Inyo County Saltcedar Control Program as itemized in Mitigation Measure V-3.

10.4.4 Mitigation Measures

V-1 **Implement Measures to Minimize New Infestations.** LADWP shall implement the following actions to minimize infestations of noxious weeds:

1. Construction and other disturbance of substrates will be minimized.
2. When possible, good water circulation will be provided in project wetlands to minimize accumulation of salts to prevent saltcedar infestation.
3. The use of fire for vegetation management will be minimized.
4. To the extent possible, LADWP will initiate flow releases and initiate dry phases within the Blackrock area between November 1 and March 15 (i.e., when saltcedar is not producing seed) to minimize the chance of invasion by saltcedar.
5. Construction equipment will be maintained "weed free" by washing and inspecting equipment used in weed-infested areas prior to moving to another site.
6. On-site fill materials for construction will be used to the extent possible. If off-site fill materials are necessary, they will be taken from borrow pits located in areas that are free of noxious weeds.

V-2 **Provide Funding to the Inyo-Mono County Agricultural Commissioner.** LADWP shall provide $50,000 per year to the Agricultural Commissioner to fund the monitoring and control of new infestations of perennial pepperweed and other noxious weeds (excluding saltcedar) in the LORP project area for the first 7 years of LORP implementation. In addition, LADWP shall provide $150,000 per year for the first 7 years to the Agricultural Commissioner to fund the control of existing perennial pepperweed and other noxious weed populations outside of the LORP area that could serve as seed sources for the LORP area.

The Agricultural Commissioner will develop protocols for monitoring and controlling infestations based upon past experience and current literature. Based on the protocols, the Agricultural Commissioner will use the funds to identify and treat new infestations of noxious weeds within the LORP area in a timely manner, with priority given to the riparian areas. Existing infestations outside of the LORP area that could serve as seed sources for the LORP area will also be monitored and treated. A Memorandum of Understanding between the Agricultural Commissioner and LADWP will be entered into, and will outline the responsibilities of each agency under the protocols.

V-3 **Provide Funding to and Coordinate with the Inyo County Saltcedar Control Program.** In addition to LADWP's contribution to the existing Inyo County Saltcedar Control Program, LADWP will provide funding to Inyo County in order for the County's Saltcedar Control Program to implement the following measures (the measures described below are in addition to the activities that will be conducted as part of the continuation of the existing Inyo County Saltcedar Control Program described in Section 10.4.1.6.):

- **Monitoring and Treatment of New Saltcedar Infestations**

Protocols for monitoring and treating new saltcedar infestations in the project area will be developed and implemented by the Inyo County Saltcedar Control Program in cooperation with LADWP. The protocols will include, but not be limited to, the following:

1. Prioritization for monitoring and treatment of areas that are to undergo a change in hydrologic status and that do not have an established cover of native plants.
2. Provisions for treating new saltcedar infestations, including protocols for treating saltcedar near rare plant populations.
3. Provisions for annual pedestrian monitoring of project areas potentially subject to saltcedar infestations.
4. Provisions for annual follow-up treatments of previously treated saltcedar infestations.

- **Treatment of Saltcedar Seed Sources**

If the ongoing Inyo County Saltcedar Control Program is not able to achieve the priorities for the control of existing saltcedar populations in the LORP area identified in Section 10.4.1.6, the control of existing saltcedar populations will be completed as part of this mitigation measure.

- **Coordination**

In addition to the above, the program will include:

1. LADWP will provide to the Saltcedar Control Program reports and data compiled through the LORP monitoring program concerning flows and water levels related to the

river baseflow and seasonal habitat flows, releases to the Delta, and water levels at the Off-River Lakes and Ponds and in the Blackrock area.

2. LADWP will notify the Saltcedar Control Program of the timing and extent of annual seasonal habitat flows, increased flow releases to Blackrock units, pulse flows to the Delta, and other changes in land management that could cause a new infestation of saltcedar.
3. LADWP will provide to the Saltcedar Control Program work products relevant to saltcedar control that are prepared through the LORP monitoring program, such as maps, imagery, etc.

- **Funding**

LADWP will provide matching funds for LORP saltcedar control equal to the amount obtained by the County up to a total of $1.5 million as described in Section 10.4.1.6. LADWP will provide a guaranteed funding of $560,000.The intent of this mitigation measure is to suppress increases in saltcedar resulting from LORP implementation. If continuation of the LORP-focused saltcedar control program is required and the matching funds described above are exhausted, funding for the program will be an ongoing post-implementation cost (Section 2.2.2.2).

V-4 **Conduct Training Program for LADWP Personnel and Lessees.** LADWP shall conduct a training program for LADWP and Inyo County personnel, lessees, and their employees working within the LORP area on identification and reporting of noxious weeds, including saltcedar, and New Zealand mud snails. The training will be conducted at LADWP or Inyo County facilities in the Owens Valley. The Eastern Sierra Weed Management Area Noxious Weed Identification Handbook will be provided to program participants. The instruction will detail how to accurately describe their locations to aid in verification and timely response and identify the agencies to which sightings of the species should be reported. As new personnel are hired or when training is updated, a refresher course will be provided. In addition, photos of relevant deleterious species will be posted in the assembly rooms of appropriate LADWP and Inyo County facilities.

V-5 **Coordinate with CDFG to Implement Public Outreach Program for Preventing the Spread of New Zealand Mud Snails.** Upon the implementation of the LORP, LADWP, in coordination with the California Department of Fish and Game, shall expand the existing public outreach program for preventing the spread of New Zealand mud snails to cover the LORP area. LADWP will post information signs instructing the public on how to identify New Zealand mud snails and notifying recreational users to take precautionary measures to prevent the spread of New Zealand mud snails. The signs will be posted at key access points to the LORP area, such as Mazourka Canyon Road, Manzanar Reward Road, the pump station, and the Delta. The precautionary measures that will be described on the signs include: scrubbing and rinsing waders, boots, watercraft, and equipment before leaving the water (using hot water or drying will enhance this measure); disposing of fish entrails in proper trash receptacles; and reporting to the Non-indigenous Aquatic Species Toll Free Hotline if this species is observed.

V-6 **Implement Measures to Prevent Spread of New Zealand Mud Snails during Project Construction and Maintenance.** During project construction and maintenance, LADWP and the County will completely dry construction equipment between use in water infested with New Zealand mud snails and non-infested water. If this is not feasible, the equipment will be steam cleaned before being used in non-infested water.

10.5 WATER SUPPLY IMPACT

10.5.1 Water Requirements and Losses Associated with the LORP

The water requirements to implement the LORP are described below, including the amount of water released to the river; the amount retrieved by the pump station; and the amount lost due to channel losses and evapotranspiration along the river, at Blackrock, and at the Delta. A summary of the water requirements and losses associated with the LORP is presented in Table 10-5.

There will be no significant change in the average annual amount of water provided for irrigation and stockwater needs on LADWP leases in the LORP project area; therefore, these uses are not addressed as an impact to LADWP's water supply.

Channel Losses Associated with Releases to the River

Loss rates along the Lower Owens River were estimated by Inyo County (Jackson, 1994b) based on several different methodologies. The primary method relied upon the observed losses during the experimental flows to the lower river in 1993. Releases to the river were made from the River Intake from July 6 to August 12, 1993 to gather data to analyze alternative flow regimes for the LORP. Releases ranged up to 155 cfs and reached the Delta.

During the 1993 field experiment, releases from the River Intake were supplemented by releases from Blackrock, Independence, Locust, Georges, and Alabama spillgates. Eight metered sections with staff gauges were established along the river from the intake to Keeler Bridge. Flows of 20, 40, and 80 cfs were established for sufficient time to collect flow, fisheries, and water quality data along each reach. The flow data from this study provided a basis for several estimates of channel loss and evapotranspiration along the river.

The first method consisted of calculating channel loss (herein defined to include loss to alluvial aquifer and evapotranspiration) based on instantaneous stream flow measurements. Based on this method, the mean channel loss along the river under moderate flows (i.e., 40 cfs) was estimated to be 0.79 cfs per mile, with a range of 0.49 to 1.53 cfs per mile. The second method utilized the streamflow data throughout the entire 1993 experiment in which flows varied greatly. Based on this method, the mean channel loss along the river was estimated to be 1.3 cfs per mile, with a range of 0.15 to 3.68 cfs per mile.

Both of the above methodologies are based on transient losses during the experimental releases, and therefore, do not represent steady-state conditions. In addition, they do not take into account the increased evapotranspiration expected to occur along the river as new riparian vegetation increases.

Jackson (1994b) also estimated evapotranspiration losses along the river by estimating average evapotranspiration of existing riparian vegetation types located along the river, multiplied by the area of the vegetation adjacent to the river. Based on this method, the evapotranspiration rate along the river under current conditions is about 0.2 cfs per mile. This method does not include channel losses to deeper aquifers or lateral groundwater movement, nor does it take into account the increased evapotranspiration expected to occur along the river as new riparian vegetation increases.

Jackson (1994b) estimated channel losses between the spillgates and the river to be about 1.0 cfs per mile based on streamflow observations by LADWP. He also estimated the losses from the reach between Keeler Bridge and the pump station, which was not gauged during the 1993 experimental releases, to be 0.31 cfs. Inyo County has indicated in recent discussions that this loss rate is probably an underestimate (Randy Jackson, pers. comm., 10/1/01).

Jackson (1994b) provided an estimate of total channel losses along the river under the initial 40-cfs flows of 36,341 acre-feet per year, of which 8,100 acre-feet would be due to spillgate channel losses. The estimated losses along the river of 28,241 acre-feet per year would represent an average loss of 0.63 cfs over the 61.6-mile long project reach.

Channel losses are likely to be less than those observed in 1993 once the alluvial aquifers along the river and spillgate channels have been filled. However, the evapotranspiration rates may be higher than estimated using existing vegetation types as riparian vegetation cover increases over time. Typical channel losses in arid regions along water conveyance channels are about 1 cfs per mile.

Based on the above information and previous estimations of channel losses, for the purpose of this analysis it is estimated that channel losses during the initial rewatering (years 1 and 2 or longer) would be about 1 cfs per mile. Inyo County believes that this value is a reasonable estimation of initial channel losses along the river (Randy Jackson, pers. comm., 10-01-01). Using this value, the estimated annual channel loss during the initial years would be 44,600 acre-feet per year (see Table 10-2). In addition, channel losses along the spillgate channels would be about 8,100 acre-feet per year, based on the assumption that four spillgates would be used for the initial rewatering to mitigate water quality and fish impacts. Hence, there will be an annual loss of up to 52,700 acre-feet in the river and spillgate channels during the initial years.

Channel losses after the initial years are expected to be reduced as flood plain aquifers are filled. However, evapotranspiration will likely increase due to a greater coverage of riparian and wetland vegetation along the river. Jackson (1994b) estimates evapotranspiration along the river from current riparian vegetation is 8,119 acre-feet per year. Based on a water usage factor of 5 feet per year for riparian vegetation, this estimate translates into a 217-foot wide riparian vegetation corridor along the river. Rewatering the river is expected to increase riparian vegetation productivity and areal extent. As a conservative approach, it is estimated that the channel losses, consisting primarily of evapotranspiration, during steady state conditions along the river would be twice the calculated evapotranspiration of current vegetation – that is, about 16,000 acre-feet per year. This loss represents a loss rate of 0.35 cfs per mile, about one-third the rate estimated for initial rewatering.

Channel losses along spillgates would be less than under the initial watering years, as spillgates would only be used infrequently for maintaining river baseflows. It is assumed that channel losses along spillgate channels would be reduced by 50 percent to 4,000 acre-feet per year. Based on these conservative considerations, the total average annual channel losses due to baseflows once steady state conditions exist could be about 19,600 acre-feet per year (see Table 10-1).

TABLE 10-1
AMOUNT OF WATER RELEASED AND CHANNEL LOSSES DURING SEASONAL HABITAT FLOWS

Day	Flow (cfs)	Seasonal Flows (cfs) Above 40 cfs Baseflows	Quantity Released (acre-feet) Above the 40 cfs Baseflows	Flow (cfs) above 40 cfs that Reaches Pump Stn with 1 cfs/mi Loss Rate	Quantity (acre-feet) Reaching Pump Stn with 1 cfs/mi Loss Rate	Channel Losses (acre-feet) at 1 cfs/mi Loss Rate
1	50	10	20			20
2	63	23	46			46
3	79	39	77			77
4	99	59	117			117
5	124	84	166	22	44	122
6	155	115	228	53	106	122
7	200	160	317	98	195	122
8	160	120	238	58	116	122
9	128	88	174	26	52	122
10	102	62	123			123
11	82	42	83			83
12	66	26	51			51
13	53	13	26			26
14	40	0	0			0
Total =			1,665		513	1,152

1 cfs per day = approximately 1.98 acre-feet per day. The seasonal habitat flows will vary from year to year depending upon runoff. The average annual peak release rate is estimated at 150 cfs (see Section 2.3.5.3). The maximum peak release rate is 200 cfs.

Seasonal habitat flows of up to 200 cfs may undergo higher channel losses than baseflows because: (1) flows across the floodplain may encounter depressions where water could be detained, resulting in higher percolation than in the channel; and (2) flows across the floodplain may encounter more dewatered storage conditions in the alluvium compared to the channel banks. No empirical data on channel losses during high flows are available. However, in the absence of such data, the estimated channel loss rate during seasonal habitat flows is estimated to be the same as channel losses during initial rewatering – 1 cfs per mile. The actual annual loss due to seasonal habitat flows will vary depending upon the maximum flow required based on the forecasted runoff in the valley.

The amount of water released from the River Intake during a seasonal habitat flow release regime of 200 cfs is estimated to be 1,665 acre-feet, as shown below in Table 10-1. Based on a channel loss rate of 1 cfs per mile (see Table 10-1), the total channel losses over the 61.6 miles of the river would be about 1,152 acre-feet. As a result, only 513 acre-feet would reach the pump station (see Table 10-2).

TABLE 10-2
ESTIMATES OF CHANNEL LOSSES DURING INITIAL FLOWS, BASEFLOWS, AND SEASONAL FLOWS

	Reasonable Estimate of Average Annual Losses (acre-feet)	Estimated Loss Rate (cfs per mile)
Initial Rewatering (Years 1 and 2)		
Channel losses* along the river as 40-cfs baseflows are established**	44,600	1.0
Channel losses in spillgate channels for flows to support 40-cfs baseflows	8,100	1.0
Total =	52,700	
Steady State Conditions		
Channel losses along river during 40-cfs baseflows along river***	15,600	0.35
Channel losses in spillgate channels	4,000	<1.0
Total =	19,600	
Channel losses during 200-cfs seasonal habitat flows (see Table 10-1)	1,152	1.0

*Channel loss includes bank and bed percolation into alluvial aquifers and evapotranspiration. 1 cfs/yr = 724 acre-feet/yr. ** River intake to pump station, 61.6 miles. Loss calculated as 61.6 cfs losses over the entire river over a 1-year period multiplied by 724 acre-feet. *** Loss calculated as 21.5 cfs losses over the entire river over a 1-year period multiplied by 724 acre-feet.

Water Supply Losses Due to Flows Bypassed to the Delta

The pump station will bypass an annual average of 6 to 9 cfs to the Delta. An estimate of the water bypassed to the Delta assuming the constant release of the initial baseflow of 5.3 cfs and the release of four pulse flows is provided below in Table 10-3.

As described above, seasonal habitat flows released from the River Intake would be subject to channel losses. An estimate of the flows that would reach the pump station based on a 200-cfs seasonal habitat release is provided in Table 10-1. This analysis shows that seasonal habitat flows above the 40-cfs baseflow would only occur for 5 days, and would total 513 acre-feet. The maximum flow at the pump station would be 98 cfs. Up to 50 cfs of the seasonal habitat flows reaching the pump station would be captured and diverted to the Aqueduct and or to the Owens Lake Dust Mitigation Project, as described in Section 2.4.3 and shown in Table 6-9.

TABLE 10-3
SUMMARY OF PROPOSED PULSE AND BASE FLOWS TO THE DELTA

		Duration (days)	cfs/day	acre-feet/ period
1	Period 1	10	25	496
2	Period 2	10	20	397
3	Period 3	10	25	496
4	Period 4	5	30	298
5	Total =	35		1,687
6	Total Baseflows =	330	5.3	3,463
Total annual water requirements (sum of Lines 5 and 6) and equivalent average annual flow (calculated based total pulse flow and baseflow quantities divided by 365 days)		365	7.1	5,150

* This table does not include seasonal habitat flows that could reach the Delta. 1 cfs per day = approximately 1.98 acre-feet per day. If the 5.3 cfs baseflow assumed in this table is increased so that the annual release of baseflow and pulse flow totals 9 cfs, the annual release to the Delta would increase to approximately 6,500 acre-feet per year.

Water Requirements to Maintain Off-River Lakes and Ponds

LADWP flow records from 1990 to 2002 show the volume of water needed to maintain the off-river lakes and ponds (e.g., Thibaut Ponds, Upper and Lower Twin Lakes, Goose Lake, and Billy Lake). These records indicate the following. The average annual volume of water from the Thibaut spillgates to maintain Thibaut Pond is 1,141 acre-feet per year. The average annual volume of water released from spillgates along the Blackrock ditch to maintain Upper and Lower Twin Lakes is 885 acre-feet per year. The average annual volume of water released from the Waggoner spillgate to maintain Goose Lake is 2,234 acre-feet per year. This number also includes water that currently spreads in the Waggoner Unit of the Blackrock Waterfowl Area. The average annual volume of water released from the Independence spillgate is 1,060 acre-feet per year to maintain Billy Lake. This equates to 5,320 acre-feet released per year to maintain off-river lakes and ponds associated with the LORP, including the current supply to the Waggoner Unit.

Under the proposed program for off-river lakes and ponds, the amount of water provided to Goose Lake may be greater than under existing conditions due to the need to create flows in the channels downstream of Goose Lake that will connect to the river. There will be an inflow and outflow from these lakes sufficient to sustain the artificial corridor below the lake, but the lake elevations will remain unchanged from current conditions. There are insufficient data to estimate the additional flows required to reach the river, and associated channel losses downstream of Goose Lake.

Billy Lake is supported by water conveyed from the Aqueduct through the Independence Spillgate and existing ditch that extends from the spillgate to the lake. Under the proposed program for off-river lakes and ponds, the amount of water provided to Billy Lake would remain the same as under current conditions.

Based on the above information, an estimate of the average annual water requirements to maintain off-river lakes and ponds in accordance with the MOU goals and proposed management approach (see Section 2.6) is provided below in Table 10-4. Water currently used to maintain the lakes and ponds is not retrieved by LADWP and returned to the Los Angeles Aqueduct. Water used for off-river lakes and ponds under the LORP would also not be retrieved by LADWP. Some of the water used to maintain Goose Lake will reach the river under LORP to create fish corridors. Hence, some of this water would contribute to the baseflows in the river and would be retrieved by LADWP at the pump station. The estimates of water requirements to maintain the off-river lakes and ponds shown in Table 10-4 do not include water that would reach the river. Instead, they represent water losses from the Los Angeles Aqueduct system.

TABLE 10-4
ESTIMATE OF WATER REQUIREMENTS TO MAINTAIN OFF-RIVER LAKES AND PONDS

Lake or Pond	Long-term Annual Average, acre-feet per year	Notes
Thibaut Ponds	1,141	Same as current water requirements
Upper and Lower Twin Lakes	885	Same as current water requirements
Goose Lake*	2,234	Same as current water requirements
Billy Lake	1,060	Same as current water requirements
Total =	5,320	

Source: LADWP Hydrographic Records 1990- 2002. * Includes water consumed in Waggoner Unit under existing Blackrock management; does not include water that will be conveyed to the river via the Goose Lake Return ditch to provide continuity to the river under the LORP.

Water Requirements for Blackrock Waterfowl Habitat Area

Under the project, an annual average of 500 acres will be flooded in the Blackrock Habitat Area in average and above average runoff years. Ecosystem Sciences has estimated the net change in open water and vegetated wetlands that would occur in the Blackrock area over the long term in response to the first two flooding and drying cycles – there would be an increase of 290 acres of open water and a loss of 83 acres of vegetated wetlands (see Table 7-3). Hence, there would be a net increase in new wetland/water habitat of 207 acres. Based on an average water consumption of 5 acre-feet per year per acre, the total net water consumption to implement the flooding regime at Blackrock is about 1,035 acre-feet per year. This estimate represents an average annual value; year-to-year water demands could vary substantially based on flooding goals and runoff conditions.

Summary of LORP Water Requirements

The estimated total water requirements for the LORP, during the initial years of rewatering, and once the river reaches steady state conditions, are summarized in Table 10-5. These water requirements represent consumptive losses due to: (1) channel losses along the river; (2) evapotranspiration from new river vegetation, off-river lakes and ponds, and Blackrock Waterfowl Habitat Area wetlands; and (3) bypass flows and releases to the Delta Habitat Area. The long-term annual average water demand, over existing water demands in the LORP project area, is estimated to be about 16,294 acre-feet per year.

TABLE 10-5
WATER REQUIREMENTS OF THE LORP

LORP Element	Initial Years	Steady State Conditions	
	Total LORP Consumptive Use (acre-feet per year)	Total LORP Consumptive Use (acre-feet per year)	Total LORP Net New Consumption (acre-feet per year)
Channel losses during baseflows and pulse flows along the river	52,700	19,600	8,100*
Channel losses during seasonal habitat flows	1,152	1,152	1,152
Off-River Lakes and Ponds	5,320	5,320	0
Blackrock Waterfowl Habitat Area	2,500	2,500	1,035
Flows bypassed to the Delta Habitat Area from baseflows and pulse flows	5,150	5,150	5,150
Flows bypassed to the Delta Habitat Area from seasonal habitat flows**	857	857	857
Total =	67,679	34,579	16,294

Source: LADWP and Ecosystem Sciences. * Since 1990, LADWP has made releases to the river from the Independence, Locust, and George's spillgates to provide up to 10 cfs in the lower reaches of the river for riparian habitat and fish purposes. These releases (called "Early LORP Releases") have been a precursor to the full LORP. These releases will be replaced with the planned releases at the River Intake. They have averaged about 11,500 acre-feet per year (see text below). ** Assumes that a maximum seasonal habitat flow (200 cfs at peak) will be released every year and a channel loss of 0.35 cfs/mile would occur. The seasonal habitat flows will vary from year to year depending upon runoff (see Section 2.3.5.3). Under a higher channel loss assumption of 1 cfs/mile, flows bypassed to the Delta during seasonal habitat flows would be 358 acre-feet (See Tables 6-9 and 6-10).

Water for the LORP will be derived from river diversions. Groundwater pumped above the River Intake is conveyed to the river prior to entering the Los Angeles Aqueduct. In addition, groundwater pumped from areas south of the River Intake is delivered directly to the Aqueduct. Therefore, part of the water to be supplied to the LORP via the River Intake and the Aqueduct spillgates will be pumped groundwater in origin. However, as described in Section 2.1.5, LORP does not include installation of new wells or increases in groundwater pumping in the Owens Valley (aside from new or replacement stockwater wells with no substantial increase in groundwater pumping over exiting conditions; see Section 2.8.1.2). Existing groundwater pumping by LADWP in the Owens Valley will continue as allowed under the Inyo County/Los Angeles Long Term Water Agreement.

10.5.2 Summary of LADWP's Exports for Municipal Water Supply

LADWP supplies water to the City of Los Angeles for municipal and industrial uses. There are three primary water sources: (1) Los Angeles Aqueduct, exporting water from the Mono Basin, Long Valley, and Owens Valley; (2) local groundwater in the Los Angeles Basin; and (3) water purchased from the Metropolitan Water District. In addition, reclaimed water is another source that is becoming more important over time.

The Los Angeles Aqueduct has provided about half of the City's water supply in the past 10 years (see Table 10-6). The average annual delivery of water from the Los Angeles Aqueduct from 1991-2001 was 319,948 acre-feet. The total average annual delivery of municipal water supply to the City of Los Angeles is about 617,000 acre-feet per year.

