United States Department of the Interior

FISH AND WILDLIFE SERVICE
Sacramento Fish and Wildlife Office
2800 Cottage Way, Room W-2605
Sacramento, California 95825-1846

In reply refer to:
1-1-02-F-0107
81420-2009-F-0639

APR 28 2009

Michael Jewell
Chief, Regulatory Division
U.S. Army Corps of Engineers
1325 J Street
Sacramento, CA 95814-2922

Subject: Amendment to Formal Section 7 Consultation on the University of California, Merced Campus and Community North Project (1999900203), Merced County, California

Dear Mr. Jewell:

This document is the U.S. Fish and Wildlife Service's (Service) amended Biological Opinion (2009 BO Amendment) in response to your December 5, 2008, request for reinitiation of formal consultation on the revised University of California, Merced (UC Merced) Campus and Community North Project in Merced County, California. This 2009 BO Amendment analyses the Proposed UC Merced Campus, Phase 1 and Campus Buildout (Corps # 199900203) and Infrastructure Project (Corps # 200100570) (2002 BO) and addresses whether the requirements in the 2002 Biological Opinion (Service File Number 1-1-02-F-0107)(2002 BO) have been met. This 2009 BO Amendment addresses the effects of the University of California's (University or UC) Proposed Project on 13 listed species in accordance with section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*)(Act). These 13 species include:

succulent owl's-clover (*Castilleja campestris* ssp. *succulenta*),
Colusa grass (*Neostapfia colusana*),
San Joaquin Valley Orcutt grass (*Orcuttia inaequalis*),
hairy Orcutt grass (*Orcuttia pilosa*),
Hoover's spurge (*Chamaesyce hooveri*),
Greene's tuctoria (*Tuctoria greenei*),
Hartweg's golden sunburst (*Pseudobahia bahiifolia*),
vernal pool fairy shrimp (*Branchinecta lynchi*),
Conservancy fairy shrimp (*Branchinecta conservatio*),
vernal pool tadpole shrimp (*Lepidurus packardi*),
California tiger salamander (*Ambystoma californiense*),

valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*), and San Joaquin kit fox (*Vulpes macrotis mutica*).

Critical habitat for listed vernal pool species also is addressed. The delisted bald eagle (*Haliaeetus leucocephalus*) is protected under the Bald and Golden Eagle Protection Act, and is addressed in this document.

Based on survey results and analysis presented in the 2002 BA and 2002 BA Supplement, the 2002 Biological Opinion concluded that the following species were not known to occur within the project area or mitigation sites: Hoover's spurge, hairy Orcutt grass, Hartweg's golden sunburst, and Greene's tuctoria. Extensive subsequent surveys (ICF Jones & Stokes 2008, Gibson and Skordal 2008) also did not locate these species in the former campus area (prior to reconfiguration of the Campus). Therefore, the Service concurs with the Corps' determination that both the University's Proposed Project (the Campus and Community North) and the Proposed Action (Campus and entire University Community) may affect, but are not likely to adversely affect Hoover's spurge, hairy Orcutt grass, Hartweg's golden sunburst, and Greene's tuctoria.

In addition to materials provided during consultation prior to the 2002 BO, this document is based on information provided in the following documents and other materials referenced within them:

- *Supplement to the Biological Assessment for the UC Merced Campus and Infrastructure in Support of UC Merced Project* (Airola 2008a),
- *Proposed Conservation Strategy for the UC Merced Project* (ICF Jones & Stokes 2008)
- *Management Plan for Conservation Lands and the Adjacent Campus Buildout Lands for the University of California, Merced* (Airola 2008b),
- *Compensatory Wetland Mitigation and Monitoring Plan* (Gibson and Skordal 2008)
- *University of California Merced and University Community Project Environmental Impact Statement/Environmental Impact Report* (Impact Sciences 2008).
- *Special-Status Species Survey Report, 2007 and 2008 Field Seasons: Robinson Ranch Conservation Easement Property, Northeastern Merced County, California* (Vollmar Consulting 2008)

A complete consultation history and the detailed project description on which this amendment is based, are provided in this document. Species information, including Species Status and Environmental Baseline were provided in detail in the 2002 BO, and are not repeated in total here, but updated information regarding the species' statuses within the project area is provided.

Consultation History

Consultation in Support of the 2002 BO

The Service's 2002 BO describes the consultation process under the Act for the UC Merced project through 2002. The proposed UC Merced Project is the product of more than 20 years of public involvement, planning efforts, and extensive analyses. In addition to obtaining direct input from concerned citizens and interested organizations as part of the planning and environmental review processes, the University engaged in discussions with various local, State, and Federal agencies. This consultation included contacts with the Service as early as 1994 and extensive discussions and communication since 1999, including the Service's written comments on the 1994 UC Merced Site Selection Environmental Impact Report (EIR); comments on the 2002 UC Merced Long-Range Development Plan (LRDP) EIR; and numerous discussions between University and the Service as well as the U.S. Corps of Engineers (Corps), U.S. Environmental Protection Agency (USEPA), California Department of Fish and Game (DFG), the County of Merced (County), and other stakeholders. The 2002 BO documents the correspondence and informal discussions between the University and the Service.

On February 25, 2002, the Service received a letter from the Corps requesting the initiation of formal consultation under section 7 of the Act and the 2002 Biological Assessment (2002 BA) (EIP Associates 2002). On July 8, 2002, the Service received a Supplement to the Biological Assessment (2002 BA Supplement) from the University containing additional information needed for the section 7 consultation and the Phase 1 campus, including a memo describing water supply and its potential effects on downstream resources.

On August 19, 2002, the Service issued the 2002 BO evaluating the effects of the UC Merced Project and the Infrastructure Project on the fleshy (succulent) owl's-clover, Colusa grass, San Joaquin Valley Orcutt grass, hairy Orcutt grass, Hoover's spurge, Greene's tuctoria, Hartweg's golden sunburst, vernal pool fairy shrimp, Conservancy fairy shrimp, vernal pool tadpole shrimp, California tiger salamander, valley elderberry longhorn beetle, bald eagle, and San Joaquin kit fox. For purposes of that analysis, the UC Merced Project included development of the Phase 1 Campus, which was constructed on the former Merced Hills Golf Course, in addition to the remainder of the campus buildout (2002 Proposed Project).

The 2002 Proposed Project evaluated in the 2002 BO consisted of a 910-acre campus, a 340-acre Campus Land Reserve, a 750-acre Campus Natural Reserve (CNR), and associated mitigation lands. The 2002 BO also addressed the related project to install roads and other public infrastructure (i.e., the Infrastructure Project) and the 2,000-acre University Community because of their relationship to the 2002 Proposed Project as interrelated and interdependent actions.

The Corps and the Service recognized that the Clean Water Act Section 404 permit process and the environmental review process under the National Environmental Policy Act (NEPA) could result in a modification of the proposed campus. Therefore, consistent with the project's characterization in the 2002 BA Supplement, we expanded our analysis to consider the potential

effects resulting from the development of a campus and community within the broader Study Area, which includes the 2002 Proposed Project site (Figure 1). In order to provide sufficient specificity to allow consultation to proceed, the University and the County agreed to a set of project conditions referred to as Parameters that were incorporated into the 2002 BO (Appendix A). The University and the County intended that these Parameters would be implemented or satisfied in connection with the selected alternative that would obtain Section 404 authorization.

The Parameters served as an important foundation for the consultation under the Act and for our conclusions in the 2002 BO. As part of the 2002 consultation, the University and the County agreed that the Parameters would apply to any preferred alternative located within an area defined as the Study Area in the 2002 BO (see Figure 1 in the 2002 BO) that may be selected by the Corps pursuant to its Section 404 permit and NEPA processes. The University also committed to a set of Conservation Measures designed to implement the Parameters. The project description for the 2002 consultation incorporated these measures.

Although the 2002 BO determined that the 2002 Proposed Project and the associated Infrastructure Project would not jeopardize the continued existence of federally-listed species, the 2002 BO did not authorize take of listed species. The 2002 BO recognized the need for subsequent consultation prior to issuance of a Section 404 permit in order to further minimize the effects of the 2002 Proposed Project consistent with the Parameters and Conservation Measures identified in the 2002 BO.

Consultation Subsequent to Issuance of the 2002 BO

Following the release of the 2002 BO, consultation continued between the Service, the Corps, the University, and other agencies and stakeholders to determine the most appropriate ways to achieve the requirements of the 2002 BO Parameters and Conservation Measures. Topics addressed during this consultation included provisions of the major documents and actions required through the Parameters, the planning and configuration of the UC Merced Campus and University Community, and the permitting process and supporting environmental approval process. Table 1 summarizes these meetings and discussions, which provided the basis for the University's reconfiguration of the UC Merced Campus and the University Community, which is comprised of the Community North and the Community South (Figure 2), to minimize impacts on threatened and endangered species and wetlands and other waters of the United States (see *Current Status of Campus Development* below for a description of this planning process).

On February 20, 2008, the University submitted its revised Section 404 permit application seeking authorization from the Corps to fill waters of the United States located on the UC Merced Campus and the Community North. The Corps issued one public notice in connection with the application (PN 199900203).

Relationship of the 2002 BO to the 2009 BO Amendment

For purposes of our analysis, the proposed project includes the UC Merced Campus and, more specifically, construction of the Campus Buildout (i.e., the part of the campus other than the already-constructed Phase 1 Campus), and the Community North portion of the University Community (Proposed Project). The Proposed Project includes the Infrastructure Project evaluated in the 2002 BO (Figure 1).

The 2008 BA Supplement updates previous BAs (EIP Associates 2002, Jones & Stokes 2002a) by incorporating recent actions and planning for the UC Merced Campus, Community North, and mitigation lands. The 2008 BA Supplement also documents how the University has complied with requirements of the 2002 BO, including the Parameters and supporting Conservation Measures. It updates the analysis previously provided in the 2002 BAs and in the 2002 BO regarding effects of the Proposed Project on listed species, with a focus on summarizing the amounts of occupied habitats and numbers of point locations of listed species that would be affected by the Proposed Project and are protected and managed within mitigation lands. The BA Supplement also individually addresses the effects of the Community South project. The UC Merced Campus and the entire University Community, i.e., both the Community North and the Community South, are referred to as the Proposed Action in that document.

This 2009 BO Amendment reflects the Corps request for reinitiation of consultation in light of the University's revised Section 404 permit application for wetland fill authorization associated with the Proposed Project. As such, this 2009 BO Amendment amends the 2002 BO and evaluates the Proposed Project for purposes of authorizing take under section 7 of the Act. Following the approach in the 2002 BO, this 2009 BO Amendment includes a programmatic evaluation of the Community South project as an interrelated and interdependent action, even though a Section 404 permit application for the Community South project has not been submitted to the Corps at this time. Thus, this 2009 BO Amendment does not authorize take for Community South development. If a Section 404 permit application is submitted in connection with Community South development, the Service will tier from this 2009 BO Amendment and conduct a more detailed analysis of that activity for purposes of authorizing incidental take.

AMENDED BIOLOGICAL OPINION

This is an amendment to our 2002 BO dated August 19, 2002, which addressed the effects of the Proposed Project. Only sections that have changed since the 2002 BO are included in this amended opinion. A section is changed either because (1) the Service has obtained new information pertinent to the revised project and the analysis of effects, (2) the effects of the Proposed Action are different from those effects described in the 2002 BO, or (3) the analysis is relevant to the Service's determination whether to authorize take.

Background and Current Status of UC Merced Project

The University has proposed the development of a major research university located in Merced County, California (Figure 1). As more fully described in the 2008 BA Supplement, the Proposed Action would include an 815-acre campus and a 1,951-acre contiguous, associated University Community comprised of the 833-acre Community North and the 1,118-acre Community South (Figure 2). The University Community would provide housing and commercial and other uses needed to support the UC Merced Campus. Although this 2008 BO Amendment focuses on the UC Merced Campus and the Community North, it also evaluates the Community South as an interdependent and interrelated project. The entire Proposed Action was analyzed in the University of California Merced and University Community Project Environmental Impact Statement/Environmental Impact Report (EIS/EIR) (Impact Sciences 2008).

Action Area

Although the revised UC Merced Campus and University Community footprint is reduced in size, the action area is unchanged from the 2002 BO.

Study Area

In the 2002 BO, the Service identified an area which was subject to the Service's review at the time and within which alternatives were considered for the proposed Campus and Community through the NEPA process. The Study Area was configured to allow consideration of potential effects of locating the project in a variety of settings. The Proposed Action is located within the Study Area as depicted on Figure 1.

Phase 1 Campus

The University initiated construction of the Phase 1 portion of the Campus in 2002 following the determination in the 2002 BO that this project component would have no effects or would not be likely to result in adverse effects on listed species. The Phase 1 Campus consists of three major academic buildings, two dormitory complexes, a recreation facility, and several support structures. Future Phase 1 development includes two major academic buildings, two dormitory complexes, and additional support facilities. As of 2008, the Phase 1 Campus supports an enrollment of approximately 2,000 students. Phase 1 has an estimated capacity of 3,200 students.

Planning for Campus and University Community Reconfiguration

The University undertook planning efforts in two phases during 2007–2008 to reconfigure the remainder of the UC Merced Campus and Community North to minimize effects. The University engaged in this planning effort in order to support the Corps' determination of the

least environmentally damaging practicable alternative for purposes of the Section 404(b)(1) Guidelines under the Clean Water Act.

Campus and University Community Footprint Evaluation and Reconfiguration

The University's initial planning phase sought to meet the Parameters by focusing on the size and location of the campus footprint. In particular, this planning effort focused on the watershed and subwatershed units of the previously proposed campus and immediately adjacent lands, as well as land within the previously designated University Community. The planning analysis incorporated subwatershed-specific information on occurrence and abundance of wetlands and listed species, as well as information on campus needs, construction costs, energy efficiency, and aesthetics. The University's primary goal was to reduce the acreage of impacts to high value wetlands (vernal pools, swale wetlands, and clay slope wetlands) and associated grasslands.

The resulting campus footprint eliminated 373 acres (41%) of the previous 910-acre campus footprint by relocating lands with greater amounts of wetland and listed species habitat from the UC Merced Campus footprint to habitat preservation and mitigation lands. In order to provide sufficient acreage for the UC Merced Campus in the new configuration, 278 acres were relocated from the University Community to the UC Merced Campus. The reconfiguration substantially reduced the direct effects of the UC Merced Campus and University Community on all wetlands, especially those to higher-value natural wetlands (vernal pools, swales, and clay slope wetlands).