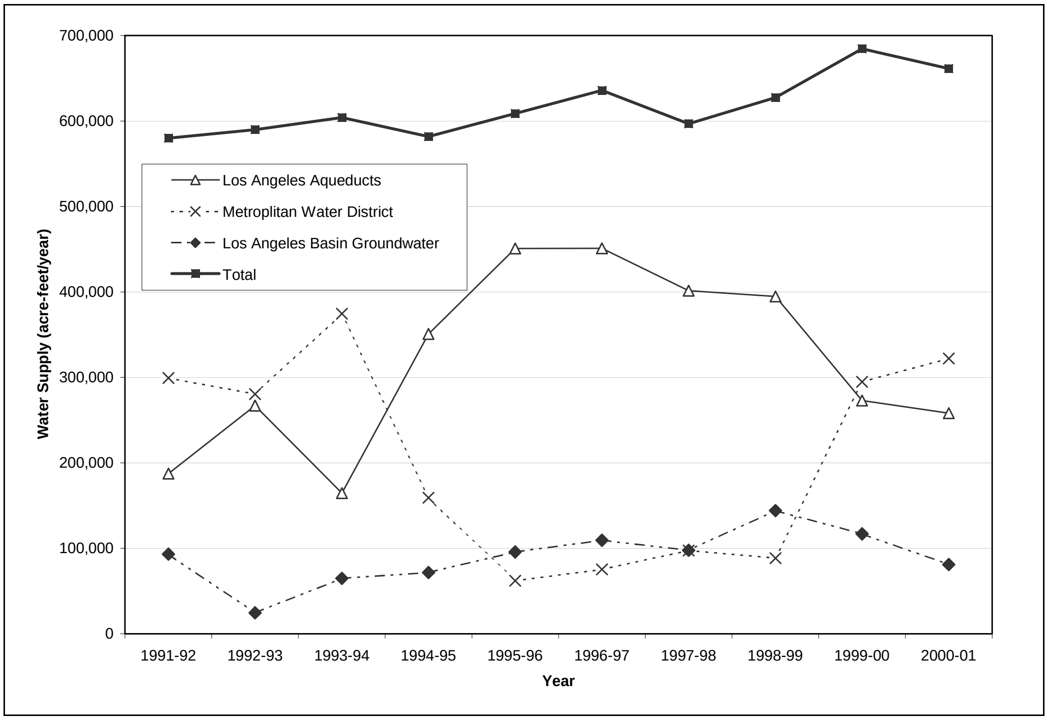
As shown in Table 10-6 and Chart 10-1, the amount of water supplied by the Los Angeles Aqueduct varies considerably from year to year, with annual fluctuations substantially exceeding 16,000 acre-feet. (During the 10-year period between 1991-92 and 2000-01, the average difference between years was approximately 73,500 acre-feet.) Therefore, the reduction in the amount supplied via the LAA resulting from LORP implementation is within LADWP's existing operational flexibility, and can be accommodated by augmenting supplies with Metropolitan purchases and Los Angeles Basin groundwater.

TABLE 10-6
SUMMARY OF LADWP WATER SUPPLIES

Year	Acre-feet per Year			
	Los Angeles Aqueduct	Metropolitan Water District Purchases	Los Angeles Basin Groundwater	Total
1991-92	187,447	299,213	93,210	579,870
1992-93	267,007	280,409	24,556	589,972
1993-94	164,632	374,443	64,919	603,994
1994-95	350,957	159,084	71,755	581,796
1995-96	450,917	62,011	95,808	608,736
1996-97	451,048	75,226	109,458	635,732
1997-98	401,482	97,490	97,716	596,688
1998-99	394,891	88,504	144,144	627,539
1999-00	272,932	294,664	116,832	684,428
2000-01	258,162	322,063	81,087	661,312
Average =	319,948	205,311	91,749	617,007

Source: LADWP.

CHART 10-1
SUMMARY OF LADWP WATER SUPPLIES



In the 2000 Urban Water Management Plan (Plan), LADWP projected the long-term average annual deliveries from the Los Angeles Aqueduct for the next twenty years to be 321,000 acre-feet per year, and that the water requirements of the LORP would be approximately 16,000 acre-feet per year more than the water that has been supplied by LADWP to the "Early LORP" (see Table 10-7). In the Plan, LADWP concluded that even with the need to supply 16,000 acre-feet to the LORP, adequate water supplies are available to serve the essential needs of the City of Los Angeles for the next 20 years. However, LADWP may need to supplement supplies during dry years through short-term water purchases on the water market to compensate for shortages in LADWP's current supplies. LADWP is continuing to secure other reliable sources of water, such as long-term water marketing and desalination. LADWP is also fully committed to increasing reclaimed water supplies and water conservation efforts.

LADWP's water uses in the Owens Valley from 1991-2001 are summarized in Table 10-7. Water for in-valley uses is derived from surface water diversions and local groundwater pumping. The average annual water demands for in-valley uses are not expected to change with the implementation of the LORP, with the exception of increased water use for the LORP. The water uses for the "Early LORP" listed in Table 10-7 consist of releases from Independence, Locust, and Georges spillgates to provide up to 10 cfs in the lower reaches of the river for riparian habitat and fish purposes, and to supply off-river lakes and ponds. These releases have been made since 1987 as a precursor to the full LORP. These releases will be replaced with the planned LORP releases at the River Intake.

TABLE 10-7
SUMMARY OF CURRENT LADWP IN-VALLEY WATER DEMANDS

	Acre-feet Per Year					
	Irrigation	Stockwater	E/M Projects*	Recreation	"Early LORP"**	Total
1991-92	39,501	14,756	9,453	8,767	11,064	83,541
1992-93	37,131	17,285	9,088	7,725	9,269	80,498
1993-94	47,798	17,218	13,480	8,676	5,830	93,002
1994-95	37,784	17,178	9,174	8,116	11,638	83,890
1995-96	57,721	20,919	11,307	12,479	11,636	114,062
1996-97	46,267	19,724	10,918	9,439	13,031	99,379
1997-98	47,013	16,395	8,539	8,022	13,069	93,038
1998-99	45,445	13,654	8,480	8,691	11,192	87,462
1999-00	49,308	14,446	8,479	7,470	15,973	95,676
2000-01	49,327	13,442	8,692	7,263	12,090	90,814
Average =	45,730	16,502	9,761	8,665	11,479	92,136

Source: LADWP Table 2 - Runoff Year Water Uses Owens Valley 1991-2001.
*E/M = Enhancement/mitigation projects identified in Table 5-2 of the 1990 EIR on the Inyo County/Los Angeles Long Term Water Agreement. These numbers do not include releases made to the "Early LORP."
**Releases made to the lower river since 1991 representing an early implementation of long-term LORP

10.5.3 Impacts on Exports from Owens Valley

The average annual water consumption associated with the LORP, during steady state conditions, is estimated to be about 34,579 acre-feet per year. This water requirement represents a net increase of about 16,294 acre-feet per year over existing water uses in the valley that currently maintain elements of the LORP, including off-river lakes and ponds; wetlands and pasture in the Blackrock Waterfowl Area; and wetlands along the lower reach of the river. This amount of water is slightly less than the LORP water consumption projected by LADWP (i.e., 16,000 acre-feet per year) in its water supply projections for 2020. Hence, the proposed project would not cause a reduction in the amount of water planned to be available for export from the Owens Valley for municipal uses in the Los Angeles Basin, and therefore, would not have an impact on water supply for municipal users.

10.6 ENERGY

The power requirement of the 50-cfs pump station is 2,115 kW when operated at 50-cfs. It will require one 34.5kV, 3-phase 5MVA transformer. The service requirement will be met from a 2000A bus, 4160V service. In order to meet this power demand an upgrade was made to the capacity of Cottonwood Power Plant. The original transformer was a 12MVA. Because of damage to this unit and the foreseen increased demand, the transformer was replaced with a 30MVA unit. Also, a circuit breaker positioner was added which will enable power to be directed to both the Owens Lake Dust Mitigation Program and the pump station. Cottonwood Power Plant will deliver 34.5kV power via a new power line from Cottonwood to the pump station.

Supplying power to the pump station will not require new releases of water at the Cottonwood Power Plant. The new power would be supplied by using unused hydraulic capacity and existing generators at the plant.

10.7 GROWTH INDUCING EFFECTS, INCLUDING INDIRECT IMPACTS

Section 15126.2(d) of the CEQA Guidelines states that an EIR should discuss "…the ways in which the proposed project could foster economic or population growth, or the construction of additional housing, either directly or indirectly, in the surrounding environment." Growth can be induced in a number of ways, including through the elimination of obstacles to growth, or through the stimulation of economic activity within the region.

The implementation of the LORP does not involve construction of new homes or businesses and does not include construction of new, potentially growth-inducing, infrastructure such as highways or potable water or wastewater systems. The project is not expected to cause an increase in population in the Owens Valley or to adversely affect the transportation system in the valley. As explained in Section 10.1, the implementation of the LORP will likely result in increased recreational use in the LORP area, but this increase is not expected to cause significant adverse impacts.

10.8 IMPACTS DUE TO FUNDING SHORTFALLS

In the Draft EIR/EIS, the potential increases in saltcedar and mosquito populations from implementation of LORP were considered potentially significant impacts that could not be fully mitigated due to funding shortfalls. Since distribution of the Draft EIR/EIS, funding commitments have been made to address impacts related to these two topics. Therefore, the Final EIR/EIS does not identify any impacts deemed to be significant due to funding shortfalls.

11.0 ALTERNATIVES

11.1 REQUIREMENTS TO EVALUATE ALTERNATIVES

11.1.1 CEQA Requirements

The key requirements under CEQA to identify and evaluate alternatives in an Environmental Impact Report are listed below from the CEQA Guidelines:

- 15126.6(a) states that "*An EIR shall describe a range of reasonable alternatives to the project, or to the location of the project, which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project, and evaluate the comparative merits of the alternatives*."

- 15126.6 (b) states that "*…the discussion of alternatives shall focus on alternatives to the project or its location which are capable of avoiding or substantially lessening any significant effects of the project, even if these alternatives would impede to some degree the attainment of the project objectives, or would be more costly*."

- 15126.6(c) states "*The range of potential alternatives to the proposed project shall include those that could feasibly accomplish most of the basic objectives of the project and could avoid or substantially lessen one or more of the significant effects*."

Under CEQA, the lead agency must attempt to identify feasible alternatives that will avoid, or at least lessen, any significant impact. The lead agency must determine what represents a feasible alternative, taking into account costs and engineering feasibility, and how the alternative may inhibit meeting the project objectives. An alternative cannot be dismissed simply because it prevents the project objectives from being fully realized. Any new environmental impacts of an alternative must also be considered.

11.1.2 NEPA Requirements

The NEPA regulations (40 CFR 1502.14) state that the alternatives analysis "… *is the heart of the environmental impact statement…. It should present the environmental impacts of the proposal and the alternatives in comparative form, sharply defining the issues and providing a clear basis for choice among options by the decision makers and the public.*" The EIS must explore and objectively evaluate all reasonable alternatives, including the No Action Alternative, as well as reasonable alternatives not within the jurisdiction of the lead agency. The analysis must provide sufficient information on the alternatives so that the public and decision makers may evaluate their comparative merits. Reasonable alternatives should meet the project purpose and need. What constitutes a reasonable range of alternatives depends on the nature of the proposal and the facts in each case.

After consideration of the alternatives presented in the EIS, the federal lead agency adopts the EIS and makes a decision on the proposed action. A Record of Decision (ROD) is then prepared to explain the agency's course of action. The ROD contains:

- An explanation of the decision on the proposed action
- Factors considered in making the decision
- Alternatives considered and the environmentally preferred alternative
- Any adopted mitigation measures or reasons why mitigation measures were not adopted
- A monitoring an enforcement program for those mitigation measures that were adopted

The draft EIR/EIS presented detailed information on two main alternatives (50 cfs and 150 cfs pump station). Since the 50 cfs alternative has been selected as the preferred project, only information on the 150 cfs pump station is presented in this section of the Final EIR/EIS. Some of the other alternatives (for example, Native Fish in Blackrock) are discussed in less detail because they constitute a specific portion of the project with isolated impacts.

11.2 EVALUATION OF NO PROJECT ALTERNATIVE (CEQA AND NEPA)

Under the No Project Alternative, both the adverse and beneficial impacts of the LORP would not occur. The enhancement of the aquatic, wetland, and riparian habitats along the river and at Blackrock Waterfowl Area would not occur, nor would any potential habitat enhancements in the Delta Habitat Area (if any). The proposed modification of grazing practices to improve rangelands and protect riparian habitat on LADWP leases would not occur. As a consequence, the poor habitat conditions along the Lower Owens River would persist.

This alternative would avoid the significant impacts of the proposed project – short-term water quality degradation during the initial river rewatering; and potential fish kills during the initial re-watering. However, overall, this alternative would not provide the environmental benefits of the LORP and would therefore not be environmentally superior to the proposed project.

Additionally, this alternative is considered infeasible, as it would be contrary to the MOU and Court Order mandating LADWP to implement the LORP. Since the MOU and the LORP Plan serve as mitigation for previous groundwater pumping impacts under the 1991 EIR, selecting the No Project Alternative would not provide mitigation for those impacts as required.

11.3 EVALUATION OF CEQA ALTERNATIVES

The proposed project would result in significant, unavoidable impacts (Class I) that cannot be mitigated to less than significant levels as summarized below. Where feasible, mitigation measures have been identified to reduce the magnitude of the adverse effects (see Sections 4 through 10).

Alternatives that may avoid or reduce the significant impacts are described below, including an assessment of their feasibility. A summary of the CEQA alternatives is provided in Table 11-1.

TABLE 11-1
SUMMARY OF CEQA ALTERNATIVES

Significant Impact of the Proposed Project (Class I)	Alternatives to Avoid or Reduce the Impact	Feasible? (as Determined by Lead Agencies)	Does the Alternative Have Other Significant Impacts?
Water quality degradation and fish kills during initial flows (two impacts)	Release Regime 1 - Gradual Baseflows and Deferred Seasonal Habitat Flows	No. While technically feasible t, not environmentally superior to the proposed project and infeasible due to delay in establishment of 40 cfs baseflows	No. However, this alternative would further delay achievement of LORP goals.
	Release Regime 2 - Begin with Seasonal Habitat Flows to Flush the System (in July following completion of the pump station)	No. While technically feasible, not environmentally superior to the proposed project and infeasible due to potential delay in establishment of 40 cfs baseflows	Possible greater water quality impacts and fish kills during the first seasonal habitat flow release, but potentially reduced water quality impacts and fish kills during establishment of the 40-cfs baseflow
	Release Regime 3 - Delay Releases for Baseflows Until Winter	No. While technically feasible, not environmentally superior to the proposed project and infeasible due to delay in establishment of 40 cfs baseflows	Possible greater water quality impacts and fish kills during first seasonal habitat flow release and would delay establishment of 40 cfs baseflows thus delaying achievement of LORP goals

11.3.1 Water Quality Degradation and Fish Kills (Two Class I Impacts)

Summary of Proposed Release Regime and Impacts

As described in Section 4.4.3, the proposed baseflow and seasonal habitat flows may cause short-term water quality degradation along the Lower Owens River downstream of Mazourka Canyon Road. Flows could interact with organic sediments that have accumulated over time in the river channel, causing a depletion of oxygen, and a possible increase in hydrogen sulfide and ammonia. Although it is anticipated that water quality conditions during baseflows would improve, there are no reliable estimates of the potential duration of adverse water quality conditions. As described in Section 4.4.3, the short-term degradation of water quality along the river could also cause fish kills along the river downstream of Mazourka Canyon Road.

Inyo County (Jackson, 1994) and Ecosystem Sciences (Technical Memorandum No. 11, no date) recommended slow and gradual ramping of the initial releases to achieve the baseflows in order to reduce the magnitude of water quality and fish kill impacts. Ecosystem Sciences (Technical Memorandum No. 11, no date) originally envisioned that the slow ramping to 40 cfs (designed to minimize water quality impacts) would require up to 3 years.

The proposed flow release regime is summarized below and is described in detail in Section 2.3.5. Under Phase 1, LADWP would release water from the River Intake upon the completion of channel clearing below the River Intake, the modification of the River Intake structure, the installation of 14 temporary flow measuring stations, installation of culverts, and completion of any other channel improvements. This is estimated to occur approximately 6 months after the completion of the environmental review process and project permitting. At that time, LADWP would release sufficient water from the River Intake to create a continuous flow in the river from the River Intake to the Delta. During this phase, flows throughout the Lower Owens River would be the same as have occurred under past and existing practices in the currently wet reach of the river, as indicated by the monthly average flows at Keeler Bridge shown in Chart 4-4. Phase 2 releases would begin at the River Intake as soon as the pump station is operative, which is required per the February 2004 Stipulation and Order to occur by April 1, 2006.

Under the proposed release regime, the first seasonal habitat flow will be released in the winter immediately following the completion of the pump station construction; this is intended to reduce the potential for substantial decreases in dissolved oxygen and adverse effects on fish health by releasing the first high flow when temperatures are low. The magnitude of the first seasonal habitat flow will be 200 cfs at peak flow, regardless of forecasted runoff. After the first seasonal habitat flow, subsequent annual seasonal habitat flows will be released in May or early June.

The Draft EIR/EIS presented three alternative release regimes as described below. These three alternatives were identified to reduce the impacts of the proposed release regime as described in the Draft EIR/EIS. However, the proposed release regime as summarized above and described in Section 2.3.5 of this Final EIR/EIS has been modified from the release regime described in the Draft EIR/EIS in the following manner:

- The first seasonal habitat flow will be released in the winter (as opposed to May or early June).
- The Phase 2 baseflow release will begin in March (at the latest) (as opposed to July).

The proposed release regime as described in this Final EIR/EIS is an amalgamation of Alternative Initial Release Regimes 2 (Begin with a Seasonal Habitat Flow to Flush the System) and 3 (Delay Releases for Baseflows Until Winter). The proposed release regime is expected to have less impacts on water quality and fish health than either of these two alternative release regimes (and the release regime presented in the Draft EIR/EIS) because the increases in flows will occur during the winter when temperatures are low. Therefore, Alternative Release Regimes 2 and 3 are no longer relevant as alternatives that are designed to reduce significant impacts of the proposed project, but are described below for completeness. In contrast, Alternative Initial Release Regime 1 is still relevant and would be expected to reduce water quality and fish health impacts as compared with the proposed release regime.

Alternative Initial Release Regime 1 – Gradual Baseflows and Deferred Seasonal Habitat Flows

The objective of this alternative is to introduce baseflows in a gradual manner over 2 to 3 years to reduce water quality and fish impacts. Under this alternative, the 40-cfs baseflow would be established along the river in accordance with the originally proposed two-phased approach over a 2- or 3-year period. A longer ramping period would allow time to slowly increase flows over a longer period of time, which may allow more time for water quality conditions to equilibrate, as well as allow more time to monitor and adjust flows from the River Intake and spillgates to attempt to reduce water quality impacts.

Under this alternative, the Phase 1 flows in the river would be initiated once construction activities in the river channel at the pump station have been completed. At that time, water would be gradually released from the River Intake at 1 to 5 cfs increments daily until a 20-cfs flow has been established throughout all reaches in the river. If adverse water quality conditions are observed, releases from the River Intake would be held steady or reduced in an attempt to improve water quality. In addition, flows downstream of the River Intake would be augmented with water released from the spillgates (to provide fish with refuge areas of higher quality water).

Once a 20-cfs flow was been achieved along all reaches, Phase 2 releases would commence from the Alabama spillgates in 1 to 5 cfs increments daily until the river below the Alabama spillgates has a steady flow of 40 cfs. The releases from Alabama Gates would only affect the lower 17.5 miles of the 62-mile-long Lower Owens River. This represents about 46 percent of the wetted reach of the river. Hence, approximately 54 percent of the currently wetted reach would not be affected by these higher flows, and as such, would not be at risk if there were adverse water quality and fish impacts.

Once a 40-cfs flow has been established between Alabama spillgates and the pump station, releases from the River Intake would be increased above 20 cfs in approximately 1 to 5 cfs daily increments as described above until the entire river has a continuous 40-cfs flow. The releases from the Alabama spillgates would be gradually reduced until all flows are derived from the River Intake, unless it is necessary to use flows from spillgates to maintain the 40 cfs and/or reduce water quality and fish impacts.

Under this alternative, the 40-cfs baseflow would not be established until water quality conditions are deemed acceptable by the Inyo/Los Angeles Technical Committee, but no later than 36 months after the initial flows. Seasonal habitat flows would be deferred until the second or third year after the initiation of flows, as specified by the Inyo/Los Angeles Technical Committee based on water quality conditions observed during baseflows.

This alternative would not result in any new impacts compared to the proposed project, nor would it increase the magnitude or extent of any impacts associated with the proposed project. It is unknown to what extent this alternative would avoid or reduce impacts to water quality or fish compared to the proposed project, but it is expected that there would be water quality benefits.

Although this alternative is technically feasible, it is not considered environmentally superior to the proposed project since it would result in a delay in the establishment of the 40-cfs baseflow in the river compared to the proposed project. Additionally, this alternative would not be consistent with the February 2004 Stipulation and Order which requires that the baseflow of 40 cfs be achieved in the river no later than April 1, 2006. Since this delay in the implementation of the LORP would continue the degraded state of the river ecosystem and delay achievement of the environmental benefits expected under LORP, this alternative would delay attainment of project objectives. It is therefore rejected as inconsistent with the Court Order, not environmentally superior to the proposed project, and therefore not proposed for adoption.

Alternative Initial Release Regime 2 – Begin with Seasonal Habitat Flows to Flush the System

The objective of this alternative is to flush the river of vegetative debris and organic sediments (mostly located downstream of Mazourka Canyon Road), breach beaver dams, and create openings in tule stands in order to prepare the river for the baseflow. This alternative is based on the assumption that the flushing effect of higher flows at the beginning of the project will reduce the duration of subsequent water quality impacts and fish kills by mobilizing and possibly removing organic sediments from the river system. In addition, this alternative is based on the assumption that a flood-like disturbance to the river corridor may stimulate natural vegetation succession processes (i.e., colonization by willows) more quickly.

Under this alternative, the initial baseflows would begin in two phases as defined under the proposed project However, seasonal habitat flows of 200 cfs would be established immediately following the completion of the pump station (currently estimated to be approximately Summer 2006). The seasonal habitat flows would be established along the entire Lower Owens River using a combination of the River Intake and various spillgates, if necessary.

The 40-cfs baseflow would be established along the entire river immediately after the end of the seasonal habitat flows, using a combination of the River Intake and various spillgates to manage water quality conditions.

This alternative may cause more severe water quality impacts and fish kills during the initial release period compared to the proposed project since the flushing flow would occur in the summer (i.e., when temperatures are higher) and may increase the potential for substantial decreases in dissolved oxygen and adverse effects on fish health. However, there is potential for the flushing action of the first seasonal habitat flow to reduce the duration of the water quality and fish impacts during the initial establishment of the 40-cfs baseflow. However, the ecological benefits of this alternative cannot be assessed based on available data and analytic tools. There is much uncertainty about the magnitude and duration of water quality impacts and fish kills under all release regimes.

Although this alternative is technically feasible, it is not considered environmentally superior to the proposed project since it may cause more severe water quality impacts and fish kills that the proposed project. Additionally, this alternative might not be consistent with the February 2004 Stipulation and Order which requires that the baseflow of 40 cfs be achieved in the river no later than April 1, 2006. It is therefore rejected as inconsistent with the Court Order, not environmentally superior to the proposed project, and therefore not proposed for adoption.

Alternative Release Regime 3 – Delay Releases for Baseflows Until Winter

Under this alternative, releases to establish the 40-cfs baseflow would occur in the first winter following completion of the pump station when water and air temperatures are lower compared to schedule under the proposed release regime. The objective of this alternative is to establish the baseflow in the river when temperatures are cooler, which could reduce the magnitude of potential impacts to water quality and fish. The significant water quality and fish impacts described in Section 4.4.3 may not be avoided under this alternative release regime, but the magnitude of the impact (i.e., the extent of water quality degradation, the length of poor water quality conditions, and the magnitude of fish kills) may be less than under the proposed project.

To reduce the water quality and fish impacts under the proposed project, the initial release to establish the 40-cfs baseflow under this alternative would begin in the first November following completion of the pump station. The releases would continue in a gradual and progressive manner, with the objective of establishing the 40 cfs along the entire river by the following April 1st. During the period of November to April, LADWP would conduct the water quality monitoring described in Section 2.3.5.2. In addition, releases would be made from spillgates to reduce water quality and fish impacts, as described in Section 2.3.5.2. The initial seasonal habitat flow will be released to the river in late May or early June 1 year after the establishment of the 40 cfs baseflow.

As compared with the proposed project, this alternative would have similar water quality impacts associated with establishment of baseflows (baseflows would be established in the cooler months) but may exacerbate impacts from the first seasonal habitat flow (since it would be released in May or June instead of in winter). It would also delay achievement of LORP goals since establishment of baseflows would be later than under the proposed project.

Although this alternative is technically feasible, it is not considered to be environmentally superior to the proposed project. Additionally, this alternative would not be consistent with the February 2004 Stipulation and Order which requires that the baseflow of 40 cfs be achieved in the river no later than April 1, 2006. It is therefore rejected as inconsistent with the Court Order, not environmentally superior to the proposed project, and therefore not proposed for adoption.

11.3.2 CEQA Alternatives Summary

Based on the discussion above in Sections 11.2 and 11.3.1, the proposed project is identified as the environmentally superior alternative.

11.4 EVALUATION OF NEPA ALTERNATIVES

Under NEPA, reasonable alternatives that meet the project purpose and need should be addressed in the EIR/EIS. A variety of alternative approaches to meeting the MOU goals were identified in the letters of comment on the 1999 draft LORP Plan and the Notice of Preparation and Notice of Intent for the EIS/EIR. Based on these comments, there appear to be alternative management actions that achieve the MOU goals, and that possibly ensure a higher probability of success and result in greater habitat and species enhancements. They may or may not be considered necessary to achieve the MOU goals. They represent alternatives that should be considered in the adoption of the project to the extent that the lead and responsible agencies find them desirable and feasible based on funding, logistics, and institutional arrangements. A summary of the NEPA alternatives is presented below in Table 11-2. None of these alternatives are designed to reduce identified significant impacts of the LORP.

TABLE 11-2
SUMMARY OF NEPA ALTERNATIVES

Alternative	Is it Feasible? (as Determined by Lead Agencies)	Does it *Avoid or Lessen* Significant Impacts of the Proposed Project	Does it Involve Any *New* Significant Impacts?
150 cfs Pump Station – Section 11.4.1	Yes	No	No
Delta Modifications – Section 11.4.2	No	No	Yes, significant wetland losses due to berm construction in the Delta
Alternative Releases for the Seasonal Habitat Flows – Section 11.4.3	Yes	No	Possibly, there is a higher potential for flows being diverted outside the Delta through the overflow channel. This impact could range from significant and adverse to beneficial.
Alternative Pulse Flow Regimes for the Delta – Section 11.4.4	Yes	No	No
Cowbird Trapping – Section 11.4.5	Yes	No	No
Native Fishes in Blackrock – Section 11.4.6	No	No	Yes, possible high mortality of native fishes during transition from wet to dry cycles.
Modified Flooding Regime in Blackrock – Section 11.4.7	Yes	No	No
Alternative Sediment Stockpiling Sites – Section 11.4.8	Yes	(Since publication of the Draft EIR/EIS, the sediment stockpile area has been changed to two upland locations to avoid impacts to the wetland located in the oxbow area.)	No

11.4.1 150 cfs Pump Station

The Draft EIR/EIS (November 2002), described the following two options for the capacity of the proposed pump station: 150 cfs (referred to as Option 1 in the Draft EIR/EIS) and 50 cfs (referred to as Option 2 in the Draft EIR/EIS). As described in Sections 1.1 and 2.4 of this Final EIR/EIS, LADWP, in consultation with Inyo County and the other MOU parties, now proposes to implement the 50-cfs pump station option. In the Draft EIR/EIS, Sections 5.0 (Diversion, Pump Station, Power Line, and Road Surfacing) and 6.0 (Delta Habitat Area) described the impacts associated with both the 50-cfs and 150-cfs pump station options. For the Final EIR/EIS, these sections have been revised to describe only the impacts associated with the proposed project (i.e., the 50-cfs pump station option), and the discussions of impacts associated with the 150-cfs pump station option are presented in this section.

The 150 cfs pump station would differ from proposed 50 cfs pump station as follows:

- There would be a total of eight pumps, each with a capacity of approximately 20 cfs (compared to four pumps, each with a capacity of approximately 17.5 cfs). The maximum flow rate leaving the pump station would not exceed 150 cfs.
- The sump and pump station building would be slightly larger approximately 66 by 72 feet (compared 35 by 69 feet).
- The air chamber would be larger.
- A smaller quantity of water would by-pass the pump station and reach the Delta during seasonal habitat flows.

Although this alternative would have a larger sump and pump station building, the facility yard would be the same (about 1 acre in size). The electrical transformer, diversion structure, roads, temporary construction zone, 400-foot long pipeline, and sediment basin would also be the same as the 50-cfs pump station facility. Construction of this alternative would be essentially the same as the 50-cfs pump station facility. It would have the same phasing, but possibly a longer overall timeframe (by several weeks only). Although the power requirements for this alternative would be greater than the proposed facility, the same new power line would be required. Therefore, the temporary and permanent impacts from construction of the pump station and associated facilities (e.g., diversion, roads, sediment basin, and power line) would be the same and as described in Section 5.0 for both the proposed project and the 150-cfs pump station alternative.

Operation of a 150-cfs pump station would be similar to the 50 cfs capacity pump station. The water surface elevations in the forebay during operations under both the baseflow and seasonal habitat conditions would be same under the 150 cfs pump station. Hence, the forebay would inundate the same acreage as the proposed project and affect the same vegetation types, as summarized in Table 5-2.

However, the quantity of water that would be bypassed to the Delta Habitat Area during the seasonal habitat flows would be less under the 150-cfs pump station alternative than under the proposed project. The potential impacts on the aquatic and wetland habitats in the Delta Habitat Area under the 150-cfs pump station alternative are described in the following subsections; Sections 11.4.1.1 and 11.4.1.2 were moved from Sections 6.3.1 and 6.3.2 of the Draft EIR/EIS. The text presented below has been modified to delete some of the discussion redundant with Section 6.3 and to make minor editorial or factual corrections; however, no change has been made to the content of the impact discussions or the impact conclusions.

As described in the introductory paragraphs to Section 6.3, there are many uncertainties in predicting the effects of the proposed flows on wetlands in the Delta due to an incomplete understanding of the complex ecological and hydrologic processes. Therefore, reasonable differences of opinion exist amongst technical experts interpreting the same data and are described below.

11.4.1.1 Impact Assessment No. 1 for 50 cfs Pump Station (Prepared by Ecosystem Sciences and White Horse Associates)

Baseflow and Pulse Flow Impacts

Under the 150-cfs pump station alternative, the impacts of the baseflows and pulse flows to the Delta will be identical to those of the proposed project (50-cfs pump station) as discussed in Section 6.3.1.

Seasonal Habitat Flow Impacts

Without considering channel losses, seasonal habitat flows that will bypass the 150 cfs pump station to the Delta Habitat Area are anticipated to range 20 to 50 cfs for a day or two every other year on average. The impacts of seasonal habitat flows are anticipated to be similar to those discussed for pulse flows (see Section 6.3.1), but, given the short duration, of lesser magnitude.

Impact Summary Related to Delta Habitat Area

LADWP, as the CEQA lead agency, believes that by enhancing and maintaining the acreage of vegetated wetlands and water that existed in 1996 (645 acres), LADWP will have met and exceeded the MOU goals of maintaining or enhancing 325 acres of existing Delta habitats. Notwithstanding this position, per LADWP's analysis, the proposed flow regime for the Delta Habitat Area is expected to enhance and maintain the Delta conditions existing at the time of the commencement of flows to the Delta under the LORP. Thus, LADWP's goal will be to enhance and maintain the Delta conditions.

For purposes of the EIR/EIS, impacts were assessed relative to 2000 conditions (White Horse Associates 2004). In this study it was estimated that approximately 831 acres of water and vegetated wetlands existed in 2000. While LADWP is not obligated to maintain and enhance these additional acres, the proposed water budget is expected to result in further expansion of wetlands relative to 2000 conditions. Wetlands expansion is expected to continue until evapotranspiration demands exceed baseflow and the expansion of wetlands levels off. Further wetland expansion may occur in response to seasonal pulse flows. Vigorous wetland vegetation will result in more efficient use of available water (e.g., increase transpiration and reduce evaporation). No impact to the extent of water and vegetated wetland for 2000 conditions is anticipated.

The MOU specifies "riparian areas and ponds" will be enhanced and maintained "to the extent feasible." Given static conditions, all open water in the Delta Habitat Area would eventually be converted to marsh. But conditions in the Delta Habitat Area since 1944 (see Section 6.1.3) have not been static. Shifting dunes and beaver are important dynamic forces that create new areas of open water that will eventually revert to vegetated wetland. Intensification of these forces is expected to cause a short-term shift towards more open water and less vegetated wetlands. Reduction of these forces is expected to cause a long-term shift towards less open water and more vegetated wetlands. However, please note that implementation of LORP is not expected to affect the extent, distribution or dynamics of dunes. At this time, beaver management is not proposed in the Delta Habitat Area, but is a potential adaptive management measure as described in Section 2.10.5.

Anticipated beneficial impacts (Class IV) resulting from implementation of baseflow include: (1) conversion of unvegetated playa to vegetated wetland; and (2) conversion of drier wetland types to wetter vegetated wetland types and open water. **Anticipated adverse, but insignificant, impacts (Class III)** resulting from implementation of baseflow include the accelerated loss of vertical structure associated with the riparian forest wetland type. Riparian forest developed under historic seasonally flooded conditions and has been reduced to small areas of decadent, dying and dead trees that are permanently flooded or saturated.

11.4.1.2 Impact Assessment No. 2 for 150 cfs Pump Station (Prepared by URS Corporation)

Amount of Water Reaching the Delta From Proposed Baseflows and Pulse Flows

The baseflows and pulse flows under the 150 cfs pump station alternative would be identical to the proposed 50 cfs pump station. Hence, the flows to the Delta under this alternative would also be about 35 percent less than under current conditions, as described in Section 6.3.2.1.

Potential for Seasonal Habitat Flows to Reach the Delta

An estimate of the seasonal habitat flows (baseflows also reach the pump station) that would reach the pump station based on a 200 cfs release at the River Intake (during average and above average flow years) is provided in Table 11-3 (based on a moderate channel loss rate estimate; see Sections 6.3.2.2 and 10.5) and in Table 11-4 (for a lower channel loss rate estimate; see Sections 6.3.2.2 and 10.5). These calculations indicate that seasonal habitat flows above the 40 cfs baseflow would occur at the pump station for 5 to 10 days. It is assumed that a minimum of 5.3 cfs would be by-passed from the pump station to the Delta. With a 150 cfs pump station, no seasonal habitat flows would be bypassed to the Delta based on a moderate channel loss rate estimate of 1 cfs per mile, as shown in Table 11-3.

TABLE 11-3
ESTIMATE OF SEASONAL HABITAT FLOWS THAT REACH THE 150 CFS PUMP STATION AND THE DELTA WITH A 200 CFS RELEASE AT THE RIVER INTAKE ONLY
MODERATE CHANNEL LOSS ASSUMPTION

	Flows at the River Intake (Flows Prior to Day 1 are 40 cfs)				Flows to the Delta Associated with Seasonal Habitat Releases	
Day	Flow	Seasonal Flows Above 40 cfs	Seasonal Flows that Reach the Pump Stn After 62 cfs Channel Loss*	Total Flows at 150 cfs Pump Stn	Flow cfs**	Acre-Feet above Baseflows ***
1	50	10	0	40	5.3	0
2	63	23	0	40	5.3	0
3	79	39	0	40	5.3	0
4	99	59	0	40	5.3	0
5	124	84	22	62	5.3	0
6	155	115	53	93	5.3	0
7	200	160	98	138	5.3	0
8	160	120	58	98	5.3	0
9	128	88	26	66	5.3	0
10	102	62	0	40	5.3	0
11	82	42	0	40	5.3	0
12	66	26	0	40	5.3	0
13	53	13	0	40	5.3	0
14	40	0	0	40	5.3	0
Total quantity of water that reaches the Delta (acre-feet) =						0

1 cfs for 1 day = 1.98 acre-feet. * The estimate of channel loss is 1 cfs per mile.
** Minimum daily baseflow to the Delta assumed to be 5.3 cfs. *** Does not include volume of water associated with 5.3 cfs baseflow

Using a lower channel loss rate estimate (0.35 cfs per mile), flows of up to 28 cfs would be by-passed to the Delta for one day (about 45 acre feet, not including the 5.3 cfs baseflows), as shown in Table 11-4. These bypass flows would occur in average and above average years, or about every other year.

TABLE 11-4
ESTIMATE OF SEASONAL HABITAT FLOWS THAT REACH THE 150 CFS PUMP STATION AND THE DELTA WITH A 200 CFS RELEASE AT THE RIVER INTAKE ONLY – LOWER CHANNEL LOSS ASSUMPTION

	Daily Average Flows at the River Intake (Flows Prior to Day 1 are 40 cfs)				Flows to the Delta Associated with Seasonal Habitat Releases	
Day	Flows	Seasonal Flows Above 40 cfs	Seasonal Flows that Reach the Pump Stn After 22 cfs Channel Loss*	Total Flows at 150 cfs Pump Stn	Flows cfs**	Acre-Feet above Baseflows ***
1	50	10	0	40	5.3	0
2	63	23	1	41	5.3	0
3	79	39	17	57	5.3	0
4	99	59	37	77	5.3	0
5	124	84	62	102	5.3	0
6	155	115	93	133	5.3	0
7	200	160	138	178	28	45
8	160	120	98	138	5.3	0
9	128	88	66	106	5.3	0
10	102	62	40	80	5.3	0
11	82	42	20	60	5.3	0
12	66	26	4	44	5.3	0
13	53	13	0	40	5.3	0
14	40	0	0	40	5.3	0
Total quantity of water that reaches the Delta (acre-feet)=						45

1 cfs for one day = 1.98 acre-feet. * The estimate of channel loss is 0.35 cfs per mile. ** Minimum daily baseflow to the Delta assumed to be 5.3 cfs. *** Does not include volume of water associated with 5.3 cfs baseflow.

<u>Ecological Effects of Reduced Flows to the Delta</u>

The magnitude and significance of the impacts of the proposed flow regime to the Delta on aquatic and wetland habitats are discussed in the following subsections based on the previous technical analyses concerning the amount of water discharged to the Delta, the channel capacity, and the potential for water spreading.

Mechanisms for Maintaining and Enhancing Delta Wetlands and Aquatic Habitats

In general, the desired benefits to habitats and habitat indicator species in the Delta due to new flow management would be achieved by one or more of the physical and biological mechanisms listed below. The occurrence and relative importance of each mechanism is directly related to the amount and timing of flows to the Delta Habitat Area.

- <u>Mechanisms to Expand Wetlands</u>. Properly managed flows could spread across areas that are not typically inundated. These flows could infiltrate or evaporate, and provide fresh water to the root zone of plants to support new growth or fill pore space to prevent upwelling of saline groundwater, which inhibits plant growth. These conditions may develop new wetlands, if conditions are favorable, as well as expand existing wetlands along their margins. An increase in vegetated wetlands would provide more opportunities for shelter, foraging, and nest sites for most of the waterfowl and riparian breeding birds that use the Delta.

- Mechanisms to Increase Wetland Growth. Properly managed flows could facilitate greater plant productivity by providing more volume of fresh water in the root zone, and/or a longer duration of available water to extend the growing season where it is limited by water. Wetlands in the floodplain of the Delta and riparian habitats along the east and west branches would benefit. An increase in wetland and riparian productivity would provide more opportunities for shelter, foraging, and nest sites for most of the waterfowl and riparian breeding birds that use the Delta.

- Mechanisms to Expand Aquatic Habitat. Properly managed flows could spread across areas that are not typically inundated, creating seasonal or semi-permanent ponds. The flows may also create more open water area within the east and west branches due to higher water surface elevations, and in the brine transition zone at the southern end of the Delta Habitat Area. An increase in open water in the channels and in isolated ponds would directly benefit various shorebirds and waterfowl that use the Delta, including the snowy plover, by creating more food and water.

- Mechanisms to Promote Sustainability. Properly managed flows could increase habitat diversity by causing more physical disturbance in the Delta channels due to higher velocities, more overbank flooding and spreading, and disturbance to beaver dams along the river upstream of the Delta. Increased physical disturbance would likely increase plant recruitment and succession, which in turn would increase sustainability of the ecosystem.

The Great Basin Unified Air Pollution Control District (GBUAPCD) has conducted studies on shallow groundwater conditions and vegetation response to groundwater with varying depths and salinities. In addition, the GBUAPCD has conducted several studies on shallow groundwater conditions in and near the Delta. Through these studies, the GBUAPCD has postulated the following explanation for groundwater and wetland conditions in Owens Lake.

Owens Lake is underlain by a shallow groundwater aquifer that is highly saline. It is recharged from winter runoff, and as such, rises each winter. The shallow groundwater is too saline for plant growth. Hence, once it reaches the root zone, plant growth is precluded. In most areas of the lake, there is a gradient of increasing salinity from the groundwater to the surface due to capillary action from evaporation. The Delta contains a freshwater “lens” that occurs above the shallow saline groundwater that is maintained by the discharges to the Delta from the Owens River. The freshwater lens essentially floats above the saline groundwater due to its lower density, and mixing appears to be minimum. In contrast to other areas of Owens Lake, salinity decreases from the depth to the ground surface due to this freshwater lens. Plants thrive in these areas because they are protected from the highly saline groundwater. If the freshwater lens is depleted during the growing season and not replenished prior to the spring runoff, plants rooted in these areas will be exposed to potentially toxic levels of saline groundwater as they break dormancy in March and April.

Based on the above observations, it appears that spreading fresh water in the sparsely vegetated floodplain of the Delta would generally contribute to wetland growth in the Delta by filling pore spaces in the upper soil with fresh water that can be exploited by colonizing wetland plants, and by creating positive pressure from freshwater infiltration that could displace saline groundwater around the margins of the Delta. In general, any additional water to the Delta has the potential to benefit wetlands (by improving soil salinity conditions) and/or birds (by maintaining aquatic habitat and associated invertebrates).

Effect on Existing Aquatic and Wetland Habitats

Aquatic habitats and wetlands in the Delta are directly affected by the amount and timing of flows to the Delta. For these habitats to be maintained in their current conditions, the proposed flow regime to the Delta must: (1) be similar to current and recent historic flows; or (2) provide water resources in different, but more efficient manner compared to the current regime.

As described above, the proposed bypass flows to the Delta would discharge about 35 percent less water to the Delta than under current release regimes unrelated to the LORP. Under current conditions (i.e., the period 1986-2001), 7,819 acre-feet of water (median annual flow) is discharged to the Delta, following a pattern of low flows in the summer and higher flows in the winter (Chart 6-4). Under the proposed initial release regime, there would be a lower baseflow year-round and four discrete 5 to 10-day periods of higher flows. The total amount of water to be released to the Delta under the proposed release regime would be about 5,140 acre-feet.

The reduction in the overall amount of fresh water discharged to the Delta may result in adverse impacts to existing aquatic habitats and wetlands. The lower flows could reduce the total volume of fresh water in the root zone, which is critical in maintaining plant productivity in this highly saline soil environment by providing positive pressure in the upper soil to prevent upwelling of highly saline groundwater. The overall reduction in fresh water in the Delta could also reduce the amount of water available for plant uptake, thereby reducing the growth period compared to current conditions. Finally, the reduction in the overall amount of water discharged to the Delta may reduce the water depth in channels and the amount of surface water in the brine transition zone, which in turn would reduce aquatic habitat for fish, invertebrates, and water-associated birds. The reduction in water surface elevation in the Delta channels could also reduce the extent of lateral groundwater infiltration that supports wetlands along the margins of the channels.

The magnitude of potential adverse impacts of a net reduction in water discharged to the Delta on the condition of existing habitats cannot be accurately predicted. The amount and timing of flows under the proposed flow regime are substantially different compared to the current regime, and as such, an ecological effect (positive or negative) is anticipated. The proposed pulse flows follow the current seasonal flow pattern – that is, low flows in the summer, increasing through the winter, then decreasing in the spring (Chart 6-4). This flow pattern may or may not be optimal for aquatic habitats and wetlands. For example, the proposed lowest pulse flow would occur in the summer (see Chart 6-4) at the time when plants exhibit the highest water demand. In contrast, the high pulse flow in the early winter may fill depleted pore spaces in the soil with freshwater that can be readily used by plants when they break dormancy in the early spring.

It is important to recognize that the seasonal pattern of existing flows is not designed to maintain or enhance habitats in the Delta. The pattern shown in Chart 6-4 is a result of upstream releases for irrigation purposes and channel losses prior to reaching Keeler Bridge. Hence, the lower flows to the Delta in the summer are likely due to high upstream water demand, and should not be considered an optimal flow pattern for maintaining and enhancing wetlands in the Delta. Alternative flow regimes designed specifically to benefit wetlands are described in Section 11.4.4.

There are no available data or analytic tools to definitively conclude that the revised regime would maintain existing aquatic and wetlands habitats. In contrast, there is a reasonable basis for postulating an adverse effect based on a substantial net reduction in flows to the Delta. Hence, absent compelling evidence to the contrary, it is concluded that a substantial reduction in the total amount of water released to the Delta may have an adverse ecological impact, even in light of the four seasonal pulse flows designed for ecological purposes. The proposed flow regime could possibly reduce the extent of existing aquatic and wetland habitats, and the productivity of vegetated wetlands. **While there may be a possibility that an adverse impact would not occur under the proposed release regime, it is considered prudent to provide a conservative impact assessment and identify this impact as potentially significant and unmitigable (Class I).** Mitigation measures and alternatives to reduce the magnitude of this impact are described below.

As described above, the seasonal habitat flows under the proposed release regime are not predicted to bypass the 150 cfs pump station and reach the Delta, or if the flows were to be sufficient to bypass the pump station, they would only occur for a single day. Hence, the proposed seasonal habitat flows do not represent an additional source of water for the Delta Habitat Area to offset the reduction under the proposed initial baseflow and pulse flow regime.

It should be noted that a large fraction of the freshwater flows to the Delta pass through to the brine pool. Hence, one can postulate that existing flows can be reduced without adverse ecological effects because not all of these flows may contribute to aquatic and wetland habitats. For example, Ecosystem Sciences (Tables for the Addendum to Technical Memorandum 8, June 2000) estimated that water demand from existing wetlands in the Delta (as of 1996) to be about 3,366 acre-feet per year, well below the approximately 8,000 acre-feet per year discharged to the Delta under current conditions. Hence, some of the water currently discharged to the Delta may not have any ecological consequences within the designated boundary of the Delta Habitat Area.

An alternative viewpoint is that water that is not consumed by plants in the Delta has other benefits, which may not be obvious. For example, maintaining water levels in the Delta channels can provide positive groundwater pressure in areas adjacent to the channels, thereby increasing the height and volume of fresh water to support wetland plants in adjacent areas. The water in channels provides aquatic habitat for invertebrates and birds. The surface area of this habitat and the quality of the water could be adversely affected by a reduction in flow (and the associated reduction in water depth).

The above described impact to Delta aquatic habitats and wetlands could be reduced by increasing the magnitude of the proposed baseflows and pulse flows, as well as modifying the number and timing of the pulse flows. The MOU specifies an average annual flow of 6 to 9 cfs. The proposed initial flow regime is an average annual flow of 7.1 cfs, which represents 5,140 acre-feet per year. If the baseflow and pulse flows were increased to an average annual flow of 9 cfs, a total of 6,516 acre-feet would be discharged to the Delta. This amount of water is still 1,303 acre-feet per year less than the current average annual discharge of about 11 cfs (7,819 acre-feet), and as such, may not be sufficient to avoid significant impacts in the Delta. The modifications, described in Mitigation Measure D-1 (see below), would reduce the magnitude of the impact; however, the residual impact may remain significant.

The impacts to aquatic and wetland habitats due to the reduction in overall water to the Delta could also be mitigated in part, by increased flows to the Delta during the seasonal habitat flows. An alternative to provide more water to the Delta from seasonal habitat flows is described in Section 11.4.3. Under this alternative, supplemental water would be released from spillgates along the river during the seasonal habitat flows to offset channel losses, and ensure that the target flows are achieved at the pump station. This alternative would substantially increase the average annual amount of water discharged to the Delta compared to the proposed release regime, and possibly avoid this significant impact if coupled with a 50 cfs pump station. See Section 11.4.3 for a detailed discussion.

Potential for Bypass Flows to Be Conveyed Outside the Delta

The river channel downstream of the pump station is clogged with cattails and bulrushes, facilitated by the low gradient of the river and the presence of several beaver dams. To determine if there is sufficient capacity in this channel to convey the seasonal habitat flows that would reach the Delta, LADWP measured six cross sections between the pump station site and the "Y" where the east and west branches diverge (Figure 6-1). The channel width ranges from 200 to 300 feet. The channel depth ranges from 2 to 4 feet.

Ecosystem Sciences conducted a hydraulic modeling analysis (HEC-RAS model) of this reach of the river (using measured cross sections at the transects described above) to determine channel capacity and water surface elevation. The analysis was completed using various flows (7.2, 25, 50, and 150 cfs) to represent different possible by-pass flows to the Delta. The modeling assumed a range of gradients and roughness coefficients in order to represent current channel conditions with dense vegetation and a cleared channel. The modeling results were presented by Ecosystem Sciences (Appendix E).

There is a low-lying area along the western bank of the river channel, about 900 feet upstream of the "Y" (Figure 6-1). The bank appears to have been manually breached to allow flows from the river channel to move to the west, possibly to enhance cattle grazing. This overflow point is about 20 to 30 feet wide, and about 3 to 4 feet deep. It appears that periodic high flows are conveyed through the breach to form the overflow channel. Under most flows, it appears that the overflow channel only receives seepage flows. However, when the water surface elevation is increased in the river, due to higher flows or effects of beaver dams, surface water spills through the overflow point into the overflow channel. The water surface elevation during a site survey in August 2001 was only 1 foot below the top of the breach, when flows in the river were estimated to be 5 to 10 cfs.

The modeling results by Ecosystem Sciences were designed to identify what magnitude of flows would be likely to overtop the breach in the bank, and be conveyed into the overflow channel. The results are summarized below in Table 11-5. These modeling results indicate that flows between 25 and 50 cfs would overtop the bank and enter the overflow channel. Under the 150 cfs pump station alternative, no seasonal habitat flows would reach the Delta. The maximum flows to the Delta would be 30 cfs, which would occur each year during a 5-day long winter pulse flow. The magnitude and frequency of high flows under the 150-cfs pump station alternative are not expected to overtop the banks and divert most of the flows outside the Delta Habitat Area.

Notwithstanding the above conclusion, it is possible that even the proposed winter pulse flows of 30 cfs could be partially diverted to the overflow channel. During flow releases by LADWP in August 2001 (for Aqueduct cleaning purposes) of up to 30 cfs, LADWP observed surface water in the overflow channel from a helicopter. No ground observations were made at the time; hence, it is uncertain if the flows in the overflow channel were derived from seepage or flows from the river channel.