To offset the loss of developable acreage within the University Community due to the shift in the UC Merced Campus, additional lands were added to the east side of the previously proposed University Community. Overall, the combined acreage of the UC Merced Campus and University Community was reduced by a total of approximately 277 acres (from 3,043 to 2,766 acres) with the bulk of the acreage that was removed from development consisting of high-value vernal pool–grassland habitat.

As part of the reconfiguration of the UC Merced Campus and the University Community, the 221 acres of University owned land removed from the Campus and 340 acres previously designated as the Campus Land Reserve were added to the Campus Natural Reserve, thereby increasing the size of the Campus Natural Reserve from 750 acres to 1,307 acres (Figure 3). The University will secure a conservation easement to protect this area in perpetuity.

The University submitted to the Corps on February 20, 2008 a Clean Water Act Section 404 Permit for the fill of waters of the United States resulting from the UC Merced Campus and Community North developments. The Infrastructure Project is now subsumed within the Proposed Project and is no longer treated as a separate project in the Section 404 application, this Biological Opinion, or NEPA/California Environmental Quality Act (CEQA) approval processes.

UC Merced Long Range Development Plan

Following the decision to modify the Campus configuration, the University began extensive land use planning. UC Merced's 2009 Long Range Development Plan (LRDP) was adopted by the Regents on March 19, 2009 (Figure 4). The LRDP consists of land use, landscape and open space, and utilities elements. The LRDP is consistent with the Parameters and Conservation Measures in the 2002 Biological Opinion.

University Community Plan Amendment

The County approved the University Community Plan (UCP) in 2004. The UCP established goals, objectives and policies and an area plan for the area south of the UC Merced Campus. Following adoption of the UCP, the County amended the County General Plan to designate the site of the University Community for multiple use urban development.

In response to the shift of the campus onto land previously within the University Community Plan area, it is anticipated that the University Community Land Company, LLC (UCLC), the owners of the land within the northern portion of the University Community (Community North), will apply to the County of Merced for a General Plan Amendment to accommodate the additional 222-acres of land from the east (See Figures 1 and 2). The University's February 2008 Section 404 permit application seeks authorization to fill wetlands within the Community North.

Other University Community Lands

LWH Farms, land owner of Community South, has not applied for a permit to fill wetlands within the Community South area. This area is not included within the University's application for a Section 404 permit because the University does not control the Community South. In the event that LWH Farms were to submit to the Corps a separate Section 404 permit application for development of the Community South, the Service would reinitiate section 7 consultation. Any such future section 7 consultations likely would tier from this 2009 BO Amendment.

Section 404 Permit

The University seeks authorization from the Corps to fill approximately 76.70 acres of waters of the United States located on the UC Merced Campus and the Community North. Additonally, the fill ultimately required for development of the Community South, brings the Proposed Action impacts to a total of approximately 85.05 acres of waters of the United States. The combined 2002 LRDP and 2004 University Community Plan planning areas included approximately 121 acres of waters of the United States. The reconfigured plans reduce the amount of fill by approximately 36 acres or 30%. In addition, many of the waters of the United States now avoided because of the Proposed Action's minimized footprint include high-functioning and high-quality wetlands and vernal pool complexes.

REVISED DESCRIPTION OF THE PROPOSED ACTION

The actions evaluated by the Service during the present consultation consist of the University's Proposed Project, which is subject to the Corps permit to fill wetlands and other waters of the United States under Section 404 of the CWA. As described in the project's 2008 BA Supplement, the University's Proposed Project consists of the construction of the 815-acre UC Merced Campus and the 833-acre Community North. This action is one of two major projects under the broader Proposed Action, which also includes the development of the 1,118-acre Community South project, an interrelated and interdependent project.

The UC Merced Campus and University Community lands are located in eastern Merced County, approximately 2 miles northeast of the corporate limits of the city of Merced, California. The area is situated south of Lake Yosemite and east of Lake Road (Figures 2 and 3).

Revised Footprint and Land Uses for the UC Merced Campus and Community North

The University's initial application for the 2002 Proposed Project proposed a campus of 910 acres with a 340-acre development reserve (the Campus Land Reserve). The Proposed Action no longer includes the Campus Land Reserve, and these lands have been incorporated into the Campus Natural Reserve (Figure 3).

As such, the 2009 LRDP consolidates the UC Merced Campus and its reserve development capacity onto 815 acres, buffered on the north and east from the natural landscape by a series of perimeter road and canals (Figure 4). The University continues to employ best practices in sustainable development through on-site stormwater management. Passive and active recreation areas are located to receive upland flows along drainage pathways at the western and eastern edges of development.

The plan for the UC Merced Campus and Community North area includes five districts that provide conceptual descriptions of the *block types* (i.e., model development types for different uses) (University of California 2008), including the Academic Core, Gateway District, Student Neighborhoods, University Town Center, and University Community Neighborhood (Figure 4). Descriptions of each of the five major districts incorporated into the Campus and Community North areas appear below. Detailed descriptions of the typical block types that describe the sizes of plan units, building sizes and densities, number of dwelling units, and other features are presented in the University's Section 404 permit application.

Academic Core: The Academic Core district would be the core of the campus and would link the student neighborhoods proposed northeast, north, and west of this district to the Town Center, proposed south of this district. The Academic Core would include mixed-uses, such as institutional, research, administration, student services, parking, recreation and other services, and a main street of on-campus student, staff and faculty services mixed with housing. The Academic Core (AC-1) and Academic Main Street (AC-2) block types are proposed for this district.

Gateway District: The Gateway District (G) is proposed west of the Town Center and the Academic Core, within the UC Merced Campus and the Community North. This district would include private and public research; visitor serving facilities; sports venues; parking; and other regional attractors. A transit hub would be located within this district that would connect to the local transit system, and providing walking opportunities to most sections of each central district. The Gateway District Academic Lab (G-1) and Industrial-Research (G-2) block types are proposed for this district.

Student Neighborhoods: The Student Neighborhood district would surround the Academic Core to the northwest, north, and east, and would be located within walking distance to the core of the UC Merced Campus. This district would include residence halls and apartments supported by student services (food and recreation), park space and shared parking. The student neighborhoods would house up to 12,500 students. Two Student Neighborhood Walk-Up Apartments (SN-1) and Residence Hall/Dorm (SN-2) block types are proposed for this district.

University Community Town Center: The University Town Center district would be located in Community North, and would serve as the downtown for the UC Merced Campus and the University Community. This district would include mixed-use commercial and residential activities, cultural facilities and parking. The Town Center Commercial Mixed Use (TC-1), Residential Mixed Use (TC-2), and Residential Townhouse/Rowhouse (TC-3) block types are proposed for this district.

University Community Neighborhood: The University Community Neighborhood district would be located within the Community North. This high-density district would include a multiple mixed-use neighborhood district with an extensive network of transit, bike and pedestrian paths. The Community North Center (NHD-1), Residential Townhouse (NHD-2), Small Lot Single-Family (NHD-3), and Large Lot Single-Family (NHD-4) are proposed for this district.

Community South

UC does not control the Community South portion of the University Community and the Community South project is not included within the UC's 404 permit application. The Community South area may be subject to a future permit and environmental review process. The 1,118 acres that constitute Community South are designated Multi-Use Urban Development in the County General Plan. This area likely would develop into two residential villages. Major land uses in the Community South area may include residential neighborhoods totaling approximately 635 acres and 5,823 residential units, non-residential retail and office areas totaling approximately 24 acres and 390,000 square feet of building space.

Infrastructure Project

The revised UC Merced Campus and Community North Section 404 permit application (#199900203) supersedes the Infrastructure Project application (# 200100570). Development of the University Community, however, includes certain infrastructure necessary to serve the UC Merced Campus. This infrastructure includes construction of a major north-south arterial road north of Yosemite Drive, portions of two additional minor arterial roadways and collector streets, and construction of utility lines (storm drainage, sewer, potable water, fire and irrigation water, telecommunications, electric and gas) within the rights-of-way secured for those roadways. Although this infrastructure is required for the UC Merced Campus alone, it is proposed to be located and configured in a manner as to allow expansion to serve the proposed University Community.

Conservation Measures

This section describes conservation measures that the University and the County have agreed to apply in order to avoid, minimize, and compensate for potential effects that the Proposed Actions could have on listed species. The following contains a summary of the general conservation measures for the Proposed Action.

- Protection and conservation management for 6,430 acres of UC-owned mitigation lands adjacent to the UC Merced Campus (including the VST, CNR, and UCLC-owned Myers Easterly property), the adjacent 3,070-acre CST lands, and the 91-acre Myers Easterly parcel (Tier 1 mitigation lands) (Figure 3; Table 2).
- Acquisition of conservation easements on an additional 17,141 acres of high-value private lands in eastern Merced County (Tier 2 lands).
- Acquisition and enhancement or creation of an additional, currently unquantified area of land to mitigate for losses of jurisdictional wetlands and other waters of the U. S. (Gibson and Skordal 2008).
- Continued commitment to design, construction, and operation measures listed in the Resource Mitigation Plan (Jones & Stokes 2002a), the 2002 BA (EIP Associates 2002), BA Supplement (Jones & Stokes 2002a), and 2002 Biological Opinion (USFWS 2002) to avoid and minimize impacts.

The following section describes the status of plans and actions that were required by the 2002 BO. Following the discussion of the plans and actions, this Biological Opinion summarizes UC Merced's compliance with the 2002 Parameters and Conservation Measures.

Status of Other Required Plans and Actions

As a result of regulatory requirements, the University's Proposed Project includes a variety of other planning documents and their resulting actions. This section summarizes activity on various plans and requirements that have been conducted since issuance of the 2002 BO.

Conservation Strategy

The 2002 BO Parameters 1a and 1b require the preparation of a Conservation Strategy for the University's Proposed Project. The Conservation Strategy was intended to:

- provide guidance for developing and implementing measures to conserve wildlife and plant species affected by the project,
- summarize the University's implementation of this strategy and describe the role of the strategy in regional conservation, and
- assess the potential effects of the project on listed species and sensitive habitats in the project vicinity.

The University submitted several drafts of the strategy for review by the Service, DFG, and other agencies and interested stakeholders prior to reconfiguration of the UC Merced Campus and University Community. The University revised the Conservation Strategy in 2008 (ICF Jones & Stokes 2008) following reconfiguration and incorporation of the Community North to the University's Proposed Project. The University submitted the revised Conservation Strategy to the Service on September 23, 2008.

Management Plan for Conservation Lands

Parameters 2a and 2d of the 2002 BO required preparation of a Resource Mitigation Plan for the Campus that includes "the measures set forth in the BA supplement, as well as management strategies and financial assurance for the monitoring and management of preserve land and a strategy for addressing indirect effects," and "financial assurance for long-term monitoring and management of identified preserve lands." Because the term *Resource Mitigation Plan* was applied to a broader plan that summarized all mitigation measures for sensitive biological resources (Jones & Stokes 2002b), the document prepared to meet Parameters 2a and 2d is referred to as the Management Plan for Conservation Lands (Airola 2008b). The University has satisfied the requirement for preparation of a Habitat Mitigation Plan (HMP) for the Infrastructure Project, which has been incorporated into the University's Proposed Project, by applying the adopted requirements for the UC Merced Campus to the Community North lands, including infrastructure components (see *Status of the Conservation Measures*, below).

The University prepared a draft of the Conservation Lands Management Plan in 2008 (Airola 2008) to define management and monitoring needs to protect and maintain listed species and their habitats on UCM mitigation lands. The plan provides management goals and objectives, management guidelines, monitoring goals, and a funding and adaptive management program. The University submitted the revised Conservation Lands Management Plan to the Service on September 24, 2008 (Airola 2008b). The Conservation Lands Management Plan addresses the following mitigation lands.

- UCM Conservation Lands (Tier 1a lands): 6,430 acres of mitigation land, comprising the University's VST Preserve and CNR and the UCLC's Myers Easterly property (which will continue to be owned by the UCLC and managed by the University under a conservation easement).

- CST: the 3,070-acre CST property (Tier 1b lands) is currently owned by The Nature Conservancy (TNC). This property will be protected with a restrictive conservation easement.

- Tier 2 Conservation Lands: 17,141 acres in five private ownerships that are protected under conservation easement (Tier 2 lands).

The Conservation Lands Management Plan also addresses management of grassland portions of the Campus adjacent to Conservation Lands (Adjacent Campus Buildout) during the interim period before they are developed in various campus phases.

Compensatory Wetland Mitigation and Monitoring Plan

The University's Compensatory Wetland Mitigation and Monitoring Plan (Compensatory Wetland Mitigation Plan) (Gibson and Skordal 2008) fulfills mitigation requirements under the Clean Water Act Section 404 and also serves to protect, enhance, and create suitable habitat for listed species that require vernal pools and other seasonal wetland habitats. The plan's major components include preservation and enhancement of existing wetlands that could be subject to future degradation and restoration of degraded wetland and/or creation of new wetlands. Preservation and enhancement is designed to meet performance standards that ensure that there will be no losses in wetlands functions and values. Restoration and creation will be conducted to ensure that no net loss of wetland area occurs.

The restoration and creation component of the Compensatory Wetland Mitigation Plan specifies a goal "to establish wetlands that are similar to the impacted wetlands in terms of physical and biological characteristics" (Gibson and Skordal 2008). Wetland restoration and creation efforts will focus on vernal pool habitat, which is a primary habitat used by many of the listed species that occur within the UC Merced Campus and Community North areas. The soil and associated seedbed from vernal pools that will be eliminated as a result of construction will be used in wetland restoration and creation, unless genetic considerations suggest otherwise.

The plan has been revised and submitted to the Corps in support of the University's Section 404 Permit application.

UC Merced Campus and University Community Environmental Impact Report/Environmental Impact Statement

As lead agencies for State and Federal actions under CEQA and NEPA, the University and the Corps prepared a joint EIS/EIR to evaluate the potential for significant environmental impacts associated with the development and operation of the Proposed Action. Although a Section 404 permit application has not been filed for Community South, consistent with the Federal statement of purpose discussed in the EIS/EIR and the Corps' conclusion that the UC Merced Campus and University Community are connected actions, the impacts associated with all fills of waters of the United States required for the Campus and University Community were addressed in the EIS/EIR.

STATUS OF COMPLIANCE WITH PARAMETERS IN THE 2002 BIOLOGICAL OPINION

This 2009 BO Amendment documents the extent to which the University has complied with the Parameters and Conservation Measures identified in the 2002 BO. The University used the 2002 BO Parameters as a guide to subsequent planning for the UC Merced Campus and Community North and for acquired conservation areas. The Parameters provide general guidance, while the Conservation Measures provide more specific guidance for achieving the requirements of the Parameters. A summary of the status of compliance with the Parameters is provided in Table 3. The discussion below is a more detailed summary of the requirements of the Parameters and the status of the University's efforts to meet them.