TABLE 11-5
SUMMARY OF ANTICIPATED BREAKOUT FLOWS TO THE OVERFLOW CHANNEL

Flows (cfs) along the River Below the Pump Station	Will the Flows Overtop the Bank with a Clogged Channel?	Will the Flows Overtop the Bank with a Cleared Channel?
7.2	No	No
25*	No	No
50**	Yes	No
150**	Yes	No

Source: Ecosystem Sciences (unpublished data).
* Flows of 25 cfs will be released for 10 days during Period 1 and Period 3 pulse flows, and flows of 30 cfs will be released for 5 days during Period 4 pulse flow (see Section 2.4.2).
**These flows would not occur under the 150-cfs pump station alternative due to channel losses of seasonal habitat flows prior to reaching the 150 cfs capacity pump station. They would only occur if LADWP supplemented the seasonal habitat flows along the river, and/or under the proposed project (50-cfs pump station), for 3-7 days during the seasonal habitat flows.

Extent of Anticipated Water Spreading in the Delta from Seasonal Habitat Flows

For the 150 cfs pump station alternative, seasonal habitat flows (with a maximum release of 200 cfs at the River Intake) would not be bypassed to the Delta, or would be bypassed for 1 day with a peak flow of about 28 cfs (see Table 11-4). Hence, under the 150 cfs pump station alternative, water spreading in the Delta during seasonal habitat flows would not occur, or would be negligible.

Mitigation Measure

D-1 This mitigation measure addresses the impact identified in Section 11.4.1.2, Impact Assessment No. 2 for the 150 cfs pump station, prepared by URS Corporation. Under the proposed monitoring and adaptive management program, LADWP shall make adjustments to the amount and timing of the baseflows and pulse flows up to an average annual flow of 9 cfs to reduce any possible adverse effects on the extent and condition of existing aquatic and wetland habitats in the Delta Habitat Area. This mitigation measure is not likely to reduce the identified impact to a less than significant level, but will reduce the magnitude of the impact.

11.4.2 Delta Modifications (With Either a 50 cfs or a 150 cfs Pump Station)

This alternative includes either a 50 cfs or 150 cfs pump station and physical modifications to the Delta to distribute flows in the Delta to increase wetlands and ponds. This represents an active management approach in which the hydrologic conditions and landforms in the Delta are manipulated to increase water spreading that will create seasonal ponds, increase infiltration, and indirectly enhance wetlands. It would include the following elements.

An instream structure would be constructed below the pump station in the north end of the Delta to divide the bypassed seasonal habitat flows (up to 150 cfs) from the main river channel to the west or east channels in varying proportions. The river channel above the split is about 250 feet wide. A concrete diversion structure with gates would need to be installed at the split. Each channel would have several gates to control the rate of flow into the channels. The diversion would be constructed to allow high flows (over 150 cfs) to pass over the top of the structure in a spillway. The water control structure would allow LADWP to concentrate flows in one or the other channel to increase the habitat benefits of the seasonal habitat flows in the Delta. For the sake of the impact assessment, it is assumed that the dimensions of the water control structure would be 25 feet wide, 10 feet high, and 20 feet long (parallel to the channel). It would have manually-operated gates. The structure would be an engineered diversion with a concrete spillway. It would be secured below scour depth in the channel bottom and anchored to the banks with concrete abutments.

Operation of the structure to concentrate more flows into one of the channels would temporarily raise the water surface elevation of the river upstream of the structure. Hence, it would be necessary to build up the banks of the river on both sides upstream of the structure for an unknown distance to prevent breakouts.

The distribution, depth, and duration of water from the seasonal habitat flows would be managed through numerous ditches and berms constructed in the Delta (see Figure 11-1). The berms would be designed to support access roads. The objective is to spread water to areas that it would not typically reach, and to retain the water for a longer period than would occur without the project. These actions would create more temporary surface water bodies, increase percolation, and potentially increase wetland productivity and extent. The berms would be 2 to 3 feet in height and about 3 feet wide, constructed of compacted on site materials. No slope or top protection would be installed. Some berms would be constructed with a 15-foot width and a layer of rocks to provide access to remote portions of the Delta or in areas where overland travel is not possible. Ditches would be constructed to convey water to target areas. Excavated material would be sidecast, or removed for use in constructing berms elsewhere in the Delta.

A conceptual plan showing major berms and ditches is provided on Figure 11-1. The total length of the berms and ditches in this plan totals about 8 miles. The plan also includes establishment of ponds. These features would be 1 to 3 feet deep depressions excavated in the Delta to create more permanent ponds. They would be designed to intercept shallow groundwater, as well as to be filled by the seasonal habitat flows from the river.

This alternative would result in the permanent loss of approximately 19 acres of wetland and playa habitats in the Delta due to construction of berms and access roads, as well as the diversion structure. The wetland loss may or may not be offset by the creation of expanded wetlands due to increased water spreading facilitated by the new structures. There is a high level of uncertainty about the effectiveness and long-term persistence of such structures. The data are insufficient to conclude that this alternative would maintain and possibly increase wetland habitats in the Delta Habitat Area. Hence, the potential loss of up to 19 acres of wetland and playa habitats in the Delta is considered a significant and unmitigable impact (Class I).

This alternative is not considered feasible and is rejected because it would result in new significant impacts, and it conflicts with the MOU goal of producing self-sustaining habitats.

11.4.3 Alternative Releases for the Seasonal Habitat Flows (With Either a 50 cfs or a 150 cfs Pump Station)

This alternative is proposed to increase the amount of water and magnitude of flows along the river during the seasonal habitat flows to compensate for channel losses. The increased flows might be expected to provide greater opportunities for spreading water in the river floodplain, which in turn could enhance riparian recruitment and productivity. The higher flows would cause greater physical disturbances, which could have ecological benefits. Finally, the greater amount of water would provide more water to the Delta to enhance aquatic and wetland habitats. This alternative would not require releases greater than 200 cfs from the River Intake; the seasonal habitat flows would be maintained along the entire Lower Owens River by releases from various spillgates along the river.

Under the proposed project, seasonal habitat flows would only be released from the River Intake. Releases from the River Intake would be subject to channel losses (e.g., percolation and evapotranspiration) along 62 miles of the river before reaching the pump station. As described in Section 6.3.2, during the maximum seasonal habitat flow (i.e., 200 cfs at the River Intake), flows of 12 to 88 cfs would be bypassed to the Delta for 5 days (totaling about 358 acre-feet above the baseflows) assuming a moderate channel loss rate of 1 cfs per mile (Table 6-9). Assuming a lower channel loss rate of 0.35 cfs per mile, flows would be bypassed to the Delta for 9 days (totaling about 857 acre-feet above the baseflows), with flows of 7 to 128 cfs being released to the Delta during the 9-day ramping period (Table 6-10).

Under this alternative, seasonal habitat flows would be maintained along the entire Lower Owens River by releases from various spillgates along the river. Flows would be managed to provide the target seasonal habitat flows at or near the pump station. The objectives of this alternative are two-fold:

- Create high flows along the entire river corridor to provide the ecological benefits described in the LORP Plan, including mobilization of debris and organic sediments, spreading of flows across the floodplain to replenish groundwater and stimulate seed germination, creation of seasonal aquatic habitats, and general physical disturbances to stimulate growth and nutrient cycling.

- Provide higher flows that bypass the pump station and reach the Delta to stimulate wetland productivity, create new seasonal aquatic habitat, and provide physical disturbances to stimulate growth and nutrient cycling.

If 200 cfs were to reach the pump station, flows would bypass the Delta with both a 150 cfs pump station and a 50 cfs pump station. As shown in Table 11-6, flows to the Delta with a 150 cfs pump station would occur for 2 days and involve about 98 acre-feet. In contrast, flows to the Delta with a 50 cfs pump station would occur for 11 days and involve about 1,286 acre-feet.

With a 150 cfs pump station and seasonal habitat flows that are not supplemented by spillgates, the total annual amount of water that would be initially discharged to the Delta would be up to 5,140 acre-feet. This quantity of water is derived from the initial daily 5.3 cfs baseflow that will be released to the Delta with four pulse flows of 20 to 30 cfs. The amount of the baseflow release may be increased or decreased as described in Section 2.4.2. No water from the seasonal habitat flows would reach the Delta. Under this alternative, an additional 97.8 acre-feet would be discharged to the Delta, resulting in a total of 5,238 acre-feet. While the additional flows are expected to benefit the river corridor, it is possible that only a negligible beneficial impact on the Delta would occur due to the short duration and low magnitude of the flows.

TABLE 11-6
ESTIMATE OF SEASONAL HABITAT FLOWS THAT REACH THE PUMP STATION AND THE DELTA WITH 150 AND 50 CFS PUMP STATIONS AND MODIFIED 200 CFS SEASONAL HABITAT FLOW RELEASE

Day	Supplemented Daily Flows that Reach the Pump Stn (cfs)	150 cfs Pump Station		50 cfs Pump Station	
		Avg. Daily Total Flows to the Delta (cfs) Above the 5.3 cfs Baseflows*	Avg. Daily Discharge to the Delta above 5.3 cfs Baseflow (acre-feet)**	Avg. Daily Total Flows to the Delta (cfs) Above the 5.3 cfs Baseflows*	Avg. Daily Discharge to the Delta above 5.3 cfs Baseflow (acre-feet)**
1	50	0	0	0	0
2	63	0	0	7.7	15.2
3	79	0	0	23.7	46.9
4	99	0	0	43.7	86.5
5	124	0	0	68.7	136.0
6	155	0	0	99.7	197.4
7	200	44.7	88.5	144.7	286.5
8	160	4.7	9.3	104.7	207.3
9	128	0	0	72.7	143.9
10	102	0	0	46.7	92.5
11	82	0	0	26.7	52.9
12	66	0	0	10.7	21.2
13	53	0	0	0	0
14	40	0	0	0	0
Total quantity of water that reaches the Delta (acre-feet) =			97.8	--	1,286.3

* The minimum flows to the Delta are assumed to be 5.3 cfs, independent of the by-pass of the seasonal habitat flows. (The amount of the baseflow release may be increased or decreased as described in Section 6.3.2). The values in this column are calculated by subtracting the baseflows (5.3 cfs) and the pump capacity (50 cfs or 150 cfs) from values in the previous column.

** Does not include volume of water associated with 5.3 cfs baseflows when such flows are not supplemented by seasonal habitat flows. Calculated using 1 cfs per day = 1.98 acre-feet.

With a 50 cfs pump station, greater flows would by-pass the pump station and reach the Delta under this alternative. The total amount of water that would be initially by-passed to the Delta under this alternative with a 50 cfs pump station would be 5,140 acre-feet, plus the 1,286 acre-feet from the seasonal habitat flows for a total of 6,426 acre-feet. This amount is still less than current and recent historic annual discharges of the Delta (median = 7,819 acre-feet per year). The additional flows are expected to benefit the river corridor; however, they would not be sufficient to reduce the significant impact to Delta habitat described in Section 6.3.2 to less than significant. The higher flows (maximum of 150 cfs) below the pump station during the seasonal habitat flows with a 50 cfs pump station and higher seasonal habitat flows at the pump station may overtop the western bank of the river below the pump station and above the center of the Delta (see Section 6.3.3). However, new aquatic and wetland habitats would be created over time along the overflow channel. There are no data or analytic tools to predict the extent of the habitat loss and gain in different portions of the Delta Habitat Area. Hence, this impact could range from significant and adverse to beneficial.

With regard to the seasonal habitat flows, the MOU provides that "*It is currently estimated that in years when the runoff in the Owens Valley watershed is forecasted to be average or above average, the amount* *of planned seasonal habitat flows will be approximately 200 cfs, unless the [MOU] Parties agree upon an alternative habitat flow…*" and does not specify that the seasonal habitat flows be maintained throughout the river. In contrast, the MOU provides that "*A base flow of approximately 40 cfs from at or near the Intake to the pumpback system to be maintained year round.*" As required by the MOU, LADWP has committed to provide and maintain a baseflow of approximately 40 cfs throughout the river; however, there is no obligation to provide additional water from spillgates to supplement the seasonal habitat flows released at the River Intake.

This alternative is rejected for the following reasons:

- This alternative is not required to meet the MOU requirements.
- This alternative would not reduce any significant impact.
- This alternative would result in a greater impact on the water supply of the City of Los Angeles compared to the proposed project. [Based on the moderate channel loss estimate (1 cfs per mile), an additional 928 acre-feet per year (= 1,286 – 358) would be released to the Delta compared to the proposed project. Based on the lower channel loss estimate (0.35 cfs per mile), an additional 429 acre-feet per year (= 1,286 – 857) would be released to the Delta compared to the proposed project. Therefore, the total water requirements of this alternative would range between approximately 16,723 and 17,222 acre-feet per year, compared to the approximately 16,294 acre-feet per year required for the proposed project.]
- This alternative is inconsistent with the intent and commitment in the 1991 EIR, which calls for a pump station to be constructed so that larger flows could be released to the river and minimize impacts to Los Angeles' water supply.

11.4.4 Alternative Regimes for Pulse Flows to the Delta

The objective of this alternative is to increase the effectiveness of the pulse flows to the Delta in enhancing aquatic and wetland impacts by modifying the number, amount, and timing of pulse flows. Two alternative pulse flow regimes are described below.

Regime to Maximize Wetland Plant Growth

The GBUAPCD has conducted studies on shallow groundwater conditions and vegetation response to groundwater with varying depths and salinities. In addition, the GBUAPCD has conducted several studies on shallow groundwater conditions in and near the Delta. Based on these studies, the seasonal interaction of freshwater entering the Delta, shallow saline groundwater, and wetland growth are better understood (see Section 6.3.2). In light of this understanding, the release regime for the four pulse flows could be slightly modified to maximize the effect on wetland plant growth, as described below:

- Freshwater flows in the early winter (October through November) fill root zones depleted during the growing season. The freshwater is not immediately used because plants are entering winter dormancy. By filling pore spaces and creating a freshwater lens, a rise in deleterious saline groundwater during the late winter and early spring is prevented. Under the proposed project, pulse flows would occur in September (Period 3) and in November-December (Period 4). Under this alternative, the Period 4 flows would occur in late October through November to meet plant growth needs. The Period 3 pulse flow would be re-scheduled to August, as described below.
- Freshwater flows in the early spring (March) ensure that freshwater lens remains intact and that plants ending dormancy encounter freshwater in their root zone. Under the proposed project, the

Period 1 pulse flow would occur in March-April. Under this alternative, the Period 1 flows would be scheduled a little earlier to meet plant growth needs.

- Freshwater flows in the summer maintain the freshwater in the root zone. The proposed project includes Period 2 flows in June - July. However, the proposed pulse flows do not include a mid-summer release in August, which would be beneficial to plant growth. Under this alternative, the Period 3 flows would be rescheduled to August to address wetland plant needs at this time of the year.

This alternative is considered feasible because it would not involve any additional releases to the Delta from the pulse flows, and therefore, would not affect flows to the Owens Lake Dust Control project or the municipal water supply to Los Angeles. Modification of pulse flows is a potential adaptive management action. There are no adverse environmental impacts associated with this alternative.

Regime Intended to Maximize Avian Needs

In a memorandum to the MOU parties dated June 23, 2000, the Sierra Club proposed a different release regime for the pulse flows to the Delta that would maximize benefits for various birds that use the Delta by ensuring adequate water year-round to maintain wetlands, shallow flooded areas (especially the brine pool transition area which is important to birds), and ponds. Their proposal was based on the observations that bird use of the Delta occurs year-round. Furthermore, Owens Lake and the Delta provide important habitat for many migrant species on the Pacific Flyway, and the proposed release regime for the Delta could be maximized for bird use, the key resource in the Delta. Their proposed seasonal releases are as follows:

- Period 1. Late March to mid-April, for stimulating plant growth and providing support for early nesting ducks and plovers. 10 days at 25 cfs (496 acre-feet per year)
- Period 2. Late May to early June, for recharging ponds and flooded areas to support new fledglings, and to maintain wetland growth. 10 days at 20 cfs (397 acre-feet per year)
- Period 3. Early to mid July to provide continued support for birds through maintenance of invertebrate populations and provide water for summer residents. 10 days at 20 cfs (397 acre-feet per year)
- Period 4. Early to mid-August to support wetlands and aquatic habitats (especially water to brine pool area), and provide water for fall migrants. 10 days at 20 cfs (397 acre-feet per year)
- Period 5. Early to mid-September to support fall migrants. 10 days at 20 cfs (397 acre-feet per year)
- Period 6. Late November to early December to maintain ponds and shallow water for resident and overwintering birds. 5 days at 15 cfs (298 acre-feet per year)

Under this alternative pulse flow regime, the number of days of pulse flows would increase from 35 to 55 days. The estimated water use during the pulse flows would increase from 1,687 acre-feet per year to 2,382 acre-feet per year – an increase of 695 acre-feet per year. The alternative release regime may provide greater benefits to birds than the proposed project because it targets specific time periods of critical bird activity, and may result in a nearly continuous availability of shallow flooded areas and ponds.

This alternative is considered feasible if it is within the approximately 6 to 9 cfs annual average flow releases to the Delta. Modification of pulse flows is a potential adaptive management action. There are no adverse environmental impacts associated with this alternative.

11.4.5 Cowbird Trapping Program

Background

The brown-headed cowbird (*Molothrus ater*) is a brood parasite. This species does not build its own nest, but instead, lays its eggs in the nests of other species, primarily songbirds. Cowbirds reduce the reproductive success of the host species by: (1) direct removal of host eggs by the female cowbird; and (2) by causing the death of host nestlings due to competition for food or nest space between the host and cowbird nestlings.

The LORP plan does not include trapping of brown-headed cowbirds, which prey on riparian breeding birds through nest parasitism. Cowbirds are very abundant in the LORP project area, and are commonly observed in riparian areas with native breeders. The LORP plan acknowledges their presence, but does not include trapping. Instead, there is an assumption that creation of more riparian habitat will provide sufficient refuge for riparian birds to withstand the parasitism rates.

Under this alternative, cowbird trapping would be implemented once riparian woodland habitat begins to establish and it appears that new habitat for riparian breeding birds is available. The trapping strategy would be developed in consultation with the California Department of Fish and Game and Audubon Society. In general, the most effective approach is to place traps at sites where cowbirds congregate (e.g., feed lots) during the breeding season, rather than in the riparian habitat where nesting is occurring. The trapping program would only be implemented if it appears that cowbird parasitism is continuing to adversely affect breeding by riparian birds in the LORP project area. The program would be temporary in nature. It would only continue to the extent that cowbird parasitism is a major detrimental factor to riparian bird breeding, and that the trapping program provides a measurable benefit.

The cowbird is a negative factor for the existing riparian breeding birds in the Owens Valley. There are some local ornithologists that believe that the use of cowbird trapping, even a modest effort during the breeding seasons, could have direct benefits on the reproductive success of riparian breeding birds in the LORP project area, including many LORP habitat indicator species. These biologists believe that use of this management tool could facilitate the achievement of the riverine-riparian system goals.

Feasibility, Impacts, and Effectiveness

There are no adverse environmental impacts associated with this alternative. However, it may not be effective in the LORP project area, nor contribute to the success of the LORP relative to riparian breeding birds for the reasons presented below.

LADWP has not proposed a brown-headed cowbird trapping program for the LORP because: (1) the available data do not indicate a substantial increase in the local or regional cowbird population in the last 30+ years; (2) cowbird parasitism rates and their impact to local bird populations are unknown; (3) there is no mechanism built into the LORP by which the need or effectiveness of a cowbird trapping program can be evaluated or justified; and (4) cowbird trapping is not a long-term solution for the management of songbird populations.

Since the late 1800's cowbird abundance in the Great Basin has greatly increased (Rothstein, 1994). The brown-headed cowbird was considered widespread in the Great Basin around 1900, and parasitism was documented in Mono County in the early 1900's (Rothstein, 1994). Although the brown-headed cowbird is currently more abundant than a century ago, Breeding Bird Survey (BBS) data for California and Great Basin Deserts for the period from 1966-2000 indicate no significant change in the number of cowbirds (USGS Patuxent Wildlife Research Center BBS data from the World Wide Web). In addition, data from the Lone Pine (1970-1999) and Big Pine (1968-2000) BBS routes also indicate no significant trends in the number of brown-headed cowbirds detected (USGS Patuxent Wildlife Research Center BBS data from the Internet).

The impact of cowbird parasitism to songbird populations in the Owens Valley is unknown. The presence or abundance of cowbirds in a particular area is not necessarily an indication of local parasitism rates. Thus, the mere presence of cowbirds in the LORP area is no indication of whether cowbird parasitism is a factor limiting bird populations in the project area. Cowbird parasitism rates vary temporally, spatially and with the identity of the host species. Many species are able to avoid reproductive losses from parasitism by abandoning parasitized nests and renesting, or by producing a successful nest at another time during the season (Smith et al., 2000).

Cowbird trapping programs are not an effective long-term management solution (California Partners in Flight Riparian Habitat Conservation Plan). Cowbird control programs spanning multiple years indicate that, based on the number of birds trapped each year, cowbird removal has no impact on cowbird populations (Griffith and Griffith, 2000). Although cowbird control may result in improved nest success of some species, the open-ended nature of cowbird control programs is undesirable from a management standpoint (Rothstein, 2000). In addition, without knowledge of local parasitism rates, control programs may be trying to “fix” a nonexistent problem, and wasting resources that could be better spent elsewhere (Rothstein, 2000).

Although cowbird parasitism reduces the nest success of some host species, it is only one factor that limits songbird populations. Nest parasitism and losses due to predation interact to reduce nest success (Grzybowski and Pease, 2000). Many studies have shown that both parasitism and predation rates are influenced by increasing habitat fragmentation and degradation. Predation, not cowbird parasitism, is usually the main cause of nest failure. Thus, the improvements in both habitat quality and extent that are expected to occur with the LORP should benefit bird populations from the standpoint of decreasing the likelihood of both predation and cowbird parasitism.

If, through further study and monitoring it is determined that cowbird parasitism is significantly limiting the breeding bird populations in LORP area despite improvements in habitat quality and connectivity, other management actions should be considered. Robinson et al. (2000) suggest that landscape-level management practices may be the best way to reduce parasitism levels. The California Partners in Flight Riparian Habitat Conservation Plan also recommends a landscape-level approach to management. This may involve an evaluation of local factors such as the condition of the habitat and the availability of feeding concentration areas near high host-density locations.

This alternative is considered feasible, but would not reduce any identified significant impact. At this time, for the reasons discussed above, LADWP and the County are not considering implementing this alternative.

11.4.6 Native Fishes in the Blackrock Waterfowl Habitat Area

The objective of this alternative is to provide habitat for endangered fish species in the Blackrock Waterfowl Habitat Area through the creation of open water habitat that is isolated from the river.
In 1998, USFWS completed a recovery plan for the native fish species of the Owens Basin (USFWS, 1998; see also Section 12.3). LADWP was not signatory to the plan as it conflicted with the LORP flow management needs and contained infeasible measures to implement in other areas of the Owens Valley on LADWP property. Conservation Areas were identified in the plan, which consist of areas where native fish populations should be established to achieve recovery. The Blackrock Conservation Area in the recovery plan generally coincides with the Blackrock Waterfowl Habitat Area from the LORP. The use

of this area for native fishes would be consistent with the recommendations in the USFWS Recovery Plan for this proposed Habitat Conservation Area.

To successfully establish a native fishery in the Blackrock Waterfowl Habitat Area, flow connections would need to be created and maintained between the various management units. However, due to site topography and the presence of existing roads, dikes, and berms, such connections cannot be created or maintained without installation of pumps and/or modifications of the roads, dikes and berms (in addition to those proposed for the LORP). In addition, providing and maintaining open water habitat and connections for native fish may be incompatible with the proposed wetting and drying cycles, which are needed to create and maintain habitat for waterfowl.

At this time, this alternative is not considered feasible because there are significant obstacles to its successful implementation, particularly related to creating and maintaining flow connections between the Blackrock management units described above. However, introduction of native fishes in the Blackrock area could be implemented as part of the HCP to be developed for all LADWP lands in the Owens Valley (see Section 2.7).

11.4.7 Modified Flooding Regime in Blackrock

The objective of this alternative is to use a modified flooding regime in the Blackrock Waterfowl Habitat Area to increase the expected benefits of this element of the LORP regarding the abundance and variety of wildlife at Blackrock.

In a letter dated July 26, 1999 commenting on the May 1999 draft LORP plan, CDFG expressed several concerns about the implementation of the plan for the Blackrock Waterfowl Habitat Area. CDFG made several suggestions to modify the flooding regime at Blackrock to increase the expected benefits of this element of the LORP. These suggestions represent an alternative flooding regime which is summarized below.

1. CDFG is concerned that the proposed lengths of the wet and dry cycles are excessive and can reduce habitat quality. A lengthy dry cycle can reduce the ability of wetland plants to recover when water is applied again, while a lengthy wet cycle can reduce plant diversity due to static water levels that favor only certain species. The duration of the proposed wet cycle would vary depending on the ratio of open water and emergent vegetation in each management unit. In CDFG's opinion, the near continuous flooding for more than 4 years could potentially inhibit habitat diversity. Hence, under this alternative, the dry cycle would only be 1 to 2 years in duration. Indicators of habitat diversity related to wetland plant colonization, growth, and decline would be monitored carefully to determine the optimal length of wet and dry cycles.

2. CDFG expressed concern that there are very high numbers of migrating waterfowl on the Pacific Flyway during wet years. As such, it would be beneficial to provide more than 500 acres of flooded wetlands in wet years to accommodate high numbers of wintering or migrating waterfowl. Hence, this alternative would provide more than 500 acres of flooded wetlands in wet years.