Adopted Environmental Commitment for the UC Merced Campus

Requirement

The measure specifies that the Conservation Measures are the specific means by which the Parameters will be addressed.

Status

Conservation Measures have been or will be met, as documented in the following sections.

Resource Mitigation Plan for Campus Buildout

Requirement

This Conservation Measure specifies that the University's Resource Mitigation Plan (RMP), the Infrastructure Project HMP, the policies of the County's Draft University Community Plan (UCP), and the Parameters are the source documents for the Conservation Measures. The measure describes how measures in the RMP were modified for the 2002 BO in response to the

shift in the focus of the project from the University's Proposed Project to the more broadly defined Proposed Action. The 2002 BO Conservation Measures include measures identified in the original RMP, the Infrastructure Project HMP, policies within the County's UCP, and the Parameters.

The measure specifies that additional analysis and planning are required to develop specific conservation programs and measures and that the Service will be involved in developing these measures and will approve them. The 2002 BO also notes that "the measures demonstrate the process and specific commitments that the University is committed to employ, consistent with the Parameters to avoid, minimize and compensate for the effects of constructing a UC Merced Campus, Infrastructure Project, and associated University Community in the Study Area".

Status

The University has undertaken additional analyses and planning efforts since the 2002 BO to implement the Conservation Measures. The Service was involved in many aspects of planning and analysis to implement the Conservation Measures, including input regarding reconfiguration of the UC Merced Campus and University Community and the development of the Conservation Strategy, Conservation Lands Management Plan, and Compensatory Wetland Mitigation Plan.

Long Range Development Plan Biological Resource Policies and Mitigation Measures

Requirement

This Conservation Measure describes the University's adoption of 11 LRDP policies governing protection of natural resources that will be met through development of a resource mitigation program. The program would ensure no net loss of wetlands functions and values and avoid and minimize effects on annual grassland habitat and special- species. The program would result in acquisition and preservation of substantial acreages of vernal pool-dominated grassland habitat and other wetland resources in eastern Merced County and in the restoration, enhancement, or creation of wetland resources within these preserved areas. The program would protect and compensate for direct effects on special-status species. The Conservation Measure also describes similar avoidance, minimization, and compensation commitments for the Infrastructure Project and the County's UCP.

Status

The 2002 LRDP policies served as the foundation for the University's analysis, planning, and implementation of measures designed to minimize effects on wetlands and special-status species and to compensate for direct effects. The 2008 BA Supplement and supporting documents, including the Conservation Strategy, Conservation Lands Management Plan, and Compensatory Wetland Mitigation Plan, document both completed and proposed future measures that meet these commitments as further discussed below.

Compensation Measures for Phase 1

Requirement

This Conservation Measure introduces the separate treatment of Phase 1 commitments in the 2002 BO and specifies that later Conservation Measures address the specific Phase 1 requirements.

Status

No specific requirements are specified in this measure. The later section *Adopted Conservation Measures for Phase 1 Campus Project* describes specific Phase 1 commitments and UC's implementation of these specific Phase 1 measures.

Campus Siting Measures

The Campus Siting Measures introduce two specific Conservation Measures related to determining the ultimate location of the Campus within the Study Area.

Siting Commitments Made for the Revised Campus Location

Requirement

This Conservation Measure identifies actions that were implemented or were being implemented by the University in 2002 during siting of its proposed campus project. These actions included avoidance of important habitat areas and acquisition of conservation easements for substantial areas of key habitat for listed species. The measure notes that these actions will be evaluated and augmented as needed to meet the requirements of the Parameters. The measure specifies that the Campus will not be relocated or reconfigured within the 2002 BO Study Area in a way that results in more effects than the Proposed Project as they were identified in the 2002 BO.

Status

By August 2002, the University had acquired 5,780 acres of conservation habitat lands in fee title within the VST Preserve and CNR and dedicated these lands to conservation management as reflected in the 2002 Biological Opinion. TNC also acquired fee title ownership to the 3,070-acre CST with Wildlife Conservation Board (WCB) UCM-related funds authorized by the California legislature. The University, in joint ownership with the VST as the UCLC, also pledged the 91-acre Myers Easterly property to permanent protection and conservation management. These lands are Tier 1 conservation lands. Concurrently, the WCB acquired conservation easements for a total of 17,141 acres of private lands that support key habitats as mitigation for effects on listed and other special-status species (Tier 2 conservation lands) (see Table 2). (Acreage measurements for these parcels were refined based on the 2008 surveys.)

Following issuance of the 2002 BO, the University reconfigured the UC Merced Campus in 2007, which resulted in the dedication of an additional 557 acres of the former UC Merced Campus lands and the Campus Land Reserve to the CNR. Therefore, the total Tier 1 conservation land acreage increased to 9,498 acres (Table 2). This 2009 BO Amendment reflects the increased land conservation program. In addition to increasing the amount of conserved habitat to mitigate for project effects, the University's 2008 revised Campus configuration substantially reduced the acreage of impacts on wetland and special-status species (see later discussions of effects on species).

Restrictions on Campus Siting Imposed by Existing and Pending Conservation Easements

Requirement

This Conservation Measure identifies requirements of the Parameters as described in the 2002 RMP and HMP, which restrict UC Merced Campus siting through acquisition of conservation easements. The measure also includes requirements of the Parameters to address a movement corridor for the San Joaquin kit fox to the north and east of the proposed 2002 Proposed Project, avoid impacts on the habitat for the Conservancy fairy shrimp and the watershed surrounding its wetland habitat, and acquire compensation lands at a ratio equal or greater to that specified in the 2002 Biological Opinion (i.e., >2:1 for listed plants and >3:1 for the kit fox).

Status

The University has granted, or committed to grant, conservation easements on lands identified in the 2002 BO. The kit fox movement corridor was addressed through analysis of movement capabilities in several versions of the Conservation Strategy. This analysis guided agency discussions and reconfiguration of the UC Merced Campus, which increased the certainty of successful movement in around the northeast side of the UC Merced Campus. The 2002 UC Merced Campus design avoided any occupied habitat and the surrounding watershed for the wetland that supports the Conservancy fairy shrimp by protecting the watershed in the CNR. Subsequently, the dedication of the Campus Land Reserve to conservation management (with its incorporation into the CNR) and reconfiguration of the UC Merced Campus in 2008 provided additional permanent protection to the area adjacent to the watershed supporting the Conservancy fairy shrimp to further protect the species from potential sources of disturbance. More details regarding compensation are presented below in response to the Conservation Measure

Compensation Measures for the Proposed Actions.

Campus Design Measures

Requirement

This Conservation Measure identifies a set of specific commitments that the University agreed to incorporate into the UC Merced Campus design to avoid and minimize direct and indirect effects

on listed species and their habitats. Measures will be incorporated at least 30 days prior to issuance of construction contracts and will be reviewed and modified if necessary to meet the requirements of the Parameters. Specific measures follow below.

Control of Stormwater and Irrigation Runoff

The University agreed to design, construct, and operate a stormwater management system to avoid and minimize direct and indirect effects on aquatic systems outside the campus that support special-status species. In addition, future development within the UC Merced Campus and University Community will be designed to be consistent with Low Impact Development (LID) principles. LID is a sustainable landscape approach used to replicate or restore natural watershed functions, and further avoids and minimizes impacts to waters and associated habitats. Implementing these and other such measures will avoid and minimize alterations of natural hydrologic regime, increases in sediment and nutrients, and introduction of pesticides and other hazardous materials into runoff. Stormwater will be detained on campus and discharged to streams outside the UC Merced Campus footprint to mimic the natural runoff pattern.

Construction of Perimeter Fencing

The University will construct perimeter fencing between development areas and natural areas to discourage human and pet disturbance.

Design of Lighting to Minimize Effects on Adjacent Habitats

The University will locate, shield, and direct lights at the campus perimeter to minimize introduction of stray lighting into habitat areas.

Status

These measures were incorporated into the Phase 1 campus design and are retained as design guidelines for subsequent UC Merced Campus phases and for development of the Community North.

Construction Measures

Requirement

This Conservation Measure requires the University to prepare and implement a construction mitigation plan addressing 12 of the Service's standard construction mitigation measures

Status

The University prepared a construction mitigation plan for Phase 1 (Jones & Stokes 2002c), which was approved by the Service, and successfully implemented with regular reporting. The

University will continue to implement the prescribed measures during the future construction of the UC Merced Campus and Community North.

Campus Operation and Maintenance Measures

Requirement

This Conservation Measure identifies specific requirements that will be incorporated into the UC Merced Campus facilities management program, including the following.

- Maintaining a continuous public education program to inform the students, residents, and staff of sensitive resource protection needs.
- Establishing a leash rule and an animal control program.
- Minimizing use of herbicides and other pesticides.
- Developing an invasive species control program.
- Developing a management plan for conservation lands.

Status

The University provides regular training to all new staff, construction workers, and students on the importance of the nearby sensitive natural resources and resource protection needs. The University has adopted and is implementing an animal control program for the Phase 1 Campus. The University adopted an integrated pest management program for campus use that addresses minimization of herbicides and other pesticides. The University remains committed to controlling invasive species during construction. The University submitted the Conservation Lands Management Plan to the Service in accordance with the Parameters.

Compensation Measures for the Proposed Actions

Requirement

This Conservation Measure identifies habitat compensation commitments and specifies preparation of a Project Compensation Plan to address acquisition and protective management of high-quality habitat and lands that will be restored to provide wetland compensation. The plan will identify specific preserve lands to compensate for take and habitat loss for special-status species. The plan is required to identify measures to implement compensation, resulting in habitat benefits, and an adaptive management program. The plan will identify ownership of preserve lands, management budgets and funding, wetland habitat restoration actions, management programs for special-status species, a comprehensive monitoring program, and an adaptive management protocol. Specific measures needed to meet the Parameters will include:

- review by the Service and DFG of existing and pending easements;
- measures to provide management and monitoring of the CNR, VST, and wetland creation/restoration lands;

- establishment of a kit fox corridor;
- other possible actions to enhance kit fox movement (e.g., passage over canals);
- compensation for any unavoidable effects on the Conservancy fairy shrimp;
- preservation of habitat occupied by special-status plants; and
- development and implementation of a restoration/creation plan for effects on vernal pools and associated habitats.

Status

These requirements have been addressed in the following sections.

Overview of Existing Land Acquisition Program

Requirement

This measure introduces the land acquisition and enhancement measures described below. It notes that acquisition may vary from the 2002 commitments, depending on the characteristics of the final Preferred Alternative and resulting mitigation requirements. This section also describes the University's 2002 proposal for a 910-acre campus and the acquisition and commitments to management for the CNR (750 acres in 2002) and VST Preserve (5,098 acres; acreage revised to 5,030 in 2008). It notes that regardless of the outcome of the regulatory actions, the VST Preserve and CNR will be protected under a conservation easement, managed adaptively, and "may be used to compensate for the effect of the Campus on wetland and listed species." Finally, it notes that public activities and access on the CNR and VST Preserve lands "are restricted … with recreation activities being entirely prohibited."

The 2002 BO's description of the portion of the measure addressing recreational use differs from that characterized by the University in the RMP. The 2002 BO states, "Activities and public access on the CNR and VST Remainder Property are restricted, with recreational activities being entirely prohibited." (p. 25). In contrast, the RMP states,

"*No general unrestricted public use will be permitted. Human uses of the …CNR lands will be limited to research, educational, and recreational activities that are consistent with, or do not interfere with, the protection of listed species and their habitats. Public use will be limited to docent-supervised use and limited controlled public use of hiking and nature observation (i.e., along existing ranch roads).*" (p. 14)

Status

Land acquisition and protection for listed species increased with the University's reconfiguration of the UC Merced Campus and Community North (also see Table 4a). See subsequent sections for discussions of compensation levels achieved through land acquisition. With respect to recreation use, the University has managed its Conservation Land on an interim basis (until the

Service approves the Conservation Lands Management Plan) to exclude recreational uses. The University will allow passive recreation uses that do not pose a threat to conservation resources on University-owned Conservation Lands. Such uses are not precluded by the Conservation Easement on the VST Preserve lands, which allows "passive recreation, including bird watching hiking, horseback riding, and picnicking, except as prohibited under agency permits." In its Management Plan for Conservation Lands, the University has proposed to allow low-intensity recreation uses on UCM Conservation Lands (hiking, running, nature study) "that are consistent with resource protection and management needs" and "that would not diminish biological resource values or conflict with other required management activities" (Airola 2008b: p. 5-20).

Compensatory Wetland Mitigation and Monitoring Plan

Requirement

The measure describes the University's commitment to prepare a detailed Compensatory Wetland Mitigation and Monitoring Plan, including on-site and off-site wetland preservation, enhancement and/or restoration, and creation. The University submitted the plan for approval by the regulatory agencies. The plan is designed to ensure that construction and long-term use of the UC Merced Campus and Community North would not result in a net loss of wetland functions. The plan identifies a combination of wetland preservation, enhancement, restoration, and creation and uses a holistic watershed-level approach. The measure specifies that the plan will incorporate the broad approaches outlined in the University's Compensation Wetland Strategy, Mitigation Design Criteria, and direction in the 2002 Biological Opinion and Section 404 permit. The objectives of the plan must include the following:

- preserve vernal pool dominated grasslands at a ratio of 10:1 for each acre of this habitat that is developed or filled;
- incorporate easement protections and other enhancements on preserved lands as needed to achieve no net loss in wetland functions;
- restore wetlands by reestablishing or enhancing areas where the vernal pool signature is present, at a 1:1 ratio for filled wetlands; and
- meet the 1:1 ratio through creation in suitable areas if the replacement ratio cannot be met through restoration.

The measure also requires preparation of a Wetland Restoration/Creation Site Design Plan for each conservation site, including a wetland delineation. The Site Design Plans will include an appropriate monitoring and adaptive management measures and adequate financial assurance to conduct management and monitoring.

Status

The Compensatory Wetland Mitigation and Monitoring Plan (Gibson and Skordal 2008) was prepared with extensive involvement by the Service, Corps, and other agencies and

nongovernmental organizations. This document incorporates and supersedes previous wetland strategies and mitigation design criteria.

Land Preservation. The University secured conservation easements and/or acquired fee title to Conservation Lands that protect various substantial areas of high value wetland habitats (i.e., vernal pool, swale wetlands, clay slope wetlands) (Table 2). Most of these lands were protected prior to the 2002 BO. Additionally, reconfiguration of the UC Merced Campus resulted in additional conservation lands and a shift from lands within the Main Campus and Campus Land Reserve to the CNR (Table 2). The University is awaiting the issuance of State bonds which will include funds for the purchase of the Ichord Ranch east of the University Community. The total package of land acquisition will ultimately exceed 30,000 acres of habitat that will benefit listed species through long-term management and protection.