3. Under this alternative, the amount of water in all flooded units would be reduced in dry years. In CDFG's opinion, this approach would result in maintenance of greater habitat quality and/or quantity than under the proposed approach.

CDFG suggested an alternative short-term flooding-drying regime that would more closely mimic natural conditions based on CDFG's experience at their own waterfowl management facilities. Under this regime, flooding would occur in the fall-winter-spring period, followed by a drawdown in March-April,

with two brief episodes of flooding in May and June (to mimic snowmelt), and drying in July and August. Areas would be reflooded in September for overwintering and migrant waterfowl. The proposed flooding regimes for the four management units includes flooding from September to April, followed by partial drawdowns during the period of April to September. The amount and duration of the partial drawdown vary among management units. However, the proposed flooding regime does not include the fluctuating water levels in the late spring and summer suggested by CDFG. The flooding regimes at the Blackrock Waterfowl Management Area are flexible and can be altered based on the results of the monitoring program.
The alternative flooding regime alternative is considered feasible. The impacts of this alternative are similar to those of the proposed project. There are no significant adverse environmental impacts associated with this alternative.

To the extent that CDFG's recommendations are consistent with the MOU (e.g., 500 acres to be flooded in average or above average runoff years), these approaches and concepts are considered feasible and may be considered as part of adaptive management.

11.4.8 Alternative Sediment Stockpiling Sites

As described in Section 2.4.3.7, sediments will be periodically removed from the forebay at the pump station. In the Draft EIR/EIS, an oxbow area adjacent to the river was presented as the proposed stockpile site for storage of sediments removed from the forebay. The oxbow area currently contains a pond, freshwater marsh vegetation, and alkali meadow vegetation. Since publication of the Draft EIR/EIS, the proposed sediment stockpile site has been changed to two upland locations (previously labeled Alternative Stockpile Site 2 and 3 in the Draft EIR/EIS, Figure 11-2) to avoid impacts to the wetland located in the oxbow area (see Sections 2.4.3.7 and 5.1.2 and Figures 2-9 and 5-2). Figure 11-2 has been revised to reflect this change in the proposed locations of the stockpile sites.

12.0 CUMULATIVE IMPACTS

12.1 CUMULATIVE IMPACT REQUIREMENTS

12.1.1 Cumulative Impacts Under CEQA

Section 15355 of the CEQA Guidelines defines cumulative impacts as two or more individual effects, that when considered together, are either considerable or compound other environmental impacts. These cumulative impacts are changes in the environment that result from the incremental impact of the proposed project and other nearby related projects. Cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time.

Under CEQA Guidelines Section 15130, an EIR must discuss cumulative impacts of a project when the project's incremental effect is "cumulatively considerable," which means that the incremental effects of an individual project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects (Section 15065). Where a lead agency is examining a project with an incremental effect that is not "cumulatively considerable," a lead agency need not consider that effect significant, but shall briefly describe its basis for concluding that the incremental effect is not cumulatively considerable.

12.1.2 Cumulative Impacts Under NEPA

NEPA requires that an Environmental Impact Statement (EIS) address the direct, indirect, and cumulative impacts of a proposed action. "Cumulative impact" is defined under the NEPA regulations (Section 1508.7) as the impact on the environment, which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

The federal Council of Environmental Quality (1997) has provided guidance on how to address cumulative impacts under NEPA. The approach involves the following steps: (1) identify the significant cumulative effects issues associated with the proposed action and define the assessment goals and establish the geographic scope for the analysis; (2) identify other actions affecting the environment; (3) characterize other impacts affecting these resources; and (4) determine the magnitude and significance of cumulative effects. This approach is used below to assess the potential cumulative impacts of the proposed project.

12.2 ENVIRONMENTAL IMPACTS OF THE LORP

The potentially significant impacts associated with the proposed project are listed below:

<u>Class I Impacts (Significant and Unmitigable)</u>

1. During the first several years of the project, the baseflows and seasonal habitat flows could degrade water quality along the river, primarily downstream of Mazourka Canyon Road. The interactions of increased flows with organic sediments in the channel may reduce dissolved oxygen levels and increase hydrogen sulfide, ammonia, and methane levels. These impacts would be minimized to the extent feasible by flow management actions, but cannot be entirely avoided.

2. The temporary adverse water quality conditions during the initial releases to the river could adversely affect fish due to the depletion of oxygen, and possible increase in hydrogen sulfide, methane, and ammonia. The poor water quality could cause fish kills along the river downstream of Mazourka Canyon Road. Both the 40 cfs baseflow and the seasonal habitat flows of up to 200 cfs could potentially cause water quality degradation. The fishery is expected to recover once water quality conditions improve.

Class II Impacts (Significant, but Mitigable)

1. Flows in the Lower Owens River could cause localized overbank flooding at several public roads and lease roads that cross the river if dislodged debris and sediments clog culverts and bridges at these crossings. This impact may occur at the initiation of the project and under the seasonal habitat flows. LADWP and Inyo County will monitor these crossings and remove accumulated debris to minimize flooding.

2. Clearing the river channel downstream of the River Intake to remove channel obstructions will require the establishment of several temporary construction access roads in native upland habitats. These roads would be removed after the operation and restored to pre-construction grade and vegetative conditions.

3. Implementation of an adaptive management measure to mechanically remove cattail and bulrush stands that are significantly impeding the goals of the LORP would require access routes to the wetted channel for equipment, staging areas for truck and equipment maneuvering, and a temporary dewatering site. Establishment of these temporary work areas could disturb wetland and riparian vegetation.

4. The construction of the pump station would temporarily disturb about 22 acres of upland vegetation due to equipment staging, overland travel between work areas, and construction of the service roads. These areas would be restored after construction.

5. Construction of various berms and ditches in the Blackrock Waterfowl Area could facilitate colonization by non-native weeds, particularly perennial pepperweed and saltcedar. This impact will be avoided by post-construction seeding with native plants and weed control to prevent an infestation of exotics.

6. Rewatering the Lower Owens River and supplying water to the Delta and to the Blackrock areas could potentially increase the distribution and abundance of perennial pepperweed, Russian knapweed, and other noxious plants. This impact will be mitigated by monitoring and treating existing and new infestations through the Agricultural Commissioner's office.

7. There is a potential to encounter previously unrecorded archeological deposits or sites during the earthmoving activities associated with pump station and power line. This impact would be reduced or avoided by construction monitoring by an archeologist.

8. One of the proposed ditches in the Blackrock Waterfowl Area will be located in proximity to an archeological site, which could be disturbed during construction. Disturbance to the site will be avoided by installing a temporary fence during construction work.

9. Construction of temporary access roads to conduct the river channel clearing below the River Intake could disturb archeological sites. This impact will be avoided by locating the temporary

access roads around the sites and installing temporary protective fencing to prevent inadvertent disturbances from heavy equipment or sediment spoil from intruding onto the sites.

10. The implementation of an adaptive management measure to mechanically remove limited stands of cattails and bulrush along the river could affect nesting birds if it occurs in the spring and early summer. This impact can be avoided by scheduling removal for the fall months.

11. The rewatering of the river would create new wetted channel areas, including areas that are barren and could cause saltcedar infestation in these and other areas. The supplying of water to the Delta and to the Blackrock areas could create additional areas for the colonization of saltcedar. This impact will be mitigated by implementing measures to minimize new infestations, monitoring of areas that are to undergo a change in hydrologic status, and treatment of new and existing infestations through the Inyo County Saltcedar Control Program.

12. The LORP will result in hundreds of acres of new open water and marsh habitats along the river, in the Blackrock Waterfowl Habitat Area, and at the Delta Habitat Area. These new habitats would provide more opportunities for mosquitoes to breed, which could result in increased nuisance and public health risk to communities and residents near these areas. This impact will be mitigated by monitoring, treating and, when possible, adjusting management to reduce mosquito sources within the LORP that threaten nearby communities.

Class III Impacts (Less than Significant)

1. Over time, the rewatering of the river is predicted to convert about 2,343 acres of alkali scrub/meadow (an upland vegetation) and 531 acres of alkali meadow (upland phase) to various wetland and riparian vegetation types due to inundation effects and altered hydrologic conditions along the river. This habitat conversion is unavoidable because the LORP cannot be accomplished without this conversion.

2. Removal of channel sediments in the river immediately downstream of the River Intake prior to the release of water could cause temporary downstream water quality impacts.

3. Infrequent removal of tule and cattail stands could cause temporary downstream water quality impacts.

4. Construction of the pump station and maintenance dredging of the forebay could cause temporary downstream water quality impacts.

5. There is a potential for cattails and tules to proliferate and reduce quality of wildlife habitat along the river.

6. Potential loss of stand of riparian forest at the pump station forebay due to flooding during operations.

7. Initial channel clearing will result in the loss of emergent wetlands along the river.

8. Construction of the pump station will result in temporary and permanent losses of upland and wetland habitats.

9. Construction activities in Blackrock would result in temporary and permanent losses of upland and wetland habitats.

10. Construction activities for all LORP elements would cause temporary air quality impacts.
11. The initial rewatering will cause off-gassing from organic sediments that cause unpleasant odors.
12. New land management on LADWP leases could increase cattle drift on BLM and SLC lands.
13. The LORP may cause increased recreation, which could adversely affect cultural and natural resources.

12.3 PROJECTS CONSIDERED FOR POTENTIAL CUMULATIVE IMPACTS

Past, present, and reasonably foreseeable projects in and near the LORP project area are briefly described below.

Owens Lake Dust Mitigation Program – LADWP

In 1998, the Great Basin Unified Air Pollution Control District (GBUAPCD) adopted a State Implementation Plan (SIP) for the Owens Lake PM10 Planning Area, which identifies dust control measures to be implemented by LADWP on the Owens Dry Lakebed. Dust control measures include the use of shallow flooding, vegetated areas, and gravel layers to reduce dust emissions over 35 square miles of the lake. In December 2001, LADWP began shallow flooding 11.9 square miles (7,639 acres) in an area along the northeast part of Owens Dry Lake referred to as Zone 2 (northeastern portion of the lake, immediately adjacent to the Delta Habitat Area; see Figure 6-1). By 2003, the Dust Mitigation Program included 15.4 square miles (9,823 acres) of shallow flooding. Shallow flooding areas are operated between October 1 and June 30 each year. In addition, as part of the CDFG Streambed Alteration Agreement for dust control activities in the southern portion of the lake, LADWP has committed to maintaining 1,000 acres of shorebird habitat within Zone 2 shallow flood area and up to 1,000 acres of additional shorebird habitat using naturally occurring water.

Owens Lake Groundwater Pumping Project

Since 1999, LADWP has been studying the feasibility of pumping from a confined aquifer beneath Owens Lake to supply a portion of the water required for the dust control project. The pumping would be bound by the requirements of the 1991 Inyo County/Los Angeles Long Term Agreement (Agreement). The results of the preliminary study, the Owens Lake Groundwater Evaluation, indicated further information was needed before conclusions on the amount of water available could be made. At this time, LADWP plans to collect this additional information and then evaluate the feasibility of this project.

Owens Basin Wetland and Aquatic Species Recovery Plan

USFWS (1998) prepared the Owens Basin Wetland and Aquatic Species Recovery Plan to describe actions necessary to restore the populations and enhance habitat for three federally listed species that occur in the Owens Valley – Owens pupfish, Owens tui chub, and Fish Slough milk-vetch. The plan also identifies conservation actions and programs to serve as a foundation for future Habitat Conservation Plans (HCPs) for these species, as well as several others that could be listed in the future – Owens Valley vole, Owens Valley speckled dace, Long Valley speckled dace, Owens Valley springsnail, Fish Slough springsnail, Owens Valley checkerbloom, and Inyo County mariposa lily. The plan describes various Conservation Areas to be established in the valley to achieve recovery of these species. This plan has not been implemented. CDFG prepared a companion plan, entitled Owens Basin Sensitive Wetland and Aquatic Species Management Guidelines Plan, which included various management actions and guidelines that would protect and enhance all species of special concern in the Owens Valley that were not include in the USFWS plan. The CDFG plan does not include specific projects. USFWS also prepared a recovery plan for the endangered southwestern willow flycatcher, which occurs in the LORP project area (USFWS, 2001). The Plan identifies priorities for conserving riparian habitat areas, including several along the Lower Owens River.

Habitat Conservation Plan for LADWP Lands in the Owens Valley

Under the MOU, LADWP is required to prepare watershed management plans for all of its lands in the Owens Valley. LADWP is required to commence the plans by June 2003 and to complete the plans by June of 2008. As part of the development of these plans, LADWP is identifying management activities that may affect special status species, including federally listed threatened and endangered species. Once these management activities have been identified, LADWP will work with the USFWS and CDFG to develop a valley-wide HCP.

Projects Required Under the Inyo County/Los Angeles Long Term Water Agreement

In October 1991, Inyo County and LADWP approved the Inyo County/Los Angeles Long Term Water Agreement (Agreement). The overall goal of the Agreement is to manage the water resources within Inyo County "…*to avoid certain described decreases and changes in vegetation and to cause no significant effect on the environment which cannot be acceptably mitigate while providing a reliable supply of water for export to Los Angeles and for use in Inyo County*." In addition to providing a framework for the management of groundwater and surface water in the Owens Valley, the Agreement includes various projects and programs. A summary of the projects in the Agreement is provided below.

- Groundwater Management. Inyo County and LADWP must manage water resources to avoid certain described changes in vegetation and to cause no significant effect on the environment, which cannot be acceptably mitigated while providing a reliable water supply for export to Los Angeles, and for in-valley uses. A groundwater management program has been implemented in which groundwater levels and the condition of vegetation are monitored, and groundwater pumping is modified based on monitoring results as relevant. LADWP must submit an Annual Operations Plan that describes the proposed operations for the upcoming year. The Plan must take into account groundwater levels and effects on vegetation. The groundwater management plan must be consistent with the goal of the Agreement.

- New Wells and Production Capacity. In order to provide for increased operational flexibility and to facilitate rotational pumping, LADWP may replace existing wells and construct new wells in areas where hydrogeologic conditions are favorable and where operations of such wells will not cause a change in vegetation that would be inconsistent with the Agreement. The Agreement provides for up to 15 new wells. In order to install a new or replacement well, a prescribed technical review process must be completed by LADWP and Inyo County to ensure compliance with the Agreement and to avoid any significant environmental impacts. LADWP had installed a total of 10 wells (eight replacement and two new wells) as of 2002. Future plans include the replacement of old wells and the installation of new wells identified in the Agreement and as needed for operational flexibility.

- Groundwater Recharge Project. LADWP may construct groundwater banking and recharge facilities. Potential sites are located in the towns of Laws and Big Pine. At the present time, LADWP has not pursued groundwater recharge facilities in the Laws area. The feasibility of this project will be evaluated before the project is implemented. LADWP has worked with Caltrans in conjunction with the Highway 395 widening in the Big Pine area to install additional diversion capacity for recharge off of the Big Pine Canal to the west of Highway 395, as identified in the Agreement and 1991 EIR.

- Enhancement/Mitigation Projects. All existing E/M projects implemented between 1985 and 1990 must continue, unless the Standing Committee agrees to modify or discontinue a project. These projects include the Millpond Recreation Area Project, Shepherd Creek Alfalfa Lands Project, Klondike Lake Project, Laws Historic Museum Project, Laws-Poleta Native Pasture Project, McNally Ponds Project, Independence Pasture Lands and Spring Field Project, Lone Pine Riparian Park, Lone Pine Sports Complex, Independence Roadside Rest, Eastern California Museum, and Town Regreening Projects, and Lower Owens River Rewatering Project (this project will be replaced with the LORP).

- Town Water Systems. LADWP will transfer to Inyo County or some other public agency, ownership of the water systems in Lone Pine, Independence, and Laws. Prior to the transfer, certain work will be completed to upgrade the systems. LADWP will provide up to 1,030 acre-feet per year to the towns free of charge. This transfer is in the process of being fully completed.

- Saltcedar Control. LADWP will continue to provide funds to Inyo County to maintain and control a salt cedar control program ($750,000 was provided during the first three years, and $50,000 per year thereafter). Inyo County initiated the program in 1999. It includes a comprehensive effort to manage saltcedar throughout the Owens Valley, concentrating during the initial years on saltcedar populations in the LORP project area.

- Park Rehabilitation, Development, and Maintenance. LADWP is providing $2 million to Inyo County to rehabilitate existing county parks and campgrounds and to develop new recreation facilities. Projects completed to date include:

  - Installation of Americans with Disabilities Act (ADA) compliance drinking fountains at various parks
  - Construction of a new shop building at Diaz Lake
  - Construction of a new entrance station at Diaz Lake
  - Provision of electrical power at Pleasant Valley Campground
  - Construction of a new fee station at Pleasant Valley Campground
  - Provision of electrical power to Tinnemaha Campground
  - Construction of new toilets at various campgrounds
  - Installation on new shade ramadas and ADA compliant picnic tables at Diaz Lake
  - Upgrade of water system at Diaz Lake

  Projects in progress include:

  - Construction of new playground equipment at Millpond
  - Installation of new signage at Millpond
  - Rehabilitation of seven tennis courts at various locations
  - Rehabilitation of Lone Pine Park including renovation of the Little League field, new restrooms, new playground equipment, installation of ADA compliant pathways, construction of a gazebo, construction of horseshoe pits, construction of ADA compliant picnic area, paving of the parking area, installation of fencing, new irrigation system, foot bridge, ADA compliant drinking fountains and a roller blade area
  - Rehabilitation of Dehy Park including expansion of the park area, construction of a visitor's center, new parking area, playground equipment, gazebo, foot bridges, interpretive trail, ADA

compliant drinking fountains, food court, new lawn area, irrigation system, ADA compliant pathways, horseshoe pits, basketball court and perimeter fencing, planting of new trees

In addition, LADWP provides approximately $100,000 per year to Inyo County for maintenance costs. As part of the funding provided for the parks rehabilitation program, Inyo County may develop a plan for recreational use and management of the Owens River from Pleasant Valley Reservoir to the Owens River Delta. At present, the County does not anticipate the development of such a plan.

- Big Pine Ditch System. LADWP will provide up to $100,000 for the reconstruction and upgrading of Big Pine ditch system, and provide up to six cfs to the ditch system from a new well to be constructed west of Big Pine. Currently LADWP and the County are working to determine the water supply source for the project.

- Release of Los Angeles-owned Lands. LADWP will offer 75 acres of land for sale in designated areas of the Owens Valley. The County is in the process of identifying the 75 acres that it will request to be released for sale. A CEQA document addressing the environmental impacts of the sale of the lands identified by the County is expected to be released by the County this fall.

The Memorandum of Understanding (MOU)

The MOU provides guidance on the design and implementation of the LORP, as well as other environmental projects and studies in and near the LORP project areas, which are listed below:

- Yellow billed Cuckoo Habitat. Under the direction of LADWP and Inyo County, Ecosystem Sciences will evaluate yellow-billed cuckoo habitat in woodland areas of Hogback and Baker creeks. If deemed warranted, habitat enhancement plans will be prepared.

- Additional Mitigation. A total of 1,600 acre-feet of water per year will be provided by LADWP for: (1) implementation of an on-site mitigation measure at Hines Spring identified in the 1991 EIR; and (2) the implementation of on-site and/or off-site mitigation that is in addition to the mitigation measures identified in the 1991 EIR for impacts at Fish Springs, Big and Little Blackrock Springs, and Big and Little Seeley Springs.

- Owens Valley Land Management Plans. LADWP, in consultation with MOU parties, will identify areas of LADWP-owned lands, which are not part of the LORP where plans will be developed to remedy problems caused by grazing and other land uses.

Mitigation Measures from the 1991 EIR

The 1991 EIR on LADWP's groundwater pump included various mitigation measures designed to offset impacts of prior water management on native vegetation and aquatic resources. The EIR mitigation measures and their current status are shown in Table 12-1.

TABLE 12-1
MITIGATION MEASURES LISTED IN THE 1991 EIR

Mitigation	Reference	Status
1. 300 acres Five Bridges area	EIR p 10-58 FEIR p 3-16 DWP p 2 (4)	In progress. A mitigation plan for the area was approved in 1999. Mitigation was initiated in 1988. ICWD has recommended a revision of the mitigation plan since not all of the mitigation goals have not been achieved.
2. 140 acres near Laws	EIR p 10-66 FEIR p 3-18 DWP p 4 (9a)	In progress. The site has been fenced (95.9 acres) and baseline data were collected. A 10-acre test plot was implemented in Dec. 2001.
3. McNally Ponds and Native Pasture (348 acres) E/M	EIR p 10-67 DWP p 5	Partially completed. Ponds west of Hwy 6 have not received water annually during the waterfowl season. Pastures on the east side of the river are completed. The project has enhanced and mitigated 300 acres.
4. Laws/Poleta Native Pasture (216 acres) E/M	EIR p 10-67 FEIR p 3-18 DWP p 5 (9b)	Completed. Although these pastures receive water, both pastures have a poor cover of irrigated pasture. The project has mitigated 220 acres.
5. Laws Historical Museum Pastures (21 & 15 acres) E/M	EIR p 10-67 DWP p 5 (9b)	Not completed. These pastures do not currently receive irrigation water. The pasture located to the east of the museum has in the past been irrigated, whereas the pasture to the west of the museum has never been irrigated. Diversion structures have been installed in the east pasture, and irrigation was intermittent during the 1992 to 1998 period. An archaeological survey of the site was conducted in 2002. As part of the Laws Type E transfer of lands and re-irrigation, areas of this project are being considered for sprinkler irrigation.
6. Laws area (acres not provided)	EIR p 10-65 DWP p. 5 (9c)	Not Completed. County and LADWP are in disagreement over surface water and groundwater operations in the Laws area.
7. Buckley Ponds	EIR p 11-40 DWP p 6 (12)	Completed.
8. Farmer’s Pond	EIR p 10-67 DWP p 5 (9b) EIR p 11-40 DWP p 6 (12)	Completed.
9. 640 acres near Laws	EIR p 10-67 FEIR p 3-18	Not Completed. Because of the existing sparse vegetation conditions, these lands may be considered by the Standing Committee for selective mitigation, which would be compatible with water spreading and groundwater recharge activities during wet years. There has not been any selective mitigation identified or implemented. The Standing Committee is to evaluate the need for mitigation.
10. 120 acres near Bishop	EIR p 10-64 DWP p 4 (7c)	In progress. The site has been fenced and baseline data were collected. Test plots have been established to evaluate different revegetation methodologies.
11. Klondike Lake E/M	EIR p 11-40 DWP p 6 (12)	Completed. The water supply, however, has been reduced. This reduction has eliminated the waterfowl nesting and feeding habitat area along the south shoreline.
12. Big Pine wellfield	EIR p 10-68 DWP p 5 (10b)	Ongoing. This area will be mitigated by the valley-wide mitigation under the Agreement, which is ongoing.

Mitigation	Reference	Status
13. Big Pine Ditch System	EIR p 10-68 DWP p 5 (10b)	In progress. Evaluation of groundwater source to supply ditch system is underway.
14. Steward Ranch	EIR p 9-74-9-77 DWP p 1 (1)	Completed. Mitigation agreement is in place.
15. Big Pine Northeast Regreening (30 acres) E/M	EIR p 10-57 FEIR p 3-16 DWP p 2 (3d) EIR p 10-68 DWP p 5 (10b)	Not Completed. Regreening has not been implemented.
16. 20 acres near Big Pine E/M	EIR p 10-68 FEIR p 3-18 DWP p 6 (10c)	Not Completed. Regreening has not been implemented.
17. 160 acres near Big Pine	EIR p 10-68 FEIR p 3-18 DWP p 5 (10a)	In Progress. The project implementation is in progress with 209 acres enclosed within a fence and test plots have been established to evaluate different revegetation techniques. In addition, baseline data have been collected. The project plan is to evaluate the test plots after five years and later expand the most promising revegetation methods to a larger scale. Mitigation is behind schedule.
18. Fish Springs	EIR p 10-59 to 62 FEIR p 2-72 DWP p 2 (6a)	Completed. Compensatory mitigation in place.
19. Big and Little Seeley Springs	EIR p 10-59 to 62 FEIR p 2-72 DWP p 2 (6b)	Completed. No evaluation of the extent of the natural revegetation in the vicinity of the pond has been made.
20. Fish Springs, Big and Little Seeley, and Big and Little Blackrock	EIR 10-62 DWP p 2 (6F)	Not Completed. The LORP portion of the mitigation is not yet implemented.
21. 80 acres (Taboose/Hines Spring area)	EIR p 10-58 FEIR p 3-16 DWP p 2 (3e)	In Progress. Impact area consists of 3 sites totaling ~ 115 acres. At the Charlie's Butte site, 100 Alkali Sacaton plants have been planted and receive drip irrigation. One site on Intake Rd. is fenced and was treated with a controlled burn.
22. Hines Spring	EIR p 10-59 to 62 FEIR p 2-73 DWP p 2 (6c)	Not Completed. Mitigation has not been implemented.
23. Little Blackrock Springs	EIR p 10-59-62 FEIR p 3-20 and p 2-72 DWP p 2 (6d)	Completed.
24. Big Blackrock Springs	EIR p 10-59-62 FEIR p 3-20 FEIR p 2-72 DWP p 2 (6a)	Partially completed. Compensatory mitigation in place; however, LORP not implemented.
25. Thibaut/Sawmill marsh habitat	EIR p 10-69 DWP p 6 (11) FEIR 3-18	In Progress. LORP not implemented. Implementation of Agreement is ongoing.