Land Protection. Wetlands on Tier 1a conservation lands are protected through fee title ownership by the University, conservation easements (completed for the VST preserve and Myers Easterly, in progress for the CNR), and management under the Conservation Lands Management Plan. Tier 1b and Tier 2 wetlands are protected from lands uses that would be detrimental to wetland values.

Wetland Restoration and Creation. As outlined in the Compensatory Wetland Mitigation Plan, the University will acquire mitigation bank credits or a conservation easement on one or multiple parcels of land with degraded vernal pool characteristics and restore and create vernal pool habitat to replace the wetland acreage and functional values of habitat affected by construction of the UC Merced Campus and Community North. Wetland restoration and creation will focus on creation of vernal pools and riparian wetlands (to compensate for effects on human-made wetlands). The University will restore and create vernal pools to compensate in-kind for vernal pool habitats. It also expects to use vernal pool creation and restoration to replace intermittent channel and clay slope wetlands because these latter types are difficult to restore or create. Achieving compensation goals for wetland restoration and creation efforts will require protection of a substantial, but currently unquantified area of land. Ultimately, the wetland plan will require approval by the Corps and the Service as. It is estimated that approximately 1000 acres of habitat will be preserved by this component. It will bring additional protection to endangered species habitat and is an indirect benefit to listed species.

Compensation Plan for Protected Species

Requirement

The measure specifies that the University is required to prepare and implement a Compensation Plan for protected species. The plan would consist of conservation measures, performance criteria, monitoring protocols, appropriate contingency measures, and a long-term maintenance plan, consistent with the 2002 BO.

Status

This 2009 BO Amendment incorporates compensation elements derived from several supporting documents, including the Conservation Strategy, Management Plan for Conservation Lands, the Compensatory Wetlands Mitigation Plan, and the 2008 BA Supplement, which collectively constitute the University's plan for the compensation of protected species and are in lieu of a separate, single document entitled "Compensation Plan for Protected Species."

Compensation Strategy for Listed Plants

Requirement

The measure specifies that the University will compensate for unavoidable project impacts on listed plant species, consistent with Parameter 2f, through preservation of occupied habitat in areas approved by the Service. The 2002 BO requires that compensation be based on preservation of two populations of an equal or greater size than those eliminated, at a 2:1 ratio of preservation to impacts (2:1 ratio) within 10 miles of the Proposed Action.

Status

During preparation of the Conservation Strategy, the Service, the University, and other agencies agreed to modify the survey protocol to be used in determining impacts and compensation for listed plants. The agencies agreed it was impractical to conduct a complete survey of all pools for all listed plants within the Proposed Action and potential compensation areas As a result, the data on occurrence of succulent (fleshy) owl's-clover presented in the 2002 BA (based on a sample of 5.4% of available pools) was augmented by additional surveys conducted during wetland surveys for the Wetland Functional Assessment. This 2009 BO Amendment relies on these data to evaluate impacts to occupied habitat and habitat within the conservation areas. Further, the 2008 BA Supplement used a geographic information systems (GIS) model to characterize all suitable wetlands within 200 meters of a known occurrence as "occupied habitat" to assist the Service in its consultation process.

Plant species occurrence data and determinations of occupied habitat show the only listed plant species that would be subject to project impacts is the succulent owl's-clover. Although two other species, Colusa grass and San Joaquin Valley Orcutt grass, have not been recorded in impact areas, they are present and given management attention on UC Conservation Lands.

The mitigation acreage ratio achieved by Tier 1a lands for impacts to occupied succulent owl's-clover habitat within the UC Merced Campus and Community North is 10.1:1. The addition of the CST and Tier 2 lands increases the mitigation ratio to 22:1 (Table 4a). In addition, the mitigation ratio for the number of point locations of species recorded during surveys on preserved versus affected areas also greatly exceeds 27:1 (Table 4b). The UC- and UCLC-owned conservation lands are preserved in perpetuity and support buffers to protect them from other perturbations. The management and monitoring of UC and UCLC-owned conservation land will

be funded over time through a combination of a specific endowment within the UC Endowment Fund, UC operating funds, and revenues from grazing leases (see Conservation Lands Management Plan for more details). Grazing revenue from CST and endowments also held by CRT are available to fund easement compliance management and monitoring on the CST and Tier 2 mitigation lands.

Compensation Strategy for Conservancy Fairy Shrimp

Requirement

As noted in the 2002 Biological Opinion, the only population of Conservancy fairy shrimp known within the area of the University's Proposed Project occurs within the Campus Natural Reserve. Several other populations occur on other eastern Merced County lands outside the boundaries of the proposed Campus, University Community, and Conservation Lands. As noted in the 2002 Biological Opinion, UC configured the CNR to encompass the entire watershed of the playa pool occupied by the Conservancy fairy shrimp. The University committed to protect the Campus Natural Reserve with a Service-approved standard conservation easement. Measures identified to minimize the effects of disturbance in the Campus Natural Reserve on adjacent lands included ongoing monitoring and management to minimize disruption of hydrology, degradation of water quality, establishment of invasive species, unauthorized human use, and competition or predation from nonnative species. No other habitat compensation was proposed or required for this species.

Status

UC implemented all protection measures for the Conservancy fairy shrimp identified in the 2002 Biological Opinion Conservation Measures. In addition to designating the entire watershed as the CNR, UC committed to measures to minimize effects of construction and operation of the Campus, including protection of hydrology and water quality, control of invasive and nonnative species, and unauthorized human use.

The Conservation Lands Management Plan incorporates protective management and monitoring of the Campus Natural Reserve. This plan includes substantial measures to manage and monitor livestock grazing, invasive species, and authorized and unauthorized human uses.

Reconfiguration of the UC Merced Campus footprint resulted in incorporation of the 340-acre former Campus Land Reserve into the Campus Natural Reserve, thereby committing this area to conservation management. The reconfiguration also eliminated portions of the Campus adjacent to the former Campus Land Reserve and incorporated these lands into the Campus Natural Reserve (Figures 1 and 3), thereby providing a substantial land buffer to increase security of the watershed of the occupied Conservancy fairy shrimp pool.

Compensation Strategy for Other Protected Vernal Pool Crustaceans

Requirement

This Conservation Measure specifies that acquisition of previously identified mitigation lands and proposed wetland restoration will protect and restore habitat for other vernal pool crustaceans. It notes that the nature and extent of compensation, including compensation ratios, will be at least equal to those identified in the 2002 BA.

Status

UC increased the amount of land that has been protected and managed for conservation purposes, compared to that described in the 2002 BA, by reconfiguring the UC Merced Campus and dedicating portions of the former campus and Campus Land Reserve to conservation. This reconfiguration and dedication has also reduced the impacts of the Proposed Action, thereby increasing the mitigation ratios achieved for vernal pool crustaceans (Tables 4a and 4b).

Compensation Strategy for San Joaquin Kit Fox

Requirement

As specified in Parameter 2b, UC agreed to prepare and implement a comprehensive strategy for conservation of the San Joaquin kit fox. The strategy included preserving a large area suitable for residence and a movement corridor east and north of the previously proposed Campus, through land acquisitions (in fee title or conservation easements), as well as other actions, if feasible, such as enhanced passage over existing Merced Irrigation District (MID) canals. The Parameters specify that these land acquisitions will be consistent with the establishment of a connection to the Sandy Mush Road movement corridor identified in the *Recovery Plan for Upland Species of the San Joaquin Valley* (Service 1998).

This Conservation Measure also recognized that all 806 acres of land then proposed for the Campus Buildout (i.e., the former campus exclusive of the Phase 1 campus) were suitable for kit fox occupation and movement and that UC has agreed to compensate for the loss of habitat at a ratio at or above the 3:1 typically required by the Service. The measure noted that all protected lands for which easements and fee title were acquired for mitigation were considered suitable kit fox habitat and noted that protection of the VST and CNR lands (as then proposed) would protect 5,780 acres, and thereby would exceed the required compensation ratio).

The Conservation Measure concluded that:

"*Potential effects of the Applicant's Proposed Project [i.e., 2002 Campus] on kit fox movement have been compensated through acquisition of lands to provide a corridor along the east and north sides of the proposed Campus and University Community [acquisition and management of*

the CNR, VST, and Cyril Smith Trust (CST) lands] and by the WCB preservation of other lands within the general movement corridor in eastern Merced County."

It also noted that an additional crossing had been proposed for MID canals as a part of Phase 1, and if approved, this crossing would improve potential for kit fox passage in this area. Finally, this measure concluded that the described actions were consistent with and supportive of the establishment of a connection with the Sandy Mush Road area.

Status

As noted in the 2002 BO, the requirements for compensation acreage and provision of a movement corridor were substantially met under the previous Campus configuration and mitigation lands. Since we issued the 2002 BO, UC conducted extensive analysis of habitat suitability for kit fox occupancy and movements during preparation of the Conservation Strategy. The analysis documented that approximately 331,000 acres of suitable kit fox habitat were present in the eastern Merced County study area, including over 180,000 acres suitable for kit fox occupancy (primary habitat) and over 150,000 acres suitable for kit fox dispersal and temporary non-breeding uses (secondary habitat) (see Table 2-2 in ICF Jones & Stokes 2008). UC's 2002 Proposed Project would have eliminated 3,521 acres of habitat, including 1,662 acres of primary habitat, or approximately 1% of the available primary and secondary habitat in eastern Merced County.

Following issuance of the 2002 BO, reconfiguring the UC Merced Campus eliminated additional lands on the north and east side of the former campus, which further increased the width of suitable habitat for kit fox occupancy and movement around the north and east sides of the reconfigured Campus. The UC Merced Campus and Community North combined would eliminate 1,969 acres of suitable kit fox habitat, including 1,293 acres of primary habitat, and the Proposed Action (Campus and University Community) in its entirety would eliminate approximately 3,316 habitat acres, including 1,354 acres of primary habitat (Table 4a).

UC's actions in refining its Proposed Project since the 2002 Biological Opinion has increased the availability of protected and enhanced lands to support kit fox movement in eastern Merced County. The compensation ratio achieved for the Campus and Community North exceed the 3:1 ratio specified in the Conservation Measures when considered for Tier 1a Conservation Lands (i.e., 4.7:1 for primary (potential breeding) habitat. The ratio is obviously even greater (18.6:1) when the Tier 1b and Tier 2 lands are included as mitigation lands (Table 4a).

The 2002 BO required that UC construct an additional canal crossing for kit fox passage. Such a crossing was planned in order to provide equipment access to the Myers Easterly property. This property was initially proposed as the wetlands mitigation site to offset effects from the County's past action of constructing the County golf course, a portion of which is now the site of Phase 1 of the UC Merced campus (see Jones & Stokes 2002, Figure 4-1). UC did not construct this crossing, however, because it concluded that the Myers Easterly property is not desirable for wetland creation and therefore a bridge was not needed for construction access. Also, the

reconfiguration of the Campus and the University Community extended the community into the area where the 2002 BO identified the crossing, thereby making the site unsuitable for a kit fox passage. UC will be required to provide an additional crossing of the LeGrand Canal, subject to MID approval. In the 2008 BA Supplement, UC submitted a list of candidate sites for a new canal crossing to the Service that could complement existing crossings (Figure 5).

Incorporation of Adaptive Management and Monitoring into the Management Plan

Management Strategies for University-Owned Lands

Requirements and Status

This measure specifies inclusion of detailed management and monitoring measures in a management plan for the VST and CNR lands. The specific Conservation Measures identified in the 2002 BO are addressed in the Conservation Lands Management Plan. Table 5 summarizes each measure and the status of its compliance.

Management Strategies for Wildlife Conservation Board Preserve Lands

Requirements

This measure describes actions to be employed on lands protected through WCB acquisition of conservation easements. It specifies that management will be conducted under the terms of conservation easements in place for each property. It specifies that conservation values would be preserved and maintained through grazing uses that are consistent with the conservation easement(s). This grazing would support and enhance conservation values. It specifies that "any future easement terms will be examined to ensure that they are adequate for lands that are determined to be critical to meeting the Parameters and other compensation and mitigation needs of the Proposed Actions, including monitoring of and access to preserve lands." Management objectives include maintaining cattle ranching, and maintaining healthy populations of special-status species.

Status

The WCB lands for which easements were acquired at the time of the 2002 BO remain the only conservation lands that are under conservation easement. These provisions were established between the WCB, TNC, and CRT. The easements in place at that time have not changed. If WCB acquires conservation easements on additional lands, the terms of this measure may be incorporated into easements. The requirements of the Parameters, however, have already been met through existing land and easement acquisitions.

Adopted Conservation Measures for Phase 1 Campus Project

This section describes the Phase 1 measures listed below.

Design Measures

Requirement

This measure specifies the following design measures:

- designing and constructing facilities to control stormwater and irrigation runoff to minimize effects on natural hydrology and vernal pool ecosystems,
- constructing perimeter fencing to discourage human and pet disturbance or adjacent habitat areas, and
- incorporating lighting design measures to minimize "escape" of light into surrounding habitats.

Status

The University incorporated all of these measures into the design of the Phase 1 Campus and implemented them during construction.

Construction Measures

Requirement

This measure identified development of a Service-approved comprehensive Phase 1 Construction Mitigation Plan to minimize potential for effects to listed species before ground disturbance began. The measure also required:

- designating an environmental monitor and specified requirements for reporting monitoring results;
- incorporating species protection requirements into construction contracts;
- conducting environmental sensitivity training, incorporation of construction best management practices (BMPs);
- fencing project boundaries and sensitive resources;
- implementing standard measures to protect any potential kit foxes from direct disturbance during construction;
- implementing measures to minimize potential for direct harm to the California tiger salamander, (including surveys of pool sites and fencing of occupied pool sites);
- preventing establishment of invasive plant species (including use of weed-free materials for erosion control and washing of construction equipment);

- conducting post-construction monitoring and remediation, if warranted, and conducting monitoring of vernal pools; and
- conducting monthly surveys of the perimeter of the Phase 1 campus to pick up trash and verify that runoff is not being discharged into adjacent lands.

Status

The University implemented all of the identified construction measures and monitoring for the Phase 1 Campus. Monitoring reports were submitted to the Service, and the monitoring confirmed that the measures were effective at avoiding impacts on species on site and to adjacent habitats.

Operations and Maintenance Measures

Requirement

The Conservation Measure specifies that the portions of the golf course outside of the Phase 1 boundary will not be irrigated, no pesticides will be used without authorization from the Service, and a firebreak will be constructed on the perimeter of the Phase 1 Campus.

Status

The University complied with these measures during Phase 1 and continues to comply with these requirements. The Conservation Lands Management Plan (Chapter 5) addresses management requirements for the interface between the Campus Buildout lands and the Phase 1 campus, including restrictions on herbicide use and construction and maintenance of fuelbreaks.

Measures to Minimize Effects of the Phase 1 Campus on Adjacent Habitats

Requirement

These measures include actions to protect habitat values during the operation of the Phase 1 campus to protect listed species and habitat values. These measures include public education, establishment and enforcement of leash laws, restriction on use of pesticides and invasive plants in landscaping, control of invasive weeds in undeveloped areas, and monitoring.

Status

The University has implemented the specified measures as an ongoing part of operations of the Phase 1 campus.

Compensation Measures for Phase 1

The 2002 BO identified certain compensation measures for effects to kit fox from the development of Phase 1 lands. These measures are described in more detail in the subsequent section.

Conservation Measures for San Joaquin Kit Fox

Requirement

This measure specified that the Phase 1 Campus development would result in a loss of 12 acres of disturbed annual grassland habitat and could affect the potential for kit fox movements in the area. UC proposed to set aside, as a kit fox conservation area, the 96-acre area Myers Easterly property east of the Phase 1 campus. The Myers Easterly property was initially intended to be a mitigation site for vernal pools lost during golf course construction prior to the UC's ownership. This area would be protected with a conservation easement and would be maintained and enhanced to support the kit fox. This measure also specifies the construction of a new canal crossing to the mitigation site to enhance kit fox passage. Finally, this measure notes that the then-estimated 94 acres of the golf course remaining outside of Phase 1 will be allowed to revert to an annual grassland habitat until developed for campus use, if necessary.

Status

The Myers Easterly property is no longer proposed as a mitigation site for vernal pool creation. This site will be maintained as mitigation land that preserves on-site vernal pools and grassland habitat.

The reconfiguration of the University Community extends the developed portion of the community to the east, into the area directly south of the Myers Easterly property. Therefore, construction of a crossing at this location would not serve to enhance kit fox movement. UC remains committed to constructing one canal crossing to enhance kit fox passage. UC conducted a siting analysis of potential alternate locations for the canal crossing (Figure 5) and submitted these locations to the Service for review. The crossing is expected to be built within 2 years of final project approval. As specified in the conservation measure, the University has allowed the former golf course lands to revert to non-irrigated grassland.

Adopted Environmental Commitments for the Infrastructure Project

As described previously under *Revised Description of the Proposed Project*, components of the County's Infrastructure Project have been incorporated into the University's Proposed Project. The discussion below pertains to those requirements specified in the 2002 BO that relate to the Infrastructure Project.

Requirement

Habitat Mitigation Plan

The County's HMP describes measures to compensate for impacts on biological resources from the Infrastructure Project. The HMP also outlines a process for determining mitigation standards. The measures are described for each of the following project elements.

Avoidance and Minimization Element

The element specified inclusion of the following measures into the final infrastructure plan: surface water management facilities (i.e., storm drainage and treatment facilities, roadway culverts, road runoff collection systems, in-channel settling basins) to maintain watershed integrity and perimeter landscaping and fencing.

Construction Measures

This element specifies that the County's Department of Public Works will prepare a construction mitigation plan approved by the Service that includes construction BMPs, incorporation of conservation measures into construction contracts, training for construction personnel, construction fencing, salvage of plants and invertebrates, construction measures to avoid take of kit fox take, invasive species control, and compliance monitoring.

Compensation Element

This element specifies that impacts on wetland habitats and species will be mitigated fully by achieving no net loss of wetlands functions and values. Mitigation will achieve ratios of 3 acres preserved, enhanced, restored, and/or created for each acre of wetland affected. Also, associated upland habitat in mitigation ratios must be preserved at a ratio of 9:1 for every acre of wetland preserved.

Monitoring and Adaptive Management

This component specifies that the Service will require adaptive management for preserve lands. The Service will also require that adequate funding assurances be provided to design and implement the mitigation plan.

Status

The commitments in this Conservation Measure for the Infrastructure Project are similar to those identified in the 2002 BO. In general, the requirements listed here have been met by applying the measures already identified for the Campus to both the Campus and Community North project components. The following responses address specific commitment elements.

Avoidance and Minimization Element

The requirements for water quality protection through design and operation and the requirement for perimeter landscaping and fencing are consistent with the requirements previously applied to the Campus (see *Campus Design Measures*, above) and implemented previously for the Phase 1 Campus project (see *Adopted Conservation Measures for Phase 1 Campus Project,* above). UC intends to meet these requirements for infrastructure components of the Campus and Community North by implementing measures that have been identified for the Campus and successfully implemented for the Phase 1 campus.

Construction Measures

UC has committed to construction measures identical to those included for the Infrastructure Project (see discussion under *Construction Measures* above) for the Campus and previously implemented these measures for the Phase 1 project. UC will apply the Campus measures to components of the Infrastructure Project now incorporated into the Campus and Community North.

Compensation Element

The mitigation requirements for wetlands and associated species in this measure are consistent with those that have been required for the Campus and Community (see *Compensatory Wetland Mitigation Plan* above). These measures will be applied to the infrastructure components of the Campus and Community Plan.

Monitoring and Adaptive Management

The monitoring and adaptive management measures included for the Infrastructure Project resemble those required for the UC Merced Campus. UC will incorporate mitigation for infrastructure into the mitigation program for the Campus and Community North. UC also has incorporated monitoring and adaptive management components into both the Conservation Lands Management Plan and Compensatory Wetland Mitigation Plan.

Adopted Environmental Commitments for the University Community

Requirement

This single Conservation Measure for the University Community is based on the objectives and policies of the County's current UCP. The measure specifies that the County will either expand the Infrastructure Project HMP to address the impacts of the University Community or it will develop project-specific HMPs. The measure specifies that mitigation standards should be developed based on habitat functions and values. Protected habitat would be monitored and managed to protect wetland habitat quality. Wetland impacts would be avoided through project siting and design. Additional Conservation Measures would include preservation of vernal pool

grassland habitat to support vernal pool species and fleshy (succulent) owl's-clover, and preservation of grassland habitat as foraging habitat for the mountain plover and Swainson's hawk, and to mitigate for potential effects of habitat loss on the kit fox.

Status

The University evaluated the effects of the Community North on listed species and their habitats and proposed mitigation for those effects in the 2008 BA Supplement, as well as the Conservation Strategy, Conservation Lands Management Plan, Compensatory Wetland Mitigation Plan, and the EIS/EIR. Therefore, the University will apply measures previously approved by the Service for the UC Merced Campus and University Community to avoid, minimize, and compensate for effects to listed species and habitats through project siting, design, construction, operation, and compensation to address effects related to the development of Community North. The ratios of mitigation land achieved for the Campus and Community North exceed the ratios previously identified for the original footprint configuration of the former campus and community. The measures the University will now apply are substantially more detailed than those included in the previous Infrastructure Project HMP. The net result is that the requirements of this Conservation Measure largely will be met through the UC's program. UC proposes to modify, rather than meet, one proposed conservation action in the UCP Conservation Measure, as outlined below.

Proposed Modification to UCP Corridor Establishment Policy

In the 2008 BA Supplement, the University proposed to eliminate one of the UCP policies referenced in the 2002 Biological Opinion to the Community North. UCP Policy PA 2.2 specified that the County would "*incorporate open space corridors into the Community Plan that allow the movement of wildlife through the Community Plan Area, to the extent feasible*". This policy described these corridors as at least 30 acres of existing, restored, or created wetlands.

Open space corridors have been incorporated into the design concept for the Community North, but they are intended primarily for stormwater management and recreation use. Although incidental wildlife use may occur, the University does not intend to design wildlife movement corridors into the University Community because such corridors would be an inefficient use of space (resulting in a larger footprint for the University Community) and would not be effective (i.e., the destination for any animals moving within such a corridor is unclear and such a corridor would expose wildlife to a variety of human sources of disturbance). Also, the Conservation Strategy incorporates an effective regional movement corridor to the east of the UC Merced Campus and University Community through campus reconfiguration, protection of preserve lands, and construction of an additional canal crossing. The University discussed the proposed policy modification with the Service during consultation on March 4, 2008.

The University's request for policy modification on the Community North portion of the former UCP does not affect policy consideration for the County in addressing the Community South.

RELATIONSHIP OF THE 2009 BO AMENDMENT TO THE 2002 BO

The 2002 BO, along with other regulatory requirements, guided development at UC Merced through 2008. The University's efforts to reconfigure the UC Merced Campus and University Community to minimize impacts to listed species and supporting wetland habitat was conducted with extensive agency input and consistent with the Parameters and Conservation Measures specified in the 2002 BO. The program-level assumptions, analyses, and requirements of the 2002 BO remain in effect for the current Proposed Action. This 2009 BO Amendment documents the specific means by which the University has complied with the 2002 BO's requirements.

Project Description

As described above, the University substantially modified the configuration of the Campus; increased the amount of lands allocated to preservation and mitigation; and made additional management commitments in the Conservation Strategy, Conservation Lands Management Plan, and Compensatory Wetland Mitigation Plan in response to the requirements of the 2002 BO.

2002 Parameters

The 2002 BO identified a set of required Parameters that "the University and the County agreed would apply to a Preferred Alternative that may be selected by the Corps within the Study Area" (Service 2002). The text of the Parameters, as it appears in the 2002 BO, is presented in Enclosure A.

Changes in Consultation Requirements

Changes in the listing status of several species and the designation of critical habitats for species resulted in modifications to the scope of the consultation effort and corresponding treatment of such species in this 2009 BO Amendment.

Decision to Not List Midvalley Fairy Shrimp

The 2002 BA and 2008 BA Supplement and the 2002 BO addressed the potential impacts of the 2002 Proposed Project on the midvalley fairy shrimp because the Service was evaluating a petition to list the species. On January 26, 2004, the Service reported its determination that the species did not warrant listing under the Act based on its finding that the species:

"*is well represented by occurrences on protected lands and with occurrences in areas with little or no current threat. Additionally, although several development projects and land use changes are affecting known occurrences, their effects are being mitigated and we are not aware of any occurrences likely to be extirpated in the near future due to habitat loss. While the existing regulatory mechanisms under CEQA, the CWA, and the ESA do not ensure protection of midvalley fairy shrimp, they are likely to moderate the rate and extent of habitat loss for*

midvalley fairy shrimp through their direct application and as an indirect benefit of conservation efforts undertaken for the other listed vernal pool crustaceans." (**FR 69** 3592–3598).

Therefore, the 2009 BO Amendment does not evaluate the effects of the Proposed Project on midvalley fairy shrimp.

Decision to Not List Mountain Plover

The 2002 BA and BA Supplement and the 2002 BO addressed the potential impacts of the 2002 Proposed Project on mountain plover. These analyses concluded that although the species apparently makes use of the site infrequently during migration, the loss of a small proportion of the available suitable habitat along with protection and management of mitigation habitats would not be detrimental to the species.

The Service withdrew its proposal to list the mountain plover in 2003, based on additional information provided regarding the species population status, habitat uses, and existing conservation actions. The Service determined that the threats to the species were not as significant as previously believed and that the available data do not indicate that the threats to the species and its habitat are not likely to endanger the species in the foreseeable future (**FR 68** 53083–53101). Therefore, effects of the Proposed Project on the mountain plover were not evaluated in the 2008 BA Supplement or in this 2009 BO Amendment.

Delisting of Bald Eagle

The 2002 BO addressed effects to the bald eagle. The Service delisted the species (i.e., declared it recovered and formally removed it from the Federal endangered species list) in June 2007 (**FR 72** 37346–37372). Therefore, it is no longer subject to provisions of the Act. However, because it is still protected under the Bald and Golden Eagle Protection Act (**FR 72** 31132–31140), which is enforced by the Service, UC requested that it be addressed in this consultation.

Recommendation for Delisting of Valley Elderberry Longhorn Beetle

In 2006, the Service published the required 5-year status review of the valley elderberry longhorn beetle (VELB). The Service determined that the species met recovery goals and recommended delisting of the species. Although the Service has not acted on the recommendation as of April 2009, it is possible that delisting will be proposed or will occur before consultation is completed. Until then, the species will continue to be treated as listed and is, therefore, addressed in this consultation.

California Tiger Salamander Listing and Critical Habitat Designation

The Service listed the California tiger salamander as a federally-threatened species in 2004 (**FR 69** 47211–47248) after it issued the BO. In 2005, it designated critical habitat for the species

(**FR 70** 49379–49458). Critical habitat unit 9 is located in eastern Merced County and includes 177 acres of Campus and the Community North and nearly all of the UC Conservation Lands (VST Preserve and CNR) (see *Effects of the Proposed Action*).

The species was addressed in the 2002 Supplemental BA, and the Service provided technical assistance in the Biological Opinion to address the species. The listing of the salamander requires its formal treatment in consultation and, therefore, inclusion in this 2009 BO Amendment. This is included in the following section.

Vernal Pool Species Critical Habitat Designation

In 2003, the Service published its final rule designating critical habitat (as formally defined under the Act) for vernal pool species in California and southern Oregon. Species covered included the following species that occur in the Study Area: Conservancy fairy shrimp, vernal pool fairy shrimp, vernal pool tadpole shrimp, Hoover's spurge, succulent (fleshy) owl's-clover, Colusa grass, San Joaquin Orcutt grass, hairy Orcutt Grass, and Greene's tuctoria (**FR 68** 46684–46867). Approximately 900,000 acres of vernal pool habitat, including lands in Merced County, were not designated as critical for economic reasons.

The decision to exclude areas of vernal pool habitat was challenged in court, and on November 2, 2006, the court overturned the Service's decision. On May 31, 2007, the Service clarified its designation of critical habitat (**FR 72** 30279–30297), which resulted in the addition of 147,638 acres of critical habitat in Merced County. The designated area of critical habitat is located east of Lake Yosemite and north of La Paloma Road and does not include land within the designated Campus and University Community. Lands within the Tier 1 mitigation areas were omitted from the designation whereas most Tier 2 mitigations were designated as critical habitat. Therefore, because critical habitat remains in effect, this Biological Opinion addresses critical habitat for vernal pool species.