Mitigation	Reference	Status
26. 60 acres in S/S well field	EIR p 10-59 FEIR p 3-16 DWP p 2 (5)	In Progress. Some plans are behind schedule. Impact area consists of 3 sites totaling ~115.2 acres. Two of the project parcels (Independence 123 and Independence 131) are part of a trial revegetation program. Test plots have been established and numerous revegetation methods are being evaluated. In addition, both of these parcels have been fenced.
27. Independence East Side Regreening (30 acres)E/M	EIR p 10-57 FEIR p 3-16 DWP p 2 (3d) EIR p 12-10 DWP p 7 (13c)	Not Completed. Regreening has not been implemented.
28. Independence Woodlot (21 acres) E/M	EIR p 10-64 FEIR p 3-16 DWP p 1 (3a)	Completed.
29. Independence Pasturelands (460 acres) E/M	EIR p 10-63 FEIR p 3-17 DWP p 3 (7a) EIR p 12-10 DWP p 6 (13a)	Completed.
30. Independence Springfield (283 acres) E/M	EIR p 10-57 FEIR p 3-16 DWP p 1 (3a) EIR p 12-10 DWP p 6 (13a)	Completed.
31. Billy Lake	EIR p 11-40 DWP p 6 (12)	Completed. This project was completed as part of the Lower Owens River Rewatering Project.
32. Shepherd Creek Alfalfa Field (185 acres) E/M	EIR p 10-57 FEIR p 3-16 DWP p 1 (3b) EIR p 12-10 DWP p 7 (13b)	Completed. Alfalfa planted and maintained on 185 acres.
33. Expand Shepherd Creek Alfalfa E/M (60 acres)	EIR, p 10-58 DWP p 1 (3c)	Not Completed. The Standing Committee is to evaluate the need for expansion of irrigation to the east side of the highway, this has not been done.
34. Reinhackle Spring	EIR p 10- 59-63 FEIR p 3-21, 22 FEIR p 3-30, 31 FEIR p 2-11 (PD5) FEIR p 2-12 (PD-5) FEIR p 2-39 (WA-4) DWP p 3 (6e)	In Progress. Vegetation dependent on springflow should be monitored by the Technical Group, but has not been monitored to date. ICWD and LADWP are developing a monitoring program for potential impacts from pumping on springflow.
35. Lone Pine Ponds E/M	EIR p 11-40 DWP p 6 (12)	Completed.
36. Lone Pine East Side Regreening (11 acres) E/M	EIR p 10-64 FEIR p 3-17 DWP p 4 (7b)	Completed.
37. Lone Pine West Regreening (7 acres) E/M	EIR p 10-64 FEIR p 3-17 DWP p 4 7b	Completed.

Mitigation	Reference	Status
38. Lone Pine Woodlot (12 acres) E/M	EIR p 10-64 FEIR p 3-17 DWP p 3 (3a)	Completed.
39. Richards Field (189 acres) E/M	EIR p 10-64 FEIR p 3-17 DWP p 3 (7a)	Completed.
40. Van Norman Field (171 acres) E/M	EIR p 10-64 FEIR p 3-17 DWP p 3 (7a)	Completed. A portion of field is not capable of being irrigated. A re-evaluation of this portion of the project has been recommended.
41. Lower Owens River Project E/M	EIR p 10-62 DWP p 3, 4 MOU p 3, 4, 6 (11,12)	Not Completed. The LORP has not been implemented.
42. Salt Cedar Control Program	EIR p 10-53 DWP p 1 (2)	Completed/Ongoing. Program implemented in 1998.
43. Springs	EIR p 10-62 FEIR p 2-12 (PD-5) DWP p 3 (discussion)	Ongoing. Ecosystem Sciences has provided a draft inventory of springs and seeps to the signatories of the MOU.
44. Irrigated fields, including Cartago and Olancha	EIR p 10-63 DWP p 4 L-TA p B-21	Ongoing. Fields are being irrigated.
45. Meadow/ riparian vegetation dependent on agricultural tailwater	EIR p 10-64 DWP p 4 (8)	Not Completed. LORP not implemented.

References: EIR = Draft 1991 EIR; FEIR = Final 1991 EIR; DWP = Monitoring Program adopted at time of approval of FEIR by LADWP Board; MOU = 1997 Agreement between LADWP and Inyo County, Calif. State Lands Comm., CDFG, Sierra Club, O.V. Committee, and Carla Scheidlinger.

12.4 POTENTIAL CUMULATIVE IMPACTS

To evaluate the potential for significant cumulative impacts to occur between the LORP and the various past, present, and probable future projects described above, the key impacts of the LORP were compared to the major impacts associated with the cumulative projects. For certain projects, information about environmental impacts is available from the environmental document that was prepared to address the project. However, for most related projects, information on their environmental impacts is not available and must be assumed or generally deduced. Environmental impacts of the cumulative projects are briefly described below and summarized in Table 12-2.

It should be noted that the following analysis of cumulative impacts is focused solely on <u>adverse</u> impacts to the environment, not beneficial impacts. There are many beneficial cumulative impacts that are expected to occur from the implementation of the LORP and all other environmental enhancement projects described below. These include increases in the acreage and variety of wetland habitats, restoration of previously disturbed upland habitats, improvement in groundwater conditions along the river, new recreational/educational opportunities, and improvements in overall quality of life for Owens Valley residents.

TABLE 12-2
SUMMARY OF CUMULATIVE IMPACTS

Potentially Impacts of the LORP	Potential Cumulative Impacts with Other Projects or Programs?						
	Owens Lake Dust Mitigation Program	Owens Lake Groundwater Project	Owens Valley Recovery Plan (no specific projects identified yet)	HCP for LADWP Lands (HCP has not been developed yet)	Groundwater Management Plan under the Agreement	Other Projects under the Agreement	Mitigation Measures from the 1991 EIR
Class I Impacts							
Water quality and fish kill impacts due to initial re-watering of the river.	No impact is anticipated	No impact is anticipated	No impact is anticipated	No impact is anticipated	No impact is anticipated	No impact is anticipated	No impact is anticipated
Class II Impacts							
Potential overbank flooding due to plugged road culverts during the initial releases to the project and from seasonal habitat flows.	No impact is anticipated	No impact is anticipated	No impact is anticipated	No impact is anticipated	No impact is anticipated	No impact is anticipated	No impact is anticipated
Potential disturbance to nesting birds during the rare occasions when dense stands of cattails and bulrush must be mechanically removed along the river.	No impact is anticipated	No impact is anticipated	No impact is anticipated	No impact is anticipated	No impact is anticipated	No impact is anticipated	No impact is anticipated
Temporary disturbance of upland habitats due to construction related disturbances (i.e., roads for initial channel clearing, and pump station construction).	Cumulative impact from both projects due to construction-related impacts to upland habitats. Less than significant due to adopted mitigation measures to restore habitats after construction.	Unknown impact, as a specific project has not been identified yet. Potential construction related impacts to uplands to install wells. Likely to be less than significant.	No specific actions identified in the plan. However, establishment of a Conservation Area at Blackrock could involve similar impacts. Likely to be less than significant.	No impact is anticipated	No impact is anticipated	Cumulative impact from certain projects due to construction-related impacts to upland habitats.	Cumulative impact due to construction-related impacts for certain projects. Less than significant due to adopted mitigation measures to restore habitats after construction.
Potential increase in non-native exotic species due to ground disturbance from construction of various berms and ditches in the Blackrock Waterfowl Area.	Cumulative impact from both projects due to possible colonization by exotics due to construction-related disturbances. Less than significant due to mitigation measures to prevent infestations.	Unknown impact, as a specific project has not been identified yet. Potential construction related disturbances. Likely to be less than significant.	No specific actions identified in the plan. However, establishment of a Conservation Area at Blackrock could involve similar impacts. Likely to be less than significant.	No impact is anticipated	No impact is anticipated	Cumulative impact from certain projects due to possible colonization by exotics due to construction-related disturbances.	Cumulative impact due to construction-related impacts for certain projects. Less than significant due to adopted mitigation measures to prevent infestations.
The LORP could cause an increase in noxious weeds such as pepperweed and Russian knapweed	Potential cumulative impact because both projects could facilitate colonization by saltcedar	No impact is anticipated	Potential cumulative impact if potential for weed infestation increased as a result of Recovery Plan projects	Potential cumulative impact if potential for weed infestation increased as a result of HCP	No impact is anticipated	Potential cumulative impact because some projects could facilitate colonization by saltcedar	No impact is anticipated
The rewatering of the river would create new wetted channel areas, including areas that are barren and could cause saltcedar infestation in these and other areas. The supplying of water to the Delta and to the Blackrock areas could create additional areas for the colonization of saltcedar.	Potential cumulative impact because both projects could facilitate colonization by saltcedar	No impact is anticipated	Potential cumulative impact if potential for saltcedar infestation increased as a result of Recovery Plan projects	Potential cumulative impact if potential for saltcedar infestation increased as a result of HCP	No impact is anticipated	Potential cumulative impact because some projects could facilitate colonization by saltcedar	No impact is anticipated

TABLE 12-2 (continued)

Potentially Impacts of the LORP	Potential Cumulative Impacts with Other Projects or Programs?						
	Owens Lake Dust Mitigation Program	Owens Lake Groundwater Project	Owens Valley Recovery Plan (no specific projects identified yet)	HCP for LADWP Lands (HCP has not been developed yet)	Groundwater Management Plan under the Agreement	Other Projects under the Agreement	Mitigation Measures from the 1991 EIR
Increase in mosquito populations due to additional flows.	Mitigation Measure PS-1 (Section 10.3.3) describes a program for monitoring, treating and, when possible, adjusting management to reduce mosquito sources within the LORP that threaten nearby communities. With implementation of mosquito control measures under both the Owens Lake Dust Mitigation Program and the LORP, the cumulative impact of the two projects on public health is anticipated to be less than significant.	No impact is anticipated	Possible cumulative impact if additional water is spread at Blackrock for Conservation Area purposes and the program for monitoring, treating, and reducing mosquito sources is not expanded.	No impact is anticipated	Not applicable	No impact is anticipated	Not applicable
Potential to disturb known archeological sites during construction of ditches in the Blackrock Waterfowl Area, and from temporary roads for initial channel desilting near the River Intake.	No impact is anticipated	Unknown impact, as a specific project has not been identified yet. Remote potential for impacts to archeological sites. Likely to be less than significant.	No specific actions identified in the plan. However, establishment of a Conservation Area at Blackrock could involve similar impacts. Likely to be less than significant.	No impact is anticipated	No impact is anticipated	No impact is anticipated	Cumulative impact due to construction-related impacts to upland habitats from certain projects. Less than significant due to adopted mitigation measures to restore habitats after construction.
There is a remote possibility that unknown archeological sites or cultural deposits could be affected by the new flows.	No impact is anticipated	No impact is anticipated	No impact is anticipated	No impact is anticipated	No impact is anticipated	No impact is anticipated	
There is a potential to encounter previously unrecorded archeological deposits or sites during the earthmoving activities associated with pump station, power line, and Blackrock ditches and berms. Known sites also occur at Blackrock and along the power line.	No impact is anticipated	Unknown impact, as a specific project has not been identified yet. Remote potential for impacts to archeological sites. Likely to be less than significant.	No specific actions identified in the plan. However, establishment of a Conservation Area at Blackrock could involve similar impacts. Likely to be less than significant.	No impact is anticipated	Cumulative impact due to construction-related impacts to upland habitats from new wells. Less than significant due to adopted mitigation measures to restore habitats after construction.	No impact is anticipated	Cumulative impact due to construction-related impacts to upland habitats for certain projects. Less than significant due to adopted mitigation measures to restore habitats after construction.
Class III Impacts							
The rewatering of the river will convert 2,343 acres of alkali scrub/meadow (an upland vegetation) and 531 acres of alkali meadow (upland phase) to various wetland and riparian vegetation types due to inundation effects.	Potential cumulative impact because the dust control project is also causing habitat conversions	No impact is anticipated	Potential cumulative impact (adverse or beneficial) depending upon the nature of the habitat conversion and the species to be recovered	Potential cumulative impact (adverse or beneficial) depending upon the nature of the habitat conversion and the species to be protected	No impact is anticipated	Potential cumulative impact because some projects may also cause habitat conversions	No impact is anticipated

TABLE 12-2 (continued)

Potentially Impacts of the LORP	Potential Cumulative Impacts with Other Projects or Programs?						
	Owens Lake Dust Mitigation Program	Owens Lake Groundwater Project	Owens Valley Recovery Plan (no specific projects identified yet)	HCP for LADWP Lands (HCP has not been developed yet)	Groundwater Management Plan under the Agreement	Other Projects under the Agreement	Mitigation Measures from the 1991 EIR
Removal of channel sediments in the river immediately downstream of the River Intake prior to the release of water could cause temporary downstream water quality impacts.	No impact is anticipated	No impact is anticipated	No impact is anticipated	No impact is anticipated	No impact is anticipated	No impact is anticipated	
Infrequent removal of tule and cattail stands could cause temporary downstream water quality impacts	No impact is anticipated	No impact is anticipated	No impact is anticipated	No impact is anticipated	No impact is anticipated	No impact is anticipated	No impact is anticipated
Construction of the pump station and maintenance dredging of the forebay could cause temporary downstream water quality impacts.	No impact is anticipated	No impact is anticipated	No impact is anticipated	No impact is anticipated	No impact is anticipated	No impact is anticipated	No impact is anticipated
There is a potential for cattails and tules to proliferate and reduce quality of wildlife habitat along the river	No impact is anticipated	No impact is anticipated	No impact is anticipated	Potential cumulative impact if increase adversely affects habitats to be used in Conservation Area	No impact is anticipated	No impact is anticipated	No impact is anticipated
Potential loss of stand of riparian forest at the pump station forebay due to flooding during operations.	No impact is anticipated	No impact is anticipated	No impact is anticipated	No impact is anticipated	No impact is anticipated	No impact is anticipated	No impact is anticipated
Initial channel clearing will result in the loss of emergent wetlands along the river.	No impact is anticipated	No impact is anticipated	No impact is anticipated	No impact is anticipated	No impact is anticipated	No impact is anticipated	No impact is anticipated
Potential reduction in aquatic habitats and wetlands due to a reduction in flows to the Delta, potentially affecting water-dependent aquatic organisms and birds such as the snowy plover and certain shorebirds.	Potential significant cumulative impact due to loss of wetland habitats and snowy plover habitat under the dust control project.	Unknown impact as a specific project has not been identified. However, the Agreement would prohibit any adverse effects on vegetation from pumping.	No impact is anticipated	No impact is anticipated	No impact is anticipated	No impact is anticipated	No impact is anticipated
Construction of the pump station will result in temporary and permanent losses of upland and wetland habitats	Cumulative impact from both projects due to construction-related impacts to upland and wetland habitats. Less than significant due to adopted mitigation measures to restore habitats after construction.	No impact is anticipated	No impact is anticipated	No impact is anticipated	No impact is anticipated	Cumulative impact from certain projects due to construction-related impacts to upland and wetland habitats.	No impact is anticipated
Construction activities in Blackrock would result in temporary and permanent losses of upland and wetland habitats	Cumulative impact from both projects due to construction-related impacts to upland and wetland habitats. Less than significant due to adopted mitigation measures to restore habitats after construction.	No impact is anticipated	No impact is anticipated	No impact is anticipated	No impact is anticipated	Cumulative impact from certain projects due to construction-related impacts to upland and wetland habitats.	No impact is anticipated

TABLE 12-2 (continued)

Potentially Impacts of the LORP	Potential Cumulative Impacts with Other Projects or Programs?						
	Owens Lake Dust Mitigation Program	Owens Lake Groundwater Project	Owens Valley Recovery Plan (no specific projects identified yet)	HCP for LADWP Lands (HCP has not been developed yet)	Groundwater Management Plan under the Agreement	Other Projects under the Agreement	Mitigation Measures from the 1991 EIR
Construction activities for all LORP elements would cause temporary air quality impacts	Little potential for cumulative impacts, as the project construction periods do not overlap	No impact is anticipated	No impact is anticipated	No impact is anticipated	No impact is anticipated	No impact is anticipated	No impact is anticipated
The initial rewatering will cause off-gassing from organic sediments that cause unpleasant odors	No impact is anticipated	No impact is anticipated	No impact is anticipated	No impact is anticipated	No impact is anticipated	No impact is anticipated	No impact is anticipated
New land management on LADWP leases could cause cattle drift on BLM lands	No impact is anticipated	No impact is anticipated	No impact is anticipated	No impact is anticipated	No impact is anticipated	No impact is anticipated	No impact is anticipated
The LORP may cause increased recreation, which could adversely affect cultural and natural resources.	No impact is anticipated	No impact is anticipated	No impact is anticipated	No impact is anticipated	No impact is anticipated	No impact is anticipated	No impact is anticipated

Owens Lake Dust Mitigation Program (Including the North Sand Sheets Project)

Environmental impacts of this project are listed below from the Final EIR for the project prepared by GBUAPCD in 1997 (programmatic analysis) and in a Negative Declaration in 2001 for the North Sand Sheets Project (first phase of the project). The project involves a wide variety of impacts, many of which are considered potentially significant. There is a potential for a significant cumulative impact with the LORP regarding loss or degradation of aquatic and wetland impacts (and dependent bird species) due to both projects, which would affect similar resources in and near the Delta Habitat Area. This is the only potentially significant cumulative impact identified for the proposed LORP.

- Potential infiltration of irrigation water to the brine pool, which could raise the brine pool and affect trona mining operations
- Operations may cause deposition of toxic metals due to precipitation of salts along the lower edge of the spreading areas
- Long-term leaching of metals from the imported gravels spread as part of the project could alter the composition of the trona and decrease its value
- Application of water to the playa would raise the shallow groundwater level under the playa, and potentially increase the discharge from springs and seeps along the historic shoreline
- The flooding of the North Sand Sheet area on either side of the Delta would increase the shallow groundwater levels and improve groundwater quality, but the effect to the shallow groundwater under the Delta of this measure is unknown
- Placement of a gravel blanket over large areas of the playa on the southern end of the lake would increase shallow groundwater levels over time due to reduced evaporation
- Irrigation of shallow flooded areas would increase the level of the shallow groundwater and improve water quality. This effect would be localized.
- Construction activities would temporarily adversely affect air quality (Significant)
- Operations of shallow flooded areas would cause a localized increase in relative humidity
- About 121 acres of transmontane alkali meadow would be converted to shallow flooded areas or dry playa due to construction and operation of the project (Significant).
- The creation of shallow flooded areas could cause an increase in exotic species at Owens Lake (Significant)
- Habitat potentially occupied by several plant species of special concern would be removed by the project (Significant)
- Construction could adversely affect nesting northern harriers, loggerhead shrike, and Le Conte’s thrasher (Significant)
- Construction and operations could adversely affect the Owens Valley vole, Mohave ground squirrel, and American badger.
- Construction, operations, and maintenance of the project could significantly reduce habitat for the snowy plover (Significant)
- Construction activities could adversely affect prehistoric archeological sites (Significant)
- Aggregate mining associated with the construction of the project could temporarily adversely affect sensitive land uses due to noise from equipment
- There would be an increase in local traffic on public and private roads due to construction and operations of the project.
- The water demand for the project would increase the frequency of water supply shortages to Los Angeles

- The diversion of water to the project would reduce energy production from LADWP's hydroelectric facilities in the Owens Valley
- Portions of the shallow flooded areas would create mosquito breeding habitat

Owens Lake Groundwater Project

No specific project has been identified to date. Therefore, potential adverse impacts are speculative. Any future Owens Lake groundwater project would be subject to CEQA.

Owens Valley Wetland and Aquatic Species Recovery Plan

No specific project has been identified to date based on the plan. However, implementation of the LORP is not anticipated to affect the development or implementation of a future Owens Valley Wetland and Aquatic Species Recovery Plan.

HCP for LADWP Lands

No specific project has been identified. However, implementation of the LORP is not anticipated to affect the development or implementation of a future HCP.

Other Projects Under the Agreement

The projects being developed pursuant to the Agreement are designed to enhance environmental conditions and quality of life in the Owens Valley. Potential adverse impacts associated with these projects vary considerably, but are generally minor, incidental impacts associated with construction activities (e.g., temporary and permanent disturbances to upland habitats).

Mitigation Measures from the 1991 EIR

The projects being developed as mitigation measures from the 1991 EIR are also designed to offset prior impacts to native habitats from groundwater pumping. Potential adverse impacts from these environmental enhancement projects (most of which include new or enhanced wetland or riparian habitats, or improved management of irrigated pastures) would likely be localized construction related impacts to upland habitats and archeological sites due to infrastructure improvements. No adverse cumulative effects from operations of these projects are expected as they are designed to improve environmental conditions or offset prior impacts.

12.5 CUMULATIVE IMPACTS TO THE WATER SUPPLY OF THE CITY OF LOS ANGELES

In LADWP's 2000 Urban Water Management Plan (Plan), it was estimated that the Owens Lake Dust Control Project would use approximately 42,000 acre-feet of water, annually, which would otherwise be exported to Los Angeles. The Final EIR for the dust mitigation project indicated that this water demand for the project would increase the frequency of water supply shortages to the City, but concluded that because LADWP had readily available sources for replacement water that the impact would be less than significant. Recent estimates of the water requirement for dust mitigation have escalated to 64,700 acre-feet per year. Therefore, it appears that the water requirement for the dust control project will exceed the projection used in the Plan by 22,700 acre-feet per year.

In addition to water supply impacts of the dust control project, the Plan reported that through 2020, exports to Los Angeles from the Mono Basin will be reduced by approximately 79,000 acre-feet per year when compared to exports prior to a restriction on exports from the Mono Basin. There has been no change in this projection.

In addition to the above-described projects, the Agreement between Inyo and LADWP has resulted in a decrease in projected groundwater pumping in the Owens Valley. The 1991 EIR for purposes of analysis assumed that groundwater pumping under the Agreement would average 110,000 acre-feet per year. During the period between 1970 (when pumping was increased to supply the increased capacity of the Aqueduct) and 1990 (when the groundwater management provisions of the Agreement went into effect), actual groundwater pumping by LADWP averaged 104,022 acre-feet per year. In contrast, after the groundwater management provisions of the Agreement, and the Drought Recovery Policy, went into effect, groundwater pumping from 1991 to 2002 averaged 74,119 acre feet per year. Therefore, groundwater pumping by LADWP between 1990 and 2002 was 35,881 acre-feet less than the amount used for analysis in the 1991 EIR and 29,903 acre-feet less than LADWP's average annual pumping from 1970 and 1990. However, it is speculative to estimate the amount of groundwater pumping from the Owens Valley that will take place in the future. Finally, it is important to note, that in projecting that exports via the Los Angeles Aqueduct from the Eastern Sierra will be approximately 321,000 acre-feet per year through 2020, the Plan does not specify an amount of groundwater that will be annually pumped from the Owens Valley that will contribute to this export total.

The average annual water consumption associated with the LORP, during steady state conditions, is estimated to be about 34,579 acre-feet per year (see Section 10.5). This water requirement represents a net increase of about 16,294 acre-feet per year over existing water uses in the valley that currently maintain elements of the LORP, including off-river lakes and ponds; wetlands and pasture in the Blackrock Waterfowl Area; and wetlands along the lower reach of the river. This amount of water is approximately the same as the LORP water consumption projected by LADWP (i.e., 16,000 acre-feet per year) in its water supply projections for 2020 in the Plan. Hence, the proposed project would not cause a reduction in the amount of water planned to be available for export from the Owens Valley for municipal uses in the Los Angeles Basin, and therefore, would not have an impact on water supply for municipal users when viewed as a single project impact.

However, the unplanned reduction in water exports from the Mono Basin and Owens Valley noted above creates a potential for a cumulative water supply impact with the LORP water demand, even though the water demands of the LORP are not expected to exceed the projections made in the Plan. The unplanned reductions include the following: (1) a reduction in exports from the Mono Basin of 79,000 acre-feet per year; and (2) a reduction in groundwater pumping from the Owens Valley of 29,903 acre-feet per year less than LADWP's average annual pumping from 1970 and 1990; and (3) increased demand of 22,700 acre feet per year for the dust control project. As a result of these projects, the total cumulative reduction from the amount exported via the Los Angeles Aqueduct could be as high as a total of 131,603 acre-feet per year. In order for LADWP to replace the water that is not exported from the Owens Valley and the Mono Basin, it will have to purchase water from Metropolitan Water District (MWD) for the foreseeable future at a cost of $350 per acre-foot or $46.1 million dollars annually. This will create additional demand and impacts on MWD supplies that are already being impacted by other significant water related issues.

12.6 CUMULATIVE IMPACTS RELATED TO THE WILLOW FLYCATCHER RECOVERY PLAN

As described in Section 2.7, the southwestern willow flycatcher (*Empidonax traillii* ssp. *extimus*) is a federally endangered species that occurs along the Lower Owens River. A draft recovery plan for the endangered southwestern willow flycatcher was issued by US Fish and Wildlife Service (USFWS) for public review in April 2001 (Recovery Plan). The potential cumulative impacts of the proposed Recovery Plan for this species and the LORP actions are evaluated below. It should be noted that the willow flycatcher Recovery Plan does not describe any specific "reasonably foreseeable or probable projects," which are the types of projects typically addressed in a CEQA and NEPA cumulative impact assessment. Hence, potential cumulative impacts between the LORP and future Recovery Plan actions are addressed at a programmatic level by necessity.