Vernal Pool Ecosystems Recovery Plan

In 2005, the Service published the *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* (*Vernal Pool Recovery Plan*)(Service 2005). The plan applies to all of the listed plants and freshwater shrimp addressed in the 2002 BA and 2002 BO. Recovery actions identified in the plan apply to federal agencies, which may meet recovery obligations by ensuring that actions they take, including issuance of permits, are consistent with or contribute to recovery actions in the plan. Therefore, this 2009 BO Amendment addresses the consistency of University's Proposed Project with the *Vernal Pool Recovery Plan.*

STATUS OF THE SPECIES

The life history and status of species addressed in this Biological Opinion, except the California tiger salamander, were provided in detail in the 2002 BO and the Conservation Strategy.

Therefore, this section provides only summary information on all other species occurrence and abundance and updated information regarding the species' statuses within the project area. The relative abundances of species in project lands, including the Campus, University Community, and Conservation Lands, is summarized in Tables 4a and 4b, based on the extent of occupied habitat and known point locations of species detected during sampling. The mountain plover was not listed and is not discussed further. The California tiger salamander was listed and critical habitat is in place. A complete life history and baseline status is provided later in this section.

During the period of 2002 to the present, there has been a change in the baseline for all of the species addressed in this BO. The Service is aware of illegal conversion of thousands of acres of grasslands and vernal pool habitats in eastern Merced County to agricultural purposes. The Service is actively pursuing litigation with several of the landowners. Because the conversion occurred without prior review, we have no way of knowing exactly what species were present as well as their status and distribution. Most of the conversions involved deep ripping of the soil which destroys the impervious clay layer that is critical to vernal pools. This lost vernal pool habitat cannot be restored. However, restoration of grasslands would still be possible. These actions have reduced the baseline for all of the species covered by this BO. Because of this reduction, the loss of the habitats that will occur from the build out of the University campus and community is of greater importance than previously described. However, because the University has compensated for these lost habitats in a greater proportion than is required to offset the impacts, the project still remains as not jeopardizing any of the covered species. Additionally, because of this overage, the compensation lands contain a greater percentage of the remaining habitat.

California Tiger Salamander

The Service issued its Final Rule listing the Santa Barbara County Distinct Population Segment of the species (65 **FR** 57241) and Final Rule for the Sonoma County Distinct Population Segment of the species (68 **FR** 13498). The Central Population of California tiger salamander was listed as threatened on August 4, 2004 (69 **FR** 47212). On August 23, 2005, 199,109 acres of critical habitat were designated in 19 counties for the central population. Detailed information about the tiger salamander can be obtained in these documents.

Life History and Habitat

The tiger salamander is a large, stocky, terrestrial salamander with a broad, rounded snout. Recorded adult measurements have been as much as 8.2 inches long (Petranka 1998; Stebbins 2003). Tiger salamanders exhibit sexual dimorphism (differences in body appearance based on gender) with males tending to be larger than females. Tiger salamander coloration generally consists of random white or yellowish markings against a black body. The markings on adults tiger salamanders tend to be more concentrated on the lateral sides of the body, whereas other tiger salamander species tend to have brighter yellow spotting that is heaviest on the dorsal surface.

The tiger salamander has an obligate biphasic life cycle (Shaffer *et al.* 2004). Although the larvae develop in the vernal pools and ponds in which they were born, tiger salamanders are otherwise terrestrial and spend most of their post-metamorphic lives in widely dispersed underground retreats (Shaffer *et al.* 2004; Trenham *et al.* 2001). Because they spend most of their lives underground, tiger salamanders are rarely encountered even in areas where salamanders are abundant. Subadult and adult tiger salamanders typically spend the dry summer and fall months in the burrows of small mammals, such as California ground squirrels and Botta's pocket gopher (*Thomomys bottae*) (Storer 1925; Loredo and Van Vuren 1996; Petranka 1998; Trenham 1998a). Although ground squirrels have been known to eat tiger salamanders, the relationship with their burrowing hosts is primarily commensal (an association that benefits one member while the other is not affected) (Loredo *et al.* 1996; Semonsen 1998).

Tiger salamanders may also use landscape features such as leaf litter or desiccation cracks in the soil for upland refugia. Burrows often harbor camel crickets and other invertebrates that provide likely prey for tiger salamanders. Underground refugia also provide protection from the sun and wind associated with the dry California climate that can cause excessive drying of amphibian skin. Although tiger salamanders are members of a family of "burrowing" salamanders, they are not known to create their own burrows. This may be due to the hardness of soils in the California ecosystems in which they are found. Tiger salamanders depend on persistent small mammal activity to create, maintain, and sustain sufficient underground refugia for the species. Burrows are short lived without continued small mammal activity and typically collapse within approximately 18 months (Loredo *et al.* 1996).

Upland burrows inhabited by tiger salamanders have often been referred to as aestivation sites. However, "aestivation" implies a state of inactivity, while most evidence suggests that tiger salamanders remain active in their underground dwellings. A recent study has found that tiger salamanders move, feed, and remain active in their burrows (Van Hattem 2004). Because tiger salamanders arrive at breeding ponds in good condition and are heavier when entering the pond than when leaving, researchers have long inferred that tiger salamanders are feeding while underground. Recent direct observations have confirmed this (Trenham 2001; Van Hattem 2004). Thus, "upland habitat" is a more accurate description of the terrestrial areas used by tiger salamanders.

Tiger salamanders typically emerge from their underground refugia at night during the fall or winter rainy season (November-May) to migrate to their breeding ponds (Stebbins 2003; Shaffer *et al.* 1993; Trenham *et al.* 2000). The breeding period is closely associated with the rainfall patterns in any given year with less adults migrating and breeding in drought years (Loredo and Van Vuren 1996; Trenham *et al.* 2000). Male salamander are typically first to arrive and generally remain in the ponds longer than females. Results from a 7-year study in Monterey County suggested that males remained in the breeding ponds for an average of 44.7 days while females remained for an average of only 11.8 days (Trenham *et al.* 2000). Historically, breeding ponds were likely limited to vernal pools, but now include livestock stockponds. Ideal breeding ponds are typically fishless, and seasonal or semi-permanent (Barry and Shaffer 1994; Petranka 1998).

While in the ponds, adult salamanders mate and then the females lay their eggs in the water (Twitty 1941; Shaffer *et al.* 1993; Petranka 1998). Egg laying typically reaches a peak in January (Loredo and Van Vuren 1996; Trenham *et al.* 2000). Females attach their eggs singly, or in rare circumstances, in groups of two to four, to twigs, grass stems, vegetation, or debris (Storer 1925; Twitty 1941). Eggs are often attached to objects, such as rocks and boards in ponds with no or limited vegetation (Jennings and Hayes 1994). Clutch sizes from a Monterey County study had an averaged of 814 eggs (Trenham *et al.* 2000). Seasonal pools may not exhibit sufficient depth, persistence, or other necessary parameters for adult breeding during times of drought (Barry and Shaffer 1994). After breeding and egg laying is complete, adults leave the pool and return to their upland refugia (Loredo *et al.* 1996; Trenham 1998a). Adult salamanders often continue to emerge nightly for approximately the next two weeks to feed amongst their upland habitat (Shaffer *et al.* 1993).

Tiger salamander larvae typically hatch within 10 to 24 days after eggs are laid (Storer 1925). The peak emergence of these metamorphs is typically between mid-June and mid-July (Loredo and Van Vuren 1996; Trenham *et al.* 2000). The larvae are totally aquatic and range in length from approximately 0.45 to 0.56 inches (Petranka 1998). They have yellowish gray bodies, broad fat heads, large, feathery external gills, and broad dorsal fins that extend well up their back. The larvae feed on zooplankton, small crustaceans, and aquatic insects for about six weeks after hatching, after which they switch to larger prey (J. Anderson 1968). Larger larvae have been known to consume the tadpoles of Pacific treefrogs (*Pseudacris regilla*), Western spadefoot toads (*Spea hammondii*), and California red-legged frogs (J. Anderson 1968; P. Anderson 1968). Tiger salamander larvae are among the top aquatic predators in seasonal pool ecosystems. When not feeding, they often rest on the bottom in shallow water but are also found throughout the water column in deeper water. Young salamanders are wary and typically escape into vegetation at the bottom of the pool when approached by potential predators (Storer 1925).

The tiger salamander larval stage is typically completed in 3 to 6 months with most metamorphs entering upland habitat during the summer (Petranka 1998). In order to be successful, the aquatic phase of this species' life history must correspond with the persistence of its seasonal aquatic habitat. Most seasonal ponds and pools dry up completely during the summer. Amphibian larvae must grow to a critical minimum body size before they can metamorphose (change into a different physical form) to the terrestrial stage (Wilbur and Collins 1973).

Larval development and metamorphosis can vary and is often site-dependent. Larvae collected near Stockton in the Central Valley during April varied between 1.88 to 2.32 inches in length (Storer 1925). Feaver (1971) found that larvae metamorphosed and left breeding pools 60 to 94 days after eggs had been laid, with larvae developing faster in smaller, more rapidly drying pools. Longer ponding duration typically results in larger larvae and metamorphosed juveniles that are more likely to survive and reproduce (Pechmann *et al.* 1989; Semlitsch *et al.* 1988; Morey 1998; Trenham 1998b). Larvae will perish if a breeding pond dries before metamorphosis is complete (P. Anderson 1968; Feaver 1971). Pechmann *et al.* (1989) found a strong positive correlation between ponding duration and total number of metamorphosing juveniles in five salamander

species. In Madera County, Feaver (1971) found that only 11 of 30 sampled pools supported larval California tiger salamanders, and 5 of these dried before metamorphosis could occur. Therefore, out of the original 30 pools, only 6 (20 percent) provided suitable conditions for successful reproduction that year. Size at metamorphosis is positively correlated with stored body fat and survival of juvenile amphibians, and negatively correlated with age at first reproduction (Semlitsch *et al.* 1988; Scott 1994; Morey 1998).

Following metamorphosis, juveniles leave their pools and enter upland habitat. This emigration can occur in both wet and dry conditions (Loredo and Van Vuren 1996; Loredo *et al.* 1996). Wet conditions are more favorable for upland travel but rare summer rain events seldom occur as metamorphosis is completed and ponds begin to dry. As a result, juveniles may be forced to leave their ponds on rainless nights. Under dry conditions, juveniles may be limited to seeking upland refugia in close proximity to their aquatic larval pool. These individuals often wait until the next winter's rains to move further into more suitable upland refugia. Juveniles remain active in their upland habitat, emerging from underground refugia during rainfall events to disperse or forage (Trenham and Shaffer 2005). Depending on location and other development factors, metamorphs will not return as adults to aquatic breeding habitat for 2 to 5 years (Loredo and Van Vuren 1996; Trenham *et al.* 2000).

Lifetime reproductive success for tiger salamander species is low. Results from one study suggest that the average female tiger salamander bred 1.4 times and produced 8.5 young per reproductive effort that survived to metamorphosis (Trenham *et al.* 2000). This resulted in the output of roughly 11 metamorphic offspring over a breeding female's lifetime. The primary reason for low reproductive success may be that this relatively short-lived species requires two or more years to become sexually mature (Shaffer *et al.* 1993). Some individuals may not breed until they are four to six years old. While tiger salamanders may survive for more than ten years, many breed only once, and in one study, less than 5 percent of marked juveniles survived to become breeding adults (Trenham 1998b). With such low recruitment, isolated populations are susceptible to unusual, randomly occurring natural events as well human-caused factors that reduce breeding success and individual survival. Factors that repeatedly lower breeding success in isolated pools can quickly extirpate a population.

Dispersal and migration movements made by tiger salamanders can be grouped into two main categories: (1) breeding migration; and (2) interpond dispersal. Breeding migration is the movement of salamanders to and from a pond from the surrounding upland habitat. After metamorphosis, juveniles move away from breeding ponds into the surrounding uplands, where they live continuously for several years. At a study in Monterey County, it was found that upon reaching sexual maturity, most individuals returned to their natal/ birth pond to breed, while 20 percent dispersed to other ponds (Trenham *et al.* 2001). After breeding, adult tiger salamanders return to upland habitats, where they may live for one or more years before attempting to breed again (Trenham *et al.* 2000).

Tiger salamanders are known to travel large distances between breeding ponds and their upland refugia. Generally it is difficult to establish the maximum distances traveled by any species, but

tiger salamanders in Santa Barbara County have been recorded dispersing up to 1.3 miles from their breeding ponds (Sweet 1998). Tiger salamanders are also known to travel between breeding ponds. One study found that 20 to 25 percent of the individuals captured at one pond were recaptured later at other ponds approximately 1,900 and 2,200 feet away (Trenham *et al.* 2001). In addition to traveling long distances during juvenile dispersal and adult migration, tiger salamanders may reside in burrows far from their associated breeding ponds.

Although previously cited information indicates that tiger salamanders can travel long distances, they typically remain close to their associated breeding ponds. A trapping study conducted in Solano County during the winter of 2002/2003 suggested that juveniles dispersed and used upland habitats further from breeding ponds than adults (Trenham and Shaffer 2005). More juvenile salamanders were captured at traps placed at 328, 656, and 1,312 feet from a breeding pond than at 164 feet. Approximately 20 percent of the captured juveniles were found at least 1,312 feet from the nearest breeding pond. The associated distribution curve suggested that 95 percent of juvenile salamanders were within 2,099 feet of the pond, with the remaining 5 percent being found at even greater distances. Preliminary results from the 2003-04 trapping efforts at the same study site detected juvenile tiger salamanders at even further distances, with a large proportion of the captures at 2,297 feet from the breeding pond (Trenham *et al.*, unpublished data). Surprisingly, most juveniles captured, even those at 2,100 feet, were still moving away from ponds (Ben Fitzpatrick, University of California at Davis, personal communication, 2004). In Santa Barbara County, juvenile California tiger salamanders have been trapped approximately 1,200 feet away while dispersing from their natal pond (Science Applications International Corporation, unpublished data). These data show that many tiger salamanders travel far while still in the juvenile stage. Post-breeding movements away from breeding ponds by adults appear to be much smaller. During post-breeding emigration from aquatic habitat, radio-equipped adult tiger salamanders were tracked to burrows between 62 to 813 feet from their breeding ponds (Trenham 2001). These reduced movements may be due to adult tiger salamanders exiting the ponds with depleted physical reserves, or drier weather conditions typically associated with the post-breeding upland migration period.

Tiger salamanders are also known to use several successive burrows at increasing distances from an associated breeding pond. Although previously sited studies provide information regarding linear movement from breeding ponds, upland habitat features appear to have some influence on movement. Trenham (2001) found that radio-tracked adults were more abundant in grasslands with scattered large oaks (*Quercus* spp.), than in more densely wooded areas. Based on radio-tracked adults, there is no indication that certain habitat types are favored as terrestrial movement corridors (Trenham 2001). In addition, captures of arriving adults and dispersing new metamorphs were evenly distributed around two ponds completely encircled by drift fences and pitfall traps. Thus, it appears that dispersal into the terrestrial habitat occurs randomly with respect to direction and habitat types.