The Endangered Species Act of 1973 (ESA) calls for preparation of recovery plans for threatened and endangered species which establish recovery goals, describe site-specific management actions recommended to achieve those goals, and estimate the time and cost required for recovery. A recovery plan is not self-implementing, but presents a set of recommendations for managers and the general public.

The Recovery Plan has two objectives: (1) recovery to the point that reclassification to "threatened" is warranted; and (2) recovery to the point that delisting is warranted. Under the proposed Recovery Plan, reclassification from endangered to threatened may be considered when the following criterion has been met for a period of five consecutive years - the total known population of flycatchers achieves a minimum of 1,950 territories (equating to approximately 3,900 individuals). The southwestern willow flycatcher may be removed from the list of threatened and endangered species when the following criteria have been met: Criterion 1. The habitats and flycatcher populations recovered to achieve downlisting to threatened are protected into the foreseeable future through development and implementation of conservation management agreements. Criterion 2. The amount of suitable breeding habitat protected within each management unit (defined below) is double that required to support the target number of flycatchers under criterion for reclassification.

USFWS has divided the flycatcher's range into six Recovery Units, which are further subdivided into Management Units. The LORP is located in the Basin and Mojave Recovery Unit, which has five Management Units: Owens River, Kern River, Amargosa River, Mojave River, and Salton Sea. There are 58 known flycatcher territories in this unit (six percent of the range-wide total). Almost all population sites have fewer than five territories. Specific populations in the Owens Valley are as follows: OWBIGP Owen's River - Big Pine; OWCHBL Owen's River - Chalk Bluff to 5 Bridges; OWHWY6 Owen's River - Hwy 6; OWLPCR Owen's River - Lone Pine Creek; and OWPOLE Owen's River - Poleta Road. USFWS estimates there are 16 territories in this unit.

Under the draft Recovery Plan, the minimum number of southwestern willow flycatcher territories needed to achieve reclassification to threatened in the Owens River Management Unit is 50. The Plan indicates that the focus of recovery efforts in the Owens River Management Unit should be on the following reaches of the Owens River: (1) Below Pleasant Valley Reservoir to Tinemaha Reservoir; and (2) below Tinemaha Reservoir to Owens Lake. The latter encompasses the Lower Owens River affected by the LORP.

The proposed actions needed to recover the southwestern willow flycatcher are presented below:

1. Increase and improve occupied, suitable, and potential breeding habitat
2. Increase metapopulation stability by increasing size, number, and distribution of populations and habitat within Recovery Units
3. Improve demographic parameters by increasing reproductive success
4. Minimize threats to wintering and migration habitat
5. Survey and monitor
6. Conduct research
7. Provide public education and outreach

8. Assure implementation of laws, policies, and agreements that benefit the flycatcher
9. Track recovery progress

The implementation of the above actions will be based on available funding. No specific projects to be implemented in the near future are identified in the Recovery Plan for the Basin and Mojave Recovery Unit, nor for the Owens River Management Unit. However, the Recovery Plan identifies several types of actions that could be facilitated by the riparian habitat restoration caused by the LORP along the Lower Owens River, or that would be complementary to the LORP. These actions are listed below using the specific wording from the Recovery Plan. The potential relationship with the LORP is noted for each action.

- **"1.2. Work with private landowners, state agencies, nongovernmental organizations, and municipalities to conserve and enhance habitat on non-federal lands. 1.2.2. Achieve protection of occupied habitats.** Achieve protection of occupied habitats through Habitat Conservation Plans, Safe Harbor Agreements, partnerships, cooperative agreements, conservation easements, or acquisition of sites from willing landowners." *Relationship to the LORP: As the willow flycatcher population increases over time in the LORP project area, LADWP may consider these types of cooperative efforts with USFWS to protect the populations.*

- **"1.2.3. Provide technical assistance to conserve and enhance occupied habitats on non-Federal lands**. Make technical assistance and, where possible funding, available to non-federal owners of occupied habitats, to conserve and enhance habitat." *Relationship to the LORP: USFWS may wish to provide technical assistance to LADWP as the LORP is implemented to enhance the benefits of the LORP for willow flycatchers.*

- **"1.2.4. Pursue joint ventures toward flycatcher conservation.** Pursue joint ventures toward flycatcher conservation." *Relationship to the LORP: LADWP and USFWS may consider such joint ventures in the future to further benefit the willow flycatcher in the LORP project area.*

- **"2.1. Increase size, number, and distribution of populations and habitat within Recovery Units. 2.1.1. Conserve and protect all existing breeding sites.** Conservation of all existing breeding sites and occupied habitats is crucial to recovery." *Relationship to the LORP: The enhancement of riparian habitats and modified grazing practices along the river will facilitate this action.*

- **"2.1.3. Develop new habitat near extant populations.** Increase the extent, distribution, and quality of habitat close to extant populations. This will increase the stability of local metapopulations by providing new habitat that will serve dual functions: (1) replacement habitat in the event of destruction of some habitat in the current population, and (2) new habitat for colonization, which once occupied will enhance connectivity between sites." *Relationship to the LORP: The LORP will increase the amount and geographic extent of suitable habitat for the willow flycatcher in the Owens Valley, and therefore, facilitate this action.*

- **"2.1.4. Enhance connectivity to currently isolated occupied sites.** Using the habitat restoration techniques described above, increase habitat near to and between currently isolated sites. This will create "stepping stones" of habitat to enhance connectivity as well as provide replacement habitat and colonization habitat." *Relationship to the LORP: The LORP will increase the amount and geographic extent of suitable habitat for the willow flycatcher along the Lower Owens River corridor, providing greater connectivity. Hence, it would facilitate this action.*

- **"3.1.1.1. Increase the amount and quality of riparian habitat.** Enhancing habitat is likely to reduce the impact of cowbird parasitism, in several ways. Increased amounts of high quality habitat and increased patch sizes of such habitat will allow for larger flycatcher breeding populations. These larger populations are likely to experience reduced levels of cowbird parasitism by dispersing cowbird eggs over a larger number of nests. Also, due to their relatively larger amounts of interior habitat, large patches of riparian woodland are likely to further reduce cowbird parasitism and nest predation, both of which tend to be concentrated along habitat edges." *Relationship to the LORP: The LORP will increase the amount and geographic extent of suitable habitat for the willow flycatcher in the Owens Valley, and therefore, facilitate this action.*

As described in Section 4.7, the restoration of riparian habitats, specifically riparian willow forest along the Owens River, could provide new habitat and improve existing habitat suitable for this species. An increase in suitable habitat would provide more opportunity for foraging and nesting by this seasonal breeder and migrant, which in turn, could increase reproduction and survival. No known suitable habitat for this species would be affected by LORP-related construction activities. Hence, no adverse cumulative impact between the LORP and any future actions or projects identified in the willow flycatcher Recovery Plan is anticipated.

13.0 CONSISTENCY WITH INYO COUNTY GENERAL PLAN

Under CEQA, a lead agency must evaluate consistency of the proposed project with local land use and environmental plans, goals, and policies. Inyo County, acting as a CEQA Responsible Agency and a MOU party with certain responsibilities for implementing the LORP, must ensure that their decision concerning LORP is not contrary to the County's General Plan. The consistency of the LORP with applicable elements of the Inyo County General Plan (adopted December 2001) is addressed below. The final determination of consistency will be made by the Inyo County Board of Supervisors when taking action on the proposed project as a CEQA Responsible Agency.

Land Use

Policy LU-5.4 Natural Resource Designation (NR): This designation, which applies to land or water areas that are essentially unimproved and planned to remain open, provides for the preservation of natural resources, the managed production of resources, and recreation (New Policy).

Consistent. The LORP project elements will occur almost entirely on land with the General Plan land use designation of "Natural Resources" or "State and Federal Lands." One exception is a property bisected by the Owens River on the east side of Highway 395 and north of the highway's intersection with Moffat Ranch Road, which is designated as "Irrigated Agriculture." The LORP will result in the enhancement and protection of natural resources, improved rangeland management and grazing practices, and greater opportunities for public recreation.

Public Services and Utilities

Expansion of Services Policy PSU-10.1: The County shall work with local gas and electric utility companies to design and locate appropriate expansion of gas and electric systems, while minimizing impacts to agriculture and minimizing noise, electromagnetic, visual, and other impacts on existing and future residents. (New Policy)

Consistent. Power for the LORP pump station will be transmitted via a new power line from the Cottonwood Power Plant, located about 10 miles southwest of the pump station. However, no new power generation is required. The new line will parallel an existing line and only traverse open space and rangeland. No existing or future residential areas will be traversed by the power line, which will be parallel to other existing lines.

Economic Development Element

Visitor Capacity on Public Lands Policy ED-1.2: The County shall encourage public agencies to develop new tourist serving facilities or otherwise enhance their capacity to serve visitors on the public lands they manage. (New Policy)

Visitor Usage of LADWP Lands Policy ED-1.3: Encourage the LADWP to continue to allow and expand the recreational uses of their land holdings in the Owens Valley. (New Policy)

Consistent. The LORP would have beneficial effects on recreational opportunities in the lower Owens Valley by improving the fisheries along the river, enhancing native habitats, and generally improving the natural environmental in the valley. Potential new and expanded recreational activities associated with the LORP include fishing, hiking, camping, birdwatching, picnicking, and outdoor education. LADWP does not propose to construct or any new recreational facilities or expand recreational uses and public access as part of the LORP. However, the LORP will indirectly stimulate more tourism, which could create a need to improve both County and LADWP visitor serving facilities. As part of the overall LORP management approach, LADWP and/or Inyo County will implement the recreation management strategies described in Section 2.9.

Collaboration Policy ED-2.1: Support collaborative efforts to market Inyo County as a tourist destination, leveraging County funds through coordinated regional promotion. (New Policy)

Consistent. The LORP could aid in initiating efforts to market Inyo County as a tourist destination. The project is anticipated to improve economic conditions in the lower Owens Valley due to increased tourism for outdoor recreation. The Central Owens Valley Community Action Plan (CAP) consists of a coalition formed by the Lone Pine Chamber of Commerce, the Independence Civic Club and the Big Pine Chamber of Commerce. The LORP will achieve a significant number of strategic objectives delineated in the CAP. Numerous federal, state and local agencies participate in CAP as cooperating organizations, and are considered “Partners in Visioning.” Presently on CAP’s agenda is development of a marketing plan and a Community River Center that would promote education about Owens River and its associated ecosystems.

Mining Industry Policy ED-4.1: Support the continued operation of existing mining activities within the County as well as new mining in appropriate areas, subject to each operator meeting all applicable safety and environmental laws, regulations, and County policies. (New Policy)

Consistent. There is an existing trona mining operation, Lake Minerals Corporation, located at the southern end of Owens Lake, adjacent to the brine pool. Trona mining is sensitive to fluctuations in the brine pool elevation. If the pool level rises, the mining operation must include construction of temporary berms composed of mined trona to prevent intrusion by the brine pool. A reduction in the brine pool would reduce brine concentrations in the mined material, making excavation and hauling easier. The overall amount of water discharged to the Delta Habitat Area would be reduced under the proposed project. As such, less water would reach the brine pool, and no adverse effect would occur to the mining operation.

Circulation Element

Prioritize Maintenance, Rehabilitation, and Reconstruction Policy RH-1.1: Prioritize improvements based on the premise that maintenance, rehabilitation, and reconstruction of the existing highway and roadway system to protect public safety have the highest consideration on available funds. (Policy 11, Revised)

Consistent. There is potential for localized overbank flooding that could affect public roads that cross the river. The County shall monitor public road crossings along the river during seasonal habitat flows each year that they occur to determine the potential for debris plugs to form at road crossings, and remove obstructive debris as necessary to prevent flooding of the roads. This action under the LORP would be consistent with the above policy.

Conservation/Open Space Element

Soil Conservation for Agriculture Policy S-1.1: Encourage the conservation of agricultural soils to provide a base for agricultural productivity and the County’s economy. (Modified Policy)

<u>Sustainable Agriculture Policy AG-1.8:</u> *Promote sustainable agricultural activities to lessen environmental impacts, such as:*

- *Manage lands on a sustainable yield basis,*
- *Encourage the use of reclaimed water for agricultural use where feasible, and/or be more efficient with irrigation water to conserve potable water, and*
- *Rotate crop production to conserve soil characteristics. (Conservation and OS Element - N. - Modified Policy 2)*

<u>Consistent.</u> The LORP includes land management plans for seven grazing/agricultural leases within the LORP project area. The proposed management actions will maintain the long-term productivity of the rangelands by managing grazing intensity with forage utilization rates, providing supplemental water sources for livestock, and protecting riparian habitats with riparian exclosures. Hence, the LORP will conserve and enhance agricultural productivity, and would be consistent with the above policies.

<u>Soil Erosion Policy S-2.1:</u> *Minimize soil erosion from wind and water related to new development. (New Policy)*

<u>Consistent.</u> Based on Ecosystem Sciences' hydraulic modeling analysis for the LORP, the proposed new flows in the Lower Owens River are not expected to cause bank erosion, channel degradation, and/or sediment deposition.

<u>Continue Agricultural Production Policy AG-1.2:</u> *Support and encourage continued agricultural production activities in the County. (New Policy)*

<u>Public Lands for Agriculture Policy AG-1.6:</u> *Support the continued use and expansion of public lands for agricultural operations. (Conservation and OS Element - N. - Modified Policy 3)*

<u>Consistent.</u> One of the goals of the LORP is to provide for the continuation of sustainable uses in the Owens Valley, including livestock grazing and agriculture. The proposed land management plans will increase the productivity of current agricultural operations in the valley, and provide for sustainable uses. Hence, the LORP is consistent with the above policies.

<u>Maintain Accessibility Policy MER-1.5:</u> *Ensure that extractive resource areas are protected from incompatible development that could interfere with extractive operations, now or in the future. (Conservation and OS Element - B. - Modified Policy 20)*

<u>Consistent.</u> There is an existing trona mining operation, Lake Minerals Corporation, located at the southern end of Owens Lake, adjacent to the brine pool. Trona mining is sensitive to fluctuations in the brine pool elevation. If the pool level rises, the mining operation must include construction of temporary berms composed of mined trona to prevent intrusion by the brine pool. A reduction in the brine pool would reduce brine concentrations in the mined material, making excavation and hauling easier. The overall amount of water discharged to the Delta Habitat Area would be reduced under the proposed project. As such, less water would reach the brine pool, and no adverse effect would occur to the mining operation.

<u>Restoration Policy WR-2.1:</u> *Encourage and support the restoration of degraded water resources, such as the Owens River. (Conservation & OS Element – B. - Modified Policy 1; K. - Modified Policy 6, Modified Policy 10)*

<u>Consistent.</u> Existing water quality in portions of the Lower Owens River is poor, primarily due to low flow. The LORP will restore the Lower Owens River, resulting in improved water quality over time due

to greater flows and the restoration of many natural riverine processes which result in high quality water (e.g., high dissolved oxygen, low temperatures). Hence, the LORP is consistent with this policy.

<u>Preservation of Riparian Habitat and Wetlands Policy BIO-1.2:</u> *Important riparian areas and wetlands, as identified by the County, shall be preserved and protected for biological resource values. (New Policy)*

<u>Restoration of Biodiversity Policy BIO-1.3:</u> *Encourage the restoration of degraded biological communities. (Conservation & OS Element – P. - Modified Policy 2)*

<u>Consistent.</u> The biological resources along the Lower Owens River are highly degraded from the River Intake to the Owens River Delta due to past diversions and the lack of seasonal flooding flows that cause periodic, natural riparian disturbances. The LORP will restore flows to a portion of the Lower Owens River where flows have been diverted and reduced since 1913. It will create and sustain healthy and diverse riparian and aquatic habitats along the river. Existing and newly created riparian and wetland areas along the river, as well as Blackrock Waterfowl Area and at the Delta Habitat Area, will be maintained and/or enhanced under the LORP. Hence, the LORP would be consistent with the above policies.

<u>Owens River Restoration Policy BIO-1.8:</u> *The County will work with the LADWP and regulatory agencies to complete the restoration of habitat values along the historic Owens River channel as mitigation for degradation done with water export activities. This policy shall apply to the portion of the Owens River identified as the Lower Owens River Project. (New Policy)*

<u>Consistent.</u> The County is actively working with LADWP and resource agencies such as the California Department of Fish and Game to implement the MOU, as required under the 1991 Inyo County/Los Angeles Long Term Agreement and MOU. The restoration of the Lower Owens River will provide the required mitigation for degradation of the Owens River due to LADWP water exports.

<u>Appropriate Access for Recreation Policy BIO-2.2:</u> *Encourage appropriate access to resource-managed lands. (Conservation and OS Element – B. - Modified Policy 11; P. – Modified Policy 1)*

<u>Consistent.</u> The implementation of the LORP will not restrict public access to lands within the LORP project area.

<u>Hunting and Fishing Policy BIO-2.3:</u> *Promote hunting and fishing activities within the County pursuant to appropriate regulations of the California Fish & Game Code. (New Policy)*

<u>Consistent.</u> The anticipated enhancement of the warmwater game fishery in the river will improve the fishing experience and attract more anglers to the lower valley. Also, the increased riparian cover and increase in the amount and variety of habitats along the river and portions of the Delta could improve duck and deer hunting conditions. Hence, the LORP will provide an incentive to promote hunting and fishing in the Owens Valley.

<u>Nature as Education Policy BIO-2.4:</u> *Provide and support passive recreational opportunities and interpretive education in the natural environment. (New Policy)*

<u>Consistent.</u> The LORP will increase the amount and variety of various aquatic, wetland, and riparian habitats along the Lower Owens River. The enhanced and expanded habitats would expand and improve passive recreational opportunities and provide for environmental education opportunities. Hence, the LORP would be consistent with this policy.

<u>*Protection of Cultural Resources Policy CUL-1.3:*</u> *Preserve and protect key resources that have contributed to the social, political, and economic history and prehistory of the area, unless overriding circumstances are warranted. (Conservation and OS Element – L. – Modified Policy 1)*

<u>Consistent.</u> Cultural resources inventories were prepared for the EIR/EIS, which included records searches and literature reviews; pedestrian surveys of the Area of Potential Effect (APE); recordation of both newly documented and previously recorded resources; National Register of Historic Places (NRHP) site evaluations; and development of management recommendations for those sites deemed eligible for the NRHP. Based on these investigations, no adverse impacts to cultural resources are expected.

<u>*Native American Consultation Policy CUL-1.5:*</u> *The County and private organizations shall work with appropriate Native American groups when potential Native American resources could be affected by development proposals. (New Policy)*

<u>Consistent.</u> LADWP and EPA have contacted Native American tribes in the Owens Valley to elicit comments and concerns about the LORP. EPA also conducted follow-up consultations with the Native American tribal groups. Hence, the LORP is consistent with this policy.

<u>*Natural Environment as Recreation Policy REC-1.1:*</u> *Encourage the use of the natural environment for passive recreational opportunities. (Conservation & OS Element – B. – Modified Policy 11; P. – Modified Policy 1)*

<u>Consistent.</u> The LORP would increase the opportunities for passive outdoor recreation such as hiking, nature photography, and birdwatching. Hence, the LORP would be consistent with this policy.

<u>*Recreational Opportunities on Federal, State, and LADWP Lands Policy REC-1.2:*</u> *Encourage the continued management of existing recreational areas and open space, and appropriate expansion of new recreational opportunities on federal, state, and LADWP lands. (New Policy)*

<u>Consistent.</u> The proposed project does not include any changes to existing recreational uses. With the exception of new signage, the project does not include construction of new recreational facilities, including roads, trails, or campgrounds. However, the LORP will provide new recreational opportunities over time due to enhanced natural resources, including game fisheries, waterfowl habitat, and a well-developed riparian corridor. If adverse impacts or threats to resources from recreational uses are observed, LADWP will implement the recreation management strategies described in Section 2.9.

Public Safety Element

<u>*Regulations to Reduce PM10 Policy AQ-1.1:*</u> *Support the implementation of the State Implementation Plan and agreement between the Great Basin Unified Air Pollution Control District (GBUAPCD) and the LADWP to reduce PM10. (New Policy)*

<u>*Attainment Programs Policy AQ-1.2:*</u> *Participate in the GBUAPCD attainment programs. (New Policy)*

<u>Consistent.</u> The State and EPA have designated the southern Owens Valley where the LORP is located as non-attainment for the state and federal 24-hour average PM10 standards. Wind-blown dust from the dry lakebed of Owens Lake is the primary cause of the PM10 violations. Air quality is considered excellent for all criteria pollutants with the exception of PM10. Mitigation measures will be implemented to minimize dust/PM10 emissions resulting from LORP construction activities, which will support the State Implementation Plan. Hence, the LORP would be consistent with the above policies.

<u>Dust Suppression During Construction Policy AQ-1.3:</u> Require dust-suppression measures for grading activities. (New Policy)

<u>Consistent.</u> Dust suppression measures, including the use of water trucks or sprinkler systems, shall be implemented to minimize fugitive dust and PM10 emissions during LORP construction. Hence, the LORP would be consistent with this policy.

<u>Channelization Policy FLD-1.4:</u> The natural condition of watercourses is to be maintained whenever feasible. The County shall discourage the channelization of watercourses unless necessary for the protection of public safety. If alterations of a watercourse are found to be necessary, the alterations shall be engineered to preserve or restore the natural characteristics of the watercourse to the greatest extent possible. (Safety Element – C. – Modified Policy 5)

<u>Consistent.</u> Physical "alterations" of the existing conditions along the Lower Owens River have been deemed necessary by the Agreement, which committed LADWP and the County to implement the LORP. The alterations (i.e., increased flows to the river) are designed to restore the natural characteristics of the river to the greatest extent possible. Hence, the LORP would be consistent with this policy.

14.0 OTHER FEDERAL IMPACT CONSIDERATIONS

14.1 RELATIONSHIP BETWEEN SHORT TERM USES OF RESOURCES AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

The Lower Owens River Project (LORP) is designed to enhance the aquatic, wetland, and riparian habitats along the river, at Blackrock Habitat Area, in the Delta Habitat Area, and in LADWP grazing leases in the LORP project area. The primary objective of the LORP is to establish healthy, fully-functioning habitats that will be self-sustaining. Implementation of the LORP would require short-term uses of resources that would result in short-term environmental impacts, as summarized below from the analyses in Chapters 4 through 10.

- Degradation of water quality in the Lower Owens River during the establishment of baseflows and seasonal habitat flows
- Fish kills in the river due to water quality degradation during the initial re-watering years
- Disturbance to river channel bed and banks, and riparian habitat due to modification of the River Intake; clearing of the river channel near the Intake; installation of stream gauges; and infrequent removal of beaver dams and dense obstructive tule stands
- Disturbance to upland and wetland habitats during the construction of berms, ditches, and new spillgates in the Blackrock Habitat Area
- Temporary and permanent disturbances to riparian and upland habitats due to the construction of the diversion and pump station
- Emissions of gaseous pollutants and fugitive dust during the construction of the pump station and the berms and ditches at the Blackrock Waterfowl Habitat Area
- Short-term habitat conversions due to flooding along the river, periodic flooding and drying cycles at Blackrock, and varying flows to the Delta

The LORP may result in the following long-term uses of resources or impacts to resources:

- Conversion of upland habitats to wetlands due to the rewatering of the river
- Permanent loss of upland and riparian habitats due to pump station facilities
- Disturbance to native habitats due to increased recreational uses of the Lower Owens River which result in destructive activities or access
- Degradation of habitats along the river due to proliferation of noxious weeds (including perennial pepperweed, Russian knapweed, and saltcedar) (without mitigation)

14.2 IRRETRIEVABLE OR IRREVERSIBLE COMMITMENT OF RESOURCES

The LORP would involve the following irretrievable and irreversible commitment of resources: the capital, labor, fuel, and construction materials required to modify the River Intake and to construct the diversion, pump station, power line, stream gauges, lease fences and exclosures, and berms and ditches in the Blackrock Waterfowl Habitat Area. All other actions under the LORP involve alterations of land and water flow patterns that are reversible over time.

14.3 ENVIRONMENTAL JUSTICE

Environmental justice is defined by the Environmental Projection Agency (EPA) as "(t)he fair treatment and meaningful involvement of all people, regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies." Executive Order 12898, entitled "General Actions to Address Environmental Justice in Minority and Low-Income Populations" requires all federal agencies to determine if their operations and major federal actions affect minority and low-income populations in an adverse manner. A significant impact to environmental justice would be if there was a significant adverse environmental impact on minority or low-income population or children that appreciably exceeded those on the general population.

The LORP would result in the following direct adverse impacts to the public: (1) nuisance odors associated with establishment of baseflows in which organic sediments are disturbed and hydrogen sulfide released; (2) fish kills that affect game fish and recreational experience; and (3) increased nuisance and public health risk due to potential increase in mosquitoes. These impacts would not directly or indirectly affect minority or low-income populations, and as such, would not cause environmental justice impacts.

14.4 FLOODPLAIN MANAGEMENT

Executive Order 11988, Floodplain Management, states "(e)ach agency shall provide leadership and shall take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health and welfare, and to restore and preserve the natural and beneficial values served by floodplains in carrying out its responsibilities… If an agency has determined to, or proposes to, conduct, support, or allow an action to be located in a floodplain, the agency shall consider alternatives to avoid adverse effects and incompatible development in the floodplains."

The LORP would be a compatible development in the Lower Owens River floodplain. It would not increase general flooding hazards to structures and the public, although there could be localized minor flooding problems at road culverts during the seasonal habitat flows (see Section 4.3.2). The project would not involve any permanent alteration of the floodplain except for the diversion and pump station. The latter would create an obstruction to river flow and alteration of floodplain limits; however, no roads or structures would be inundated or adversely affected by the forebay. The proposed project would restore many of the floodplain functions along the Lower Owens River that have been altered or impaired due to diversions to the Los Angeles Aqueduct. The primary functions that would be re-established include creation and expansion of floodplain riparian habitats; groundwater recharge; deposition of sediments, seeds, and organic material on floodplain terraces during seasonal habitat flows to enhance ecosystem processes; and conveyance of sediments along the river channel and floodplain for deposition in the Delta.

14.5 WETLANDS PROTECTION

Executive Order 11990, Protection of Wetlands, states that "(e)ach agency shall provide leadership and shall take action to minimize the destruction, loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands in carrying out the agency's responsibilities." Federal agencies are required to avoid undertaking or providing assistance for new construction located in wetlands unless there is no practicable alternative. The short- and long-term impacts of the project on wetlands, as defined under Section 404 of the Clean Water Act, are summarized below in Table 14-1. The LORP would result in an overall increase in wetlands, as intended, even with the potential wetland losses in the Delta Habitat Area as described in Section 6.3.2. Hence, the project is consistent with Executive Order 11990.

TABLE 14-1
SUMMARY OF IMPACTS TO WETLANDS

Project Element	Impact	Temporary	Permanent
River Rewatering			
Marsh/wet alkali meadow	Increased in areal extent and productivity due to additional flows		+882
Riparian forest			+854
Alkali meadow			+1,190
Freshwater marsh	Channel clearing prior to initial releases	-3.7	
Pump Station			
Transmontane alkali meadow	Temporary construction disturbance	-0.8	
Mojave riparian forest		-0.4	
Transmontane freshwater marsh		-0.4	
Transmontane alkali meadow	Permanent losses due to facilities		-1.85
Mojave riparian forest			-1.36
Transmontane freshwater marsh			-0.37
Transmontane alkali meadow	Conversion to open water in the forebay		-4.1
Mojave riparian forest			-5.3
Transmontane freshwater marsh			-7.5
Delta Habitat Area			
	Possible long-term loss of wetlands due to reduction in flows, including brine pool transition		Loss cannot be quantified*
Blackrock Waterfowl Habitat Area			
Alkali meadow, freshwater marsh	Construction of berms, ditches, and new spillgates	<1	
Open water	Net increase due to flooding about 500 acres each year (long term average)		290
Emergent wetlands	Net change in emergent wetlands due to flooding of upland habitats (long-term average)		-83
Total =		6.3	+3,113*

* The potential losses in wetlands in the Delta Habitat Area (see Section 6.3.2), if any, are not included. However, the total wetlands in the Delta Habitat Area are less than 900 acres, and as such, any reduction would not significantly alter the overall wetland gains by the LORP.

14.6 ENDANGERED SPECIES ACT AND MIGRATORY BIRD TREATY ACT

14.6.1 Endangered Species Act

Section 7 of the federal Endangered Species Act requires that federal agencies consult with the U.S. Fish and Wildlife Service (USFWS) when a federal agency determines that a proposed action may affect a species listed as threatened or endangered by the USFWS, or its designated critical habitat. This same consultation requirement applies for actions that may affect a species proposed for listing, or proposed critical habitat. Section 7 requires that federal agencies take necessary steps to ensure that actions authorized, funded, or carried out by them do not jeopardize the continued existence of threatened and endangered species, nor result in the adverse modification of critical habitat.

In a letter dated February 5, 2003, EPA requested USFWS to provide information identifying all listed and proposed species, as well as designated or proposed critical habitat, that may be present within the project area. In response, in a letter dated February 11, 2003, USFWS provided a list of endangered, threatened, proposed, and candidate species that may occur in or around the project area:

- Owens pupfish (endangered species; discussed below)
- Owens tui chub (endangered species; discussed in Section 4.6)
- Bald eagle (threatened species; proposed for delisting)
- Southwestern willow flycatcher (endangered species; discussed below)
- Yellow billed cuckoo (candidate species)
- Mountain plover (proposed for threatened status, but proposal withdrawn)
- Least Bell's vireo (endangered species; no known population in the Owens Valley)
- Western snowy plover (federal status applies only to coastal populations)

Owens Pupfish

The only known occurrence of this species in the LORP project area is the area near Well 368 in the Blackrock lease, which supports a population of Owens pupfish. In the past, protective fencing was installed around the area where the pupfish population was originally located. However, as the local vegetation and hydrologic conditions of the area near Well 368 changed through natural processes over time, the pupfish population migrated to a location outside of the fenced area. Based on a field visit to this site conducted in May 2003, CDFG and USFWS concluded that this pupfish population and its habitat are doing well without fencing and that modifications are not needed (S. Parmenter, CDFG, and D. Threelof, USFWS, pers. comm., 2003). Therefore, LADWP does not propose any management action with regard to the existing pupfish population.

Southwestern Willow Flycatcher

The willow flycatcher (*Empidonax traillii*) is a state endangered species. The southwestern willow flycatcher (*Empidonax traillii* ssp. *extimus*) is a federally endangered subspecies of the willow flycatcher. The state listed species occurs in the Owens Valley as a rare spring and fall migrant, summer resident, and/or possible spring/summer breeder. It occurs in dense willow thickets near water. Sightings of the flycatcher in and near the LORP area in the past 10 years include between Big Pine and Baker Creek, Owens River between Steward Lane and Tinemaha Reservoir, and the Owens River between Bishop and Pleasant Valley Reservoir. Only the latter sighting included documented breeding birds, but it is located outside the LORP project area.

The southwestern willow flycatcher historically occurred in the Owens Valley; its historic northern limit represented by specimens from Independence (Riparian Bird Conservation Plan 2000). The draft southwestern willow flycatcher Recovery Plan prepared by USFWS indicates that the federally endangered subspecies occurs at five locations along the Lower Owens River.

The restoration of riparian habitats, specifically riparian willow forest along the Owens River, could provide new habitat and improve existing habitat suitable for this species. As described in Section 4.5.2, the acreage of riparian forest along the river is predicted to increase from 744 acres to 1,598 acres due to the rewatering the river. An increase in suitable habitat would provide more opportunity for foraging and nesting by this seasonal breeder and migrant, which in turn, could increase reproduction and survival.

No known suitable habitat for this species would be affected by construction activities at the pump station or at Blackrock Waterfowl Habitat Area.

EPA has preliminarily concluded that the LORP would have "no adverse effect" on the flycatcher. The LORP would result in indirect beneficial impacts to the flycatcher species due to long-term habitat creation and enhancement. The LORP would have "no effect" on the pupfish. Based on these preliminary findings, EPA has initiated a Section 7 endangered species consultation with USFWS.

14.6.2 Migratory Bird Treaty Act

The original Migratory Bird Treaty Act (MBTA) of 1918 implemented the 1916 Convention between the United States and Great Britain (for Canada) for the protection of migratory birds. Specific provisions of the statute include the establishment of a Federal prohibition, unless permitted, to "pursue, hunt, take, capture, kill, attempt to take, capture or kill, possess, offer for sale, sell, offer to purchase, purchase, deliver for shipment, ship, cause to be shipped, deliver for transportation, transport, cause to be transported, carry, or cause to be carried by any means whatever, receive for shipment, transportation or carriage, or export, at any time, or in any manner, any migratory bird, included in the terms of the Convention … for the protection of migratory birds … or any part, nest, or egg of any such bird." Bird species protected under the provisions of the Migratory Bird Treaty Act are identified in the List of Migratory Birds provided by USFWS (2004b).

As with the federal Endangered Species Act, the MBTA authorizes the Secretary of the Interior to issue permits for incidental take. The proposed project area contains suitable habitat for birds subject to MBTA and therefore, nesting birds and the contents of the nest within the project area are protected pursuant to the MBTA. As part of the conditions of the CDFG Streambed Alteration Agreement for the LORP, pre-construction surveys may be conducted as relevant to avoid nests of birds protected by the MBTA if construction would take place during nesting season.

14.7 CLEAN WATER ACT

14.7.1 Waters of the U.S. and Wetlands

The primary purpose of the Clean Water Act is to "maintain and restore the chemical, physical, and biological integrity of waters of the United States." Section 404 of the Clean Water Act regulates the discharge of fill or dredged material into "waters of the United States," including wetlands. A 404 permit from the U.S. Army Corps of Engineers (Corps) is required for projects that result in a regulated discharge. LADWP will obtain a Section 404 permit from the Corps for the following LORP actions that affect jurisdictional "waters of the United States," including open water and vegetated wetlands:

- Temporary earthmoving and stream diversion activities associated with construction of the diversion on the Lower Owens River
- Construction of the diversion structure and establishment of a forebay on the river
- Maintenance dredging of the forebay
- Installation of stream gauges along the river
- Channel clearing downstream of the River Intake

A summary table of all anticipated temporary and permanent wetland impacts under the LORP is provided in Section 14.4.

If an individual 404 permit is required for the above activities, LADWP must demonstrate to the Corps that (1) the Project's potential impacts to "waters" have been avoided to the maximum extent possible; (2) remaining, unavoidable impacts have been minimized, to the extent feasible; and (3) there is mitigation to compensate for those unavoidable impacts. Compensatory mitigation is meant to offset the loss of acreage, values and functions of the aquatic resource caused by the activities. LADWP must also demonstrate that least environmentally damaging alternative to accomplish the above actions have been selected. The Corps will make the final determination of the least environmentally damaging alternative (as required under Section 404 of the Clean Water Act), relying upon EPA's determination of the environmentally preferred alternative made under the requirements of NEPA.

14.7.2 Water Quality

The primary responsibility for the protection of water quality in California under the Clean Water Act resides with the State Water Resources Control Board and its nine Regional Water Quality Control Boards. The State Board sets statewide policy for the implementation of state and federal laws and regulations. The Regional Boards adopt and implement Water Quality Control Plans (Basin Plans).

The LORP occurs in jurisdiction of the California Regional Water Quality Control Board, Lahontan Region. The Basin Plan for the region sets forth water quality standards for surface and ground waters of the region, which include: (1) designated beneficial uses of water; and (2) narrative and quantitative water quality objectives to protect those beneficial uses. The Regional Board seeks to maintain the water quality objectives through its planning and permitting authorities to protect designated beneficial uses. A description of beneficial uses and water quality objectives for the Lower Owens River is presented in Section 4.4.1.

The proposed baseflow and seasonal habitat flows could cause short-term water quality degradation along the Lower Owens River from Mazourka Canyon Road to the pump station site. The poor water quality conditions would adversely affect the following beneficial uses designated for this part of the river: Cold Freshwater Habitat, Warm Freshwater Habitat, Commercial and Sportfishing, Non-Contact Water Recreation, and Wildlife Habitat. Water quality conditions could result in fish kills and create a nuisance due to odors from off-gassing sediments. The following water quality objectives may not be met during this period: Biostimulatory Substances, Chemical Constitutes, Dissolved Oxygen, Floating Materials, Non-Degradation of Aquatic Communities and Populations, Sediment, Settleable Materials, Suspended Materials, Taste and Odor, Temperature, and Turbidity. There is potential for toxic substances to be released to the water in deleterious amounts – in particular, naturally-occurring hydrogen sulfide and ammonia.

Eventually, water quality along the river is expected to improve with time under the LORP. The time required to stabilize water quality under the baseflows and seasonal habitat flows is unknown. There are no additional data or analytic tools to provide reliable estimates. Based on the analysis presented herein, it is speculated that the impacts would diminish with time and continual flows in the river. Eventually, water quality conditions in the river are expected to improve over current conditions.

Because the proposed project would exceed water quality objectives and adversely affect beneficial uses when water quality conditions are degraded during the initial flows, the project would be inconsistent with the Lahontan Basin Plan for an unknown period of time. Water quality conditions, once equilibrium has been achieved in the river, cannot be predicted at this time. Once equilibrium has been reached in the river and water quality conditions are stabilized, the Regional Board will need to consider possible changes in beneficial use designations for the Lower Owens River.

Implementation of the LORP may require Regional Board approval through the issuance of Waste Discharge Requirements for dewatering operations at the pump station during construction.

Section 401 of the Clean Water Act requires that the discharge of dredged or fill material into "waters" does not violate water quality standards. The Corps may not issue Section 404 permits (see above) unless the state has been notified, through the Regional Board, and a certification of compliance or a waiver of state water quality standards has been obtained. Implementation of the LORP will require a 401 water quality certification from the Lahontan Regional Water Quality Control Board.

14.8 CLEAN AIR ACT

Under the Clean Air Act, states must prepare a State Implementation Plan (SIP) to ensure that areas within the state are in attainment with the National Ambient Air Quality Standards established by the EPA. Air quality standards have been set for the following pollutants: particulate matter less than 10 microns in diameter (PM10), carbon monoxide (CO), nitrogen oxides (NOx), sulfur dioxide, and lead. The Clean Air Act also requires that federal actions conform to the most recent federally approved SIP. Conformity consists of the following:

- A project must be consistent with the SIP's purpose of reducing the severity and frequency of air quality violations
- A project must not cause or contribute to new violations of the air quality standards, nor delay attainment of standards

EPA has established regulations that specify how federal agencies determine if their actions will conform with the SIP, promulgated at 40 CFR 51. Determining conformity requires two steps: an applicability analysis and a conformity determination. The applicability analysis is used to determine if the project will exceed *de minimus* emission thresholds based on the region's non-attainment status. A conformity determination is not required for projects where the annual and daily emissions caused by the federal action are less than the applicable threshold.

All LORP implementation activities would occur in the southern Owens Valley, which has been designated by EPA as a non-attainment area for the federal 24-hour average PM10 standards. Wind-blown dust from the dry lakebed of Owens Lake is the primary cause of the PM10 violations. The area has been designated as attainment (or unclassified) for all other ambient air quality standards.

Implementation of the LORP will result in short-term emissions of gaseous pollutants and fugitive dust due to construction activities, as described in Section 5.4. The *de minimus* threshold for PM10 for the conformity applicability analysis is 100 tons per year. As described in Section 5.3, the total annual PM10 emissions for construction would be 1.2 tons, well below the conformity threshold. As such, further conformity analysis is not required and the project-related construction emissions are presumed to conform to the most recent federally approved SIP, as required under the Clean Air Act.

14.9 NATIONAL HISTORIC PRESERVATION ACT

Section 106 of the National Historic Preservation Act (NHPA) requires that federal agencies take into account the effects of their actions on historic properties. Pursuant to these requirements, a cultural resources inventory (Far Western, 2001) was conducted in 2000 to determine if implementation of the LORP could affect historic properties, which includes archaeological sites, ethnographic resources, and historic structures. The results of the 2000 inventory are summarized in Section 4.8.3.2. The inventory identified one previously documented prehistoric archaeological site, four newly recorded historic sites, five newly recorded prehistoric sites, three isolated finds, and five historic structures. The four historic sites are not considered eligible for inclusion on the National Register of Historic Places (NRHP) as they consist of insignificant historic can scatters (see Section 5.4.2). Four of the six prehistoric sites (including the one previously documented site) are considered ineligible, consisting of very disturbed, ephemeral artifact scatters with little potential for intact subsurface deposits (see Section 5.4.2). The two remaining prehistoric sites are unevaluated with regard to their NRHP status, but would not be affected by the project (see Section 7.3.1). The three isolated finds are not eligible for the NRHP. Five historic architectural structures, all water conveyance or control features, were identified during the field survey. Only one structure, the Lower Owens River Intake, is recommended eligible to the NRHP (see Sections 4.8.4.1 and 7.3.2). JRP (2001) assessed the significance of the proposed modifications to River Intake using the criteria under the NHPA and concluded that the proposed modifications would not alter the characteristics of the structure that qualify it for inclusion on the NRHP (see Section 4.8.4.1).

To complete the requirements under Section 106 of the NHPA, on November 9, 2001, EPA forwarded the cultural resource studies and a Finding of No Adverse Effect for the Intake Modifications to OHP along with a request that OHP concur with the conclusions. No objection to the request for concurrence was received from OHP.

After the completion of the 2000 cultural resources inventory, LADWP identified a need to clear sediment out of a 2.2-mile stretch of the Owens River channel immediately below the River Intake (see Section 2.3.6). This specific undertaking, which will include construction of temporary access roads in the area, was not considered as part of the 2000 cultural resources inventory for the LORP conducted by Far Western. EPA, therefore, considered this effort a "new undertaking" with respect to the Section 106 process under NHPA and, in a September 10, 2002 letter, reinitiated consultation with OHP for this new activity. Far Western conducted a second cultural resource analysis for this channel clearing activity in 2003. The results of this second inventory are summarized in Section 4.8.3.3. During the field survey conducted as part of the inventory, five new isolates, three new prehistoric sites, and five historic sites (three new sites and two previously recorded sites) were identified. Two of the prehistoric sites and two of the historic sites are considered ineligible for inclusion in the NRHP. With respect to the two prehistoric sites and three historic sites that are either unevaluated or previously recommended eligible for the NRHP status, Mitigation Measure CRR-1 (see Section 4.8.5) will be implemented to protect these sites. On July 29, 2003, EPA forwarded the 2003 cultural resource inventory along with a request that OHP concur with the conclusions.

A third cultural resources evaluation was conducted in 2004 to evaluate the historic significance of 16 manmade structures that are located in or adjacent to the river channel and were identified by LADWP and Ecosystem Sciences (2003) for potential removal or modification prior to initial flow releases (see Section 2.3.6). The evaluation included: reviews of available literature and records, a field survey of the structures, and NRHP site evaluations. The results of the evaluation are presented in a report completed by JRP (2004) and summarized in Section 4.8.3.4. The report concluded that none of the 16 resources is considered eligible for inclusion on the NRHP. To complete the requirements under Section 106 of the NHPA, EPA will forward the report to OHP along with a request that OHP concur with the conclusions.

In addition to the cultural resources studies, LADWP and EPA sought input from the following Indian Tribes to determine their interests and concerns about the project in general and their specific concerns about the channel clearing work (see Section 4.8.2): Big Pine Tribe; Bishop Indian Tribal Council; Bishop Paiute Tribe; Fort Independence Indian Reservation; Fort Independence Tribal Office; Independence Paiute Tribe; Lone Pine Paiute Tribe; Utu Utu Gwaitu Paiute Tribe, Benton. Written responses to the Notice of Preparation and Notice of Intent were received February 22, 2000, from Vernon J. Miller, Tribal Chairman for the Fort Independence Indian Reservation, and Mel O. Joseph, Environmental Coordinator for the Lone Pine Paiute-Shoshone Reservation. Following the publication of the Draft EIR/EIS in November, 2002, written comments were received from the following Tribes and Tribal representatives: Big Pine Paiute Tribe of the Owens Valley, Fort Independence Indian Reservation, Lone Pine Paiute-Shoshone Reservation, Lone Pine Paiute-Shoshone Reservation, and Owens Valley Indian Water Commission. Oral comments from the Tribes were received from representatives of the

Lone Pine Paiute-Shoshone Tribe and the Owens Valley Indian Water Commission. EPA has considered their concerns during the project environmental review process.

Where there is federal nexus, any future project actions (i.e., adaptive management measures) that rise to the level of a potential significant impact to historic properties (including archaeological sites, ethnographic resources, and historic structures) will be treated as a “new undertaking” subject to Section 106 review of the NHPA. As required by NHPA regulations, these new undertakings may necessitate a new round of Tribal consultations. This will ensure continued Tribal input with regard to possible future project impacts on cultural resources.

15.0 LIST OF AGENCIES AND PERSONS CONTACTED

Federal Agencies

U.S. Fish and Wildlife Service, Ventura Office – Carl Benz, Leanne Naue
U.S. Army Corps of Engineers, Ventura Office – Bruce Henderson
Bureau of Reclamation – Moses Moya, Steve Robertson
Bureau of Land Management – Doug Dodge

State Agencies

State Lands Commission – Kris Varda
California Department of Fish and Game – Denyse Racine, Darrell Wong, Don Sada, Steve Parmenter, Curtis Milliron, Phil Pister
Great Basin Unified Air Pollution District – Jim Paulus
Lahontan Regional Water Quality Control Board – Joe Kenny
State Office of Historic Preservation – Michael McGuirt

Local Government

Inyo County Planning Department – Chuck Thistlethwaite
Inyo-Mono County Agricultural Commissioner – George Milovich
Owens Valley Mosquito Abatement Program

Tribes

Fort Independence Indian Reservation
Richard Wilder, Chairperson
Independence, California

U-tu Utu Gwaitu Paiute Tribe
Benton Paiute Reservation
Rose Marie Salque, Chairperson
Benton, California

Big Pine Paiute Tribe
Jessica Bacoch, Chairperson
Big Pine, California

Timbi-Sha Shoshone Tribe
Georgia Kennedy, Acting Chairperson
Death Valley, California

Owens Valley Indian Water Commission
Teri Cawelti, Director
Bishop, California

Lone Pine Paiute-Shoshone Reservation
Rachel Joseph, Chairperson
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17.0 GLOSSARY AND ABBREVIATIONS

Action Plan – A plan prepared by Ecosystem Sciences in 1999 describing the implementation of the Lower Owens River Plan, which they also prepared.

APE – Area of Potential Effect (APE is defined under Section 106 of the National Historic Preservation Act (NHPA) as the geographic area or areas within which an undertaking (i.e., a project activity) may directly or indirectly cause changes in the character or use of historic properties, if any such properties exist.)

BLM – U.S. Department of Interior, Bureau of Land Management

CDFG – California Department of Fish and Game

CEQA - California Environmental Quality Act

CEQA mitigation – Measures to reduce or avoid impacts identified through the environmental impact analyses performed for an EIR or Negative Declaration

cfs – cubic feet per second

CHRIS – California Historical Resources Information System

Class I impact - Unavoidable significant impact that cannot be avoided if the project is implemented, and cannot be mitigated to a less than significant level

Class II impacts - Significant environmental impacts that can be mitigated to a less than significant level

Class III impacts - Other environmental impacts that are considered adverse but not significant. Mitigation measures are recommended to minimize adverse impacts but the lead agencies are not required to adopt them.

Class IV impacts - Beneficial impacts

Delta conditions - The amount of water and vegetated wetland within the Delta Habitat Area boundary existing at the time of the commencement of flows to the Delta under the LORP

EPA – U.S. Environmental Protection Agency

ESA – Federal Endangered Species Act

fps – feet per second

GBUAPCD – Great Basin Unified Air Pollution Control District

Historic properties – Any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places maintained by the Secretary of the Interior. This term includes artifacts, records, and remains that are related to and located within such properties. The term includes properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization and that meet the National Register criteria. (30 CFR Sec. 800.16 (l)(1))

HEC-2 – Hydraulic model developed by the Corps of Engineers to predict water surface elevations and flow velocities in channels and rivers

HEP – Habitat Evaluation Procedures, an analytic model developed by the US Fish and Wildlife Service to predict how wildlife would respond to habitat changes

Lead Agencies – The agencies with responsibilities under either CEQA or NEPA to prepare environmental documents.

LORP Plan – The plan prepared by Ecosystem Sciences that describes the objectives and major element of the Lower Owens River Project. The most recent version is dated August 2002.

Lower Owens River Rewatering Project - Releases are currently made from the Aqueduct at the Independence, Locust, and Georges spillgates to provide water to the river for fish and habitat purposes under an “Enhancement/Mitigation Project” called the “Lower Owens River Rewatering Project” that was initiated by the LADWP and the County in 1986. The releases under that project will be replaced by the releases under the LORP.

MOU – Memorandum of Understanding amongst LADWP, the County, California Department of Fish and Game, State Lands Commission, Sierra Club, the Owens Valley Committee, and Carla Scheidlinger. The MOU specifies goals for the LORP, a timeframe for the development and implementation of the project, specific project actions, and requires that a LORP ecosystem management plan be prepared to guide the implementation and management of the project. It also provides certain minimum requirements for the LORP related to flows, locations of facilities, habitat and species.

NEPA mitigation - Measures to reduce or avoid impacts identified through the environmental impact analyses performed for an EIS or Environmental Assessment

NHPA – National Historic Preservation Act

NRHP – National Register of Historic Places

NTU - Nephelometric Turbidity Units

OHP – California Office of Historic Preservation

Responsible Agency – State or local agency that can only approve a project after a lead agency has already completed the CEQA environmental review and taken action on the project.

Regional Board – Lahontan Regional Water Quality Control Board

ROD – Record of Decision

RWQCB – Regional Water Quality Control Board

SIP – State Implementation Plan

TMDL – Total Maximum Daily Load. Section 303(d) of the federal Clean Water Act requires states to identify surface water bodies which are not attaining water quality For each listed water body/pollutant combination, states must develop a TMDL, which is a plan to limit pollutants from various sources in the watershed to ensure attainment of standards.

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