Documented or potential tiger salamanders predators include coyotes, raccoons, striped skunks, opossums, egrets (*Egretta* spp.), great blue herons (*Ardea herodias*), crows (*Corvus brachyrhynchos*), ravens (*Corvus corax*), garter snakes (*Thamnophis* spp.), bullfrogs (*Rana*

catesbeiana), red-legged frogs, mosquito fish (*Gambusia affinis*), and crayfish (*Procrambus* spp.). Domestic dogs (*Canis familiaris*) have been observed eating California tiger salamanders at Lake Lagunitas at Stanford University (Sean Barry, ENTRIX, personal communication to C. Nagano, July 2004).

Threats

The tiger salamander is imperiled throughout its range due to a variety of human activities (Service 2004). Current factors associated with declining tiger salamander populations include continued habitat loss and degradation due to agriculture and urbanization; hybridization with the non-native eastern tiger salamander (*Ambystoma tigrinum*) (Fitzpatrick and Shaffer 2004; Riley *et al.* 2003); and predation by introduced species. Tiger salamander populations are likely threatened by multiple factors but continued habitat fragmentation and colonization of non-native salamanders may represent the most significant current threats. Habitat isolation and fragmentation within many watersheds have precluded dispersal between sub-populations and jeopardized the viability of metapopulations (broadly defined as multiple subpopulations that occasionally exchange individuals through dispersal, and are capable of colonizing or "rescuing" extinct habitat patches). Other threats include predation and competition from introduced exotic species; possible commercial over-utilization; diseases; various chemical contaminants; road kill; and certain unrestrictive mosquito and rodent control operations. Currently, these various primary and secondary threats are largely not being offset by existing federal, state, or local regulatory mechanisms. The tiger salamander is also prone to chance environmental or demographic events, to which small populations are particularly vulnerable.

Historical and Current Distribution

The tiger salamander is endemic to California and historically inhabited the low-elevation grassland and oak savannah plant communities of the Central Valley, adjacent foothills, and inner coast ranges (Jennings and Hayes 1994; Storer 1925; Shaffer *et al.* 1993). The species has been recorded from near sea level to approximately 3,900 feet in the coast ranges and to approximately 1,600 feet in the Sierra Nevada foothills (Shaffer *et al.* 2004). Along the coast ranges, the species occurred from the Santa Rosa area of Sonoma County, south to the vicinity of Buellton in Santa Barbara County. The historic distribution in the Central Valley and surrounding foothills included northern Yolo County southward to northwestern Kern County and northern Tulare County. Three distinct California tiger salamander populations are recognized and correspond to Santa Maria area within Santa Barbara County, the Santa Rosa Plain in Sonoma County, and vernal pool/grassland habitats throughout the Central Valley.

The CNDDB lists 908 extant occurrences for this species within the state, 61 of which are located within the project region (California Natural Diversity Database 2008). Approximately, 178 acres of USFWS designated critical habitat for this species is located on the Campus and Community North portions of the project site. Within the Campus site, adult California tiger salamanders have been detected within grassland areas (UC Merced 2001). Within the Community North portion of the project site, adult California tiger salamanders have been

observed in vernal pools (Merced County 2001). Observations of adults in vernal pools are considered to represent documented breeding of the species on site. Currently, California tiger salamanders have not been detected on the Community South site, likely due to the predominance of agricultural land. A total of 1,648 acres of lands within the project site are considered to be occupied by the species. Additionally, Conservation Lands that have been incorporated in the Proposed Action account for 20,136 acres of occupied habitat for this species and 12,101 acres of critical habitat, which would be conserved at a 14:1 ratio as part of the project. The known occupied habitat reported to occur within the project site and the project region on Conservation Lands was determined based on numerous surveys listed in **Table 4.4-1** and on the methodology developed as part of the *Conservation Strategy*.

Recent studies near Lake Yosemite found hybrids of the eastern tiger salamander and the California tiger salamander in vernal pools (Fitzpatrick and Schaffer 2007). This finding may affect the management of occupied California tiger salamander habitats in the project region. This research suggests that permanent ponds have a higher representation of eastern tiger salamander genes, while intermittent ponds support more genetically pure California tiger salamander. Therefore, pond management may be available as a technique to reduce effects of hybridization

California Tiger Salamander Critical Habitat

The final rule designating critical habitat for the Central population of California tiger salamanders was issued on August 23, 2005 (Service 2005). The rule identifies approximately 199,109 acres (80,576 hectares) within 32 critical habitat units. When designating critical habitat, the Service is required to list the known primary constituent elements essential (PCE) to the conservation of the species, and that may require special management considerations and protection (50 CFR § 424.14). Such physical and biological features include, but are not limited to: (1) Space for individual and population growth and for normal behavior; (2) food, water, air, light, minerals, or other nutritional or physiological requirements; (3) cover or shelter; sites for breeding, reproduction, and rearing (or development) of offspring; (4) and habitats that are protected from disturbance or are representative of the historic geographical and ecological distributions of a species (Service 2005). The units are located across twenty counties and are divided into four geographic regions: (1) Central Valley Region; (2) Southern San Joaquin Region; (3) East Bay Region; and (4) Central Coast Region.

The PCEs for the tiger salamander are based on our current knowledge of the life history, biology, and ecology of the species and the relationship of its essential life history functions to its habitat, we have determined that the Central population of the tiger salamander requires the following primary constituent elements: (1) Standing bodies of fresh water (including natural and manmade (*e.g.*, stock)) ponds, vernal pools, and other ephemeral or permanent water bodies which typically support inundation during winter rains and hold water for a minimum of 12 weeks in a year of average rainfall; (2) Upland habitats adjacent and accessible to and from breeding ponds that contain small mammal burrows or other underground habitat that CTS depend upon for food, shelter, and protection from the elements and predation; and (3)

Accessible upland dispersal habitat between occupied locations that allow for movement between such sites.

Primary Constituent Element 1:

The requisite aquatic habitat described as the first PCE is essential for the Central population of the tiger salamander for providing space, food, and cover necessary to support reproduction and to sustain early life history stages of larval and juvenile tiger salamander. Aquatic and breeding habitats consist of fresh water bodies, including natural and artificially made (e.g., stock) ponds, vernal pools, and vernal pool complexes. To be considered essential, aquatic and breeding habitats must have the capability to hold water for a minimum of 12 weeks in the winter or spring in a year of average rainfall, the amount of time needed for salamander larvae to metamorphose into juveniles capable of surviving in upland habitats. During periods of drought or less-than-average rainfall, these sites may not hold water long enough for individuals to complete metamorphosis; however, these sites would still be considered essential because they constitute breeding habitat in years of average rainfall.

Primary Constituent Element 2:

Essential upland habitats containing underground refugia described as the second PCE are essential for the survival of the Central population's adult tiger salamanders and juveniles that have recently undergone metamorphosis. Adult and juvenile tiger salamanders are primarily terrestrial; adult tiger salamanders enter aquatic habitats only for relatively short periods of time to breed. For the majority of their life cycle, tiger salamanders survive within upland habitats containing underground refugia in the form of small mammal burrows. The Central population of the tiger salamander cannot persist without upland underground refugia. These underground refugia provide protection from the hot, dry weather typical of California in the nonbreeding season. The Central population of the tiger salamander also forages in the small mammal burrows and rely on the burrows for protection from predators. The presence of small burrowing mammal populations is essential for constructing and maintaining burrows. Without the continuing presence of small mammal burrows in upland habitats, the tiger salamander would not be able to survive.

Primary Constituent Element 3:

The dispersal habitats described as the third PCE are essential for the conservation of the Central population of the tiger salamander. Protecting the ability of tiger salamander to move freely across the landscape in search of suitable aquatic and upland habitats is essential in maintaining gene flow, recolonization, and population structure. Movement between areas containing suitable upland and aquatic habitats (i.e., dispersal) is restricted due to inhospitable conditions around and between areas of suitable habitats. Because many of the areas of suitable habitats may be small and support small numbers of salamanders, local extinction of these small units may be common.

Essential dispersal habitats generally consist of upland areas adjacent to essential aquatic habitats that are not isolated from essential aquatic habitats by barriers that tiger salamanders cannot cross. Essential dispersal habitats provide connectivity among suitable aquatic and upland habitats. While the tiger salamanders can bypass many obstacles, and do not require a particular type of habitat for dispersal, the habitats connecting essential aquatic and upland habitats need to be free of barriers (e.g., a physical or biological feature that prevents salamanders from dispersing beyond the feature) to function effectively. Examples of barriers are areas of steep topography devoid of soil or vegetation. Agricultural lands such as row crops, orchards, vineyards, and pastures do not constitute barriers to the dispersal of tiger salamanders.

The UC Merced project is within the Central Valley population of the California tiger salamander and within Unit 9. Critical Habitat Unit 9 is 17,799 acres in size and contains all three of the PCE's. Land ownership had mostly been private but with the purchase in fee title and/or conservation easements regarding development and many activities, most of the habitat can be considered to be University or State owned. The proposed UC Merced campus and community would lead to a loss of 229 acres of this critical habitat unit (about 1%). Conversely, the purchase of over 25,000 acres of Conservation Lands for the University project has protected 12,100 acres of habitat in Unit 9. Thus, nearly 68% of Unit 9 is protected from most of the causes leading to the listing of the species.

Vernal Pool Species Critical Habitat

Updated Status within Project Lands

Background information on the designation of critical habitat for vernal pool species is discussed in the 2009 BO Amendment section *Changes in Consultation Requirements*. The designated boundary for critical habitat for vernal pool species adopted by the Service avoided the Campus and University Community.

Succulent (Fleshy) Owl's-Clover

Updated Status within Project Lands

Systematic surveys for succulent owl's-clover were conducted in 2003 within the previously proposed Campus, the CNR, VST Preserve, and CST mitigation lands and on the adjacent Flying M Ranch (ICF Jones & Stokes 2008: Appendix D). This survey encompassed 28 square miles of land supporting more than 15 square miles of suitable habitat. Over 1,400 vernal pools and swales were searched within previously unsurveyed habitat (representing 1–10% of the number of these features present on surveyed lands). Succulent owl's-clover was found in a total of 41 pools, at a frequency of 3 to 6% of surveyed pools and swales.

Additional surveys of the Robinson Ranch Tier 2 easement lands were conducted in 2007 and 2008 (Vollmar Consulting 2008). Based on these surveys, the species was found in 34 pools (11% of all pools surveyed) within these lands.

The Conservation Strategy identified 1,337 acres of known occupied habitat in eastern Merced County (ICF Jones & Stokes 2008; Table 3-6). A total of 689 acres of occupied habitat (52% of the regional total) occur on Conservation Lands, with 45% of that within Tier 1a lands (Table 4a). A total of 739 recognized point locations of this species occur within Conservation Lands, including 244 (33%) within Tier 1a mitigation lands (VST Preserve, CNR, and Myers Easterly lands).

Colusa Grass

Updated Status within Project Lands

No surveys have been conducted for Colusa grass since the 2002 BAs and 2002 BO, except those conducted on the Robinson Ranch Tier 2 easement lands in 2007 and 2008 (Vollmar Consulting 2008). No additional records were made during surveys and no additional incidental sightings have been reported. The Conservation Strategy identified 282 acres of occupied habitat in eastern Merced County, with 156 occupied acres (55%) occurring on Conservation Lands (all on Tier 1a mitigation lands). Five separate point locations of this species are within Conservation Lands, all of which are Tier 1a lands (the VST and CNR).

San Joaquin Valley Orcutt Grass

Updated Status within Project Lands

No extensive recent surveys have been conducted within project lands or in the surrounding region for San Joaquin Valley Orcutt grass, except those conducted on the Robinson Ranch Tier 2 easement lands in 2007 and 2008 (Vollmar Consulting 2008). No new incidental sightings have been reported. The Conservation Strategy has identified eight point locations of this species in the eastern Merced Study area, encompassing 156 acres of known occupied habitat. One occurrence, encompassing 16 acres, is within the CNR.

The extension of the boundary of the Community North area to the east was further modified by the University specifically to avoid any direct or indirect impacts on wetlands supporting San Joaquin Valley Orcutt grass and vernal pool tadpole shrimp that occurs on the adjacent Ichord Ranch.

Vernal Pool Fairy Shrimp

Updated Status within Project Lands

This species is relatively common in eastern Merced County, with 2,384 acres of known occupied habitat. No recent surveys have been conducted for the vernal pool fairy shrimp since the 2002 BAs and BO, except those conducted on the Robinson Ranch Tier 2 easement lands in 2007 and 2008 where the species was found in 21% of pools randomly selected for survey (Vollmar Consulting 2008). No additional incidental sightings have been reported. Tier 1a lands support 490 acres of occupied habitat, and Tier 1b and Tier 2 lands support another 653 acres of occupied habitat (Table 4a).

Vernal Pool Tadpole Shrimp

Updated Status within Project Lands

No new surveys have been conducted for vernal pool tadpole shrimp, except on the Robinson Ranch Tier 2 easement lands in 2007 and 2008 (Vollmar Consulting 2008). No additional records were made during these surveys and no additional incidental sightings have been reported. The species is relatively uncommon in eastern Merced County, with only 318 acres of known occupied habitat, of which 14 acres are on Tier 1a lands.

Conservancy Fairy Shrimp

Updated Status within Project Lands

No recent surveys have been conducted for the Conservancy fairy shrimp except those conducted on the Robinson Ranch Tier 2 easement lands in 2007 and 2008 (Vollmar Consulting 2008). No additional records were made during surveys and no additional incidental sightings have been reported. The species is known to occur with the large vernal pool within the CNR (which was established to protect the watershed of this pool). This occurrence comprises 14 acres of occupied habitat. Three other point locations, encompassing107 acres of occupied habitat, occur elsewhere in eastern Merced County.

Valley Elderberry Longhorn Beetle

Updated Status within Project Lands

No new surveys have been conducted for VELB or elderberry shrubs that serve as its habitat, and no incidental sightings of shrubs or the beetle have been reported.

California Tiger Salamander

Updated Status within Project Lands

No additional surveys have been conducted for the California tiger salamander since the original project surveys conducted for the LRDP EIR (URS Corporation 2001). Occupied upland habitat was designated and quantified in the Conservation Strategy based on locations of breeding sites and the Service' recommended areas of occupied upland habitat (ICF Jones & Stokes 2008). This analysis showed that nearly all lands encompassing the campus and Tier 1a mitigation lands (the VST Preserve, CNR, and Myers Easterly) are considered occupied habitat.

California Tiger Salamander Critical Habitat

As noted in *Changes in Consultation Requirements*, the Service designated critical habitat for the California tiger salamander in 2005. The designated area includes 229 acres of Campus and Community North lands and over 12,700 acres of Conservation Lands, including nearly 5,914 acres of Tier 1a Conservation Lands and an additional 6,187 acres on other Conservation Lands (Table 4a).

San Joaquin Kit Fox

Updated Status within Project Lands

No surveys have been conducted for the San Joaquin kit fox on project lands or within eastern Merced County since the 2002 BO. No incidental sightings have been reported.

The Conservation Strategy developed and applied a habitat suitability model to identify the relative values of habitats in eastern Merced County for use by kit fox. The model characterized two kinds of habitat based on their potential for use by the kit fox: primary habitat (suitable for kit fox residence) and secondary habitat (not capable of use for residence, but suitable for use in dispersal movements). The model's key variables used to identify suitable primary and secondary habitats include land cover type (e.g., grassland, agricultural, developed), slope, and effects of adjacent uses. The model was applied using GIS analysis to evaluate potential effects of the Campus and Community (ICF Jones & Stokes 2008). The Conservation Strategy identified over 180,000 acres of primary habitat and 150,000 acres of secondary habitat in a nearly 371,000-acre area of eastern Merced County. Tier 1a mitigation lands support 6,128 acres of primary habitat, while other Conservation Lands support over 18,000 acres of additional primary habitat (Table 4a).

EFFECTS OF THE PROPOSED ACTION

The 2002 BO addressed potential effects on 12 listed species and provided technical assistance for the California tiger salamander, which was subsequently listed, as well as midvalley fairy

shrimp and mountain plover, which the Service determined did not warrant listing (see *Changes in Consultation Requirements* above).

As presented on page 2 of this Biological Opinion, the Service has concurred with the Corps that Hoover's spurge, hairy Orcutt grass, Hartweg's golden sunburst, and Greene's tuctoria may be affected, are not likely to be adversely affected by the Proposed Project. Based on survey results and analysis presented in the 2002 BA and 2002 BA Supplement, the 2002 BO concluded that the four plant species were not known to occur within the project area or mitigation sites. Extensive subsequent surveys (ICF Jones & Stokes 2008, Gibson and Skordal 2008) also did not locate these species in the former campus area (prior to reconfiguration of the Campus).

The following nine listed species and the bald eagle have the potential to be affected by the University's Proposed Project and were, therefore, addressed in the 2008 BA Supplement:

- Succulent owl's-clover
- Colusa grass
- San Joaquin Valley Orcutt grass
- Conservancy fairy shrimp
- Vernal pool fairy shrimp
- Vernal pool tadpole shrimp
- Valley elderberry longhorn beetle
- California tiger salamander
- San Joaquin kit fox

In presenting effects, consistent with treatment in the 2008 BA Supplement, this 2009 BO Amendment focuses on evaluating effects on habitat determined to be occupied by the listed species (occupied habitat) and on the amount of take. Determinations of occupied habitat for species were based on the presence of suitable habitat (Table 6) within prescribed distances of known species point locations (600 feet [200 m] for vernal pool plants and crustaceans, 1.75 miles [2,500 m] for the California tiger salamander).

Species effects assessments quantify direct and indirect impacts on species' occupied habitats based on methods described in the Conservation Strategy. Occupied habitats on Conservation Lands also were similarly quantified and used to determine mitigation ratios, for comparison against requirements in the Parameters and Conservation Measures (see *Effects of the Proposed Action*). In addition to acreage evaluations, the BA also quantified the numbers of known species point locations (as defined by the California Natural Diversity Database and quantified in the Conservation Strategy) for the UC Merced Campus, University Community lands, and Conservation Lands, which were used to determine mitigation ratios.

Potential take for species was determined qualitatively from the effects on occupied habitat. Effects of take were evaluated based on the extent of offsetting mitigation through habitat preservation, restoration, and creation.

Updated Discussion of General Effects of the Proposed Action

The 2002 BO identified a set of general impacts that could affect species and their habitats. These impacts were addressed individually for each species as applicable. Similarly, the 2008 BA and this 2009 BO Amendment addresses these impacts at a species level. This section updates the description of these general impacts.

Construction-Related Effects

As noted in the 2002 BO, a variety of potential impacts could result from construction-related activities, including dust emissions, erosion, sedimentation, hazardous material spills, introduction of non-native species, and injury or direct mortality of species. The Conservation measures directly address these potential impacts and proposed mitigation measure to avoid, minimize, and mitigate for these effects. Measures include preconstruction surveys, construction monitoring, best management practices (BMPs), training of construction personnel, enforcement of measures through construction contracts, a spill response plan, erosion control measures, measures to prevent introduction of invasive non-native species, and marking and fencing of sensitive exclusion areas. Since the 2002 BA, the University incorporated these measures into a construction mitigation plan for Phase 1 Campus project and has successfully implemented these construction mitigation measures.

Altered Hydrology and Nonpoint Source Pollution

The 2002 BO determined that alteration of hydrology has the potential to affect vernal pool wetlands and associated plants by changing patterns of runoff and introducing sediment and pollutants. The Conservation Measures, however, committed to specific avoidance and minimization measures for these effects. Since the 2002 BO, UC reconfigured the Campus and University Community to minimize potential hydrologic effects on sensitive wetlands. It implemented design and operations measures to minimize effects of its Phase 1 Campus.

The University remains committed to Conservation Measures that avoid, minimize, and mitigate potential hydrologic effects on listed wetland species. In addition, the University is committed to implementing LID planning and building practices as part of campus design and implementation of the Conservation Strategy. As explained above, LID is a sustainable landscape approach used to replicate or restore natural watershed functions. The University anticipates implementing a variety of LID practices, including the use of bio-retention areas, grass swales, and permeable pavement throughout the UC Merced Campus and University Community development.

Pesticides

The 2002 BO identifies use of pesticides on the Campus and on Conservation Lands as threats to habitat values. It noted that Conservation Measures identified commitments to develop a landscape management plan for University facilities, incorporate into the management plan for

Conservation lands measures that would restrict pesticides to uses for habitat maintenance, and restrictions of uses in areas of major infrastructure.

UC continues to agree to these commitments. It has developed integrated pest management procedures for management of the Phase 1 Campus. This plan will be updated as the Campus and Community North expand (including related infrastructure components). The *Management Plan for Conservation Lands* includes pesticide use requirements.

Human Disturbance

The 2002 BO identified human disturbance of habitat adjacent to the Campus and University Community as a potential threat to listed species. The 2002 BO also noted, however, that acquisition of Conservation Lands, and implementation of Conservation Measures to protect them, would reduce this threat. The 2002 BO concluded that implementation of the Parameters and supporting Conservation Measures would ensure that UC would develop strategies acceptable to the Service that would control indirect effects caused by human disturbance.

The University's reconfiguration of the UC Merced Campus and University Community reduced the potential for indirect impacts by increasing the amount of habitat protected and by providing a wider buffer between the Campus and Conservation Lands that support species of greatest conservation value (e.g., Conservancy fairy shrimp). The University also has incorporated measures to protect conservation lands from human disturbance into its *Management Plan for Conservation Lands*, including: restrictions on uses, public education, signage, and monitoring and enforcement.

Introduction of Non-native Species

The 2002 BO identified the potential for the introduction of non-native species through ground-disturbance during construction and the use of invasive species in landscaping. The Biological Opinion also noted that Conservation Measures adopted by UC would minimize potential for introduction of non-native species.

Since the 2002 BO, UC has developed and implemented a construction mitigation plan for the Phase 1 Campus that incorporated measures to discourage introduction of non-native weeds. The *Management Plan for Conservation Lands* includes an extensive integrated pest management program that incorporates measures to avoid and minimize potential for introduction of invasive plan and animal species, requires monitoring to detect these species, and requires a rapid response as needed to control species that threaten listed species and their habitats.

Fragmentation of Habitat

The 2002 BO identified additional fragmentation of habitat as a threat to listed species. It identified existing sources of fragmentation as canals, Yosemite Lake, agricultural lands, existing development, and roads. The 2002 BO noted that areas in the north of the Biological Opinion

Study Area were less fragmented. It noted that the extent of fragmentation from the UC Merced Campus and University Community would depend on the lands selected for these uses within the Study Area addressed at that time. It also noted that protection of substantial areas of intact high quality areas of vernal pool-grassland habitat would reduce potential for future fragmentation of these areas.

The reconfiguration of the UC Merced Campus for the Section 404 Permit application was conducted through extensive discussion with the Service and other agencies to minimize effects of fragmentation and associated disturbance on high quality habitats (Table 1). Potential effects were substantially reduced through the reconfiguration (see Table 7, and later discussions of effects on species).

Air Pollution

The 2002 BO notes localized air pollution (especially ozone concentrations) has potential to affect listed species. It noted that locating the UC Merced Campus and University Community in the southern portion of the study area could reduce these potential effects. The reconfiguration of the campus shifted its location southward and increased the area protected as Conservation Lands, thereby potentially reducing the potential effect of ozone on listed plants.

Succulent (Fleshy) Owl's-Clover

Campus and Community North Effects

Habitat Effects

The UC Merced Campus and Community North would result in direct loss of 27 acres of habitat considered occupied by succulent owl's-clover and indirect effects on an additional 4 acres (Table 4a). Tier 1a mitigation lands will protect a total of 313 acres of occupied habitat, resulting in a 10:1 ratio of land areas protected-to-affected. The University's ownership and management of Tier 1a lands under the terms of an approved Management Plan for Conservation Lands will protect and enhance 23% of the regional total amount of known occupied succulent owl's-clover habitat. An additional 378 acres of succulent owl's-clover habitat will be protected by conservation easements on CST Tier 1b lands and Tier 2 mitigation lands, resulting in achievement of a total mitigation ratio of 22:1. The UC Merced Campus and Community North would eliminate nine individual point locations of succulent owl's-clover but will conserve 244 known point locations on Tier 1a mitigation lands (Table 4b). In total all mitigation lands will protect 739 occurrences, an 82:1 mitigation ratio (Table 4b). Additionally, UC has committed to restore and create 40.12 acres of vernal pool habitat, which will be suitable for succulent owl's-clover.

Destruction of Known Plants

Development of the Campus will result in destruction of individual succulent owl's-clover within the Campus and Community North areas. The number of individuals within the 31 acres of occupied habitat to be directly or indirectly affected has not been quantified. UC has minimized this destruction to the extent feasible through campus redesign and a variety of avoidance and minimization measures and has compensated for effects through protection and management of the 689 acres in Tier 1 and Tier 2 mitigation areas.

The University has committed to restoration and creation of approximately 40 acres of vernal pool habitat to replace wetland functions and values. Upon approval by the Corps and Service, soil and seed from wetland habitats occupied by the succulent owl's-clover within the UC Merced Campus and Community North will be salvaged and used in vernal pool restoration and creation, thereby allowing the genetic pool of individuals within the UC Merced Campus and Community North to be maintained. With all of the prescribed measures, the level of take anticipated that will result from the UC Merced Campus and Community North will not have a significant detrimental impact on the species.

Community South Effects

No known point locations of succulent owl's-clover would be directly or indirectly affected by development of the Community South area. No take of individuals is anticipated within the Community South.

Total Effects of the Proposed Action

Implementation of the proposed action will result in direct loss of 27 acres of habitat considered occupied by succulent owl's-clover and indirect effects on an additional 4 acres (Table 4a). Tier 1a mitigation lands will protect a total of 313 acres of occupied habitat, resulting in a 10:1 ratio of land areas protected-to-affected.

Comparison of Effects with the 2002 Proposed Project

The reconfiguration of the UC Merced Campus and University Community reduced the amount of succulent owl's-clover habitat to be affected by 43%, from 54 acres to 31 acres (Table 7). Conserved lands increased by 85 acres (14%), and resulting mitigation ratios more than doubled for Tier 1a lands (to 10:1) and all Conservation Lands (to 22:1).

Colusa Grass

Campus and Community North Effects

Habitat Effects

As noted in the 2002 BAs and 2002 BO, and in the Conservation Strategy, Colusa grass is not present within the lands that are proposed for the Campus and University Community (Tables 4a and 4b). UC will conserve a total of 156 acres of occupied habitat and five point locations on Tier 1a mitigation lands, representing more than half of the known occupied habitat and known point locations of the species in eastern Merced County.

The reduction in the size of the currently proposed Campus (from that identified in the 2002 BAs and BO) and increasing the buffer for occupied habitat by expanding the CNR and implementation of the Conservation Lands Management Plan will reduce the potential for detrimental effects due to trespassing, invasion by noxious weeds, and other potentially negative influences. As documented in the Conservation Strategy, the configuration of the campus and protected lands also will reduce the potential for land conversion or degradation. This long-term protection and conservation management will be highly beneficial to the species.

Destruction of Known Plants

Construction-related activities would not result in the destruction of any individual Colusa grass plants. Destruction of Colusa grass individuals could occur through management activities occurring on Tier 1 mitigation lands, including regulated livestock grazing, stock pond maintenance, and invasive species control. All these management efforts will occur under provisions in the approved *Management Plan for Conservation Lands* and will be designed to provide long-term protection and management to benefit the species. Thus, any incidental take that may occur will be the byproduct of management efforts designed to maintain and enhance long-term conditions for the species.

In summary, the UC Merced Campus and Community North would have no direct or indirect detrimental effects on Colusa grass habitat or individuals. In addition, more than half of the known occupied habitat for the species will be protected and beneficially managed.

Community South Effects

Colusa grass is not known to occur within or adjacent to the Community South property. Therefore, development of Community South is not expected to result in any impacts on the species.

Total Effects of the Proposed Action

The total effects of the Proposed Action on Colusa grass is as described for the UC Merced Campus and Community North, as development of the Community South would not affect the species.

Comparison of Effects with the 2002 Proposed Project

Effects of the Proposed Action and the 2002 Proposed Project on Colusa grass are similar (Table 7). As noted under *Habitat Effects* above, adding the former Campus Land Reserve lands to the CNR provides a greater buffer distance between the Campus and the Colusa grass populations on CNR lands.

San Joaquin Valley Orcutt Grass

Campus and Community North Effects

Habitat Effects

San Joaquin Valley Orcutt grass is not present within the area identified for the Campus and Community North (Tables 4a and 4b). UC's protection and conservation management of one occurrence and 16 acres of occupied habitat (10% of the regional habitat) for San Joaquin Valley Orcutt grass on Tier 1a mitigation lands (the CNR) will be beneficial to the species.

The reduction in the size of the Campus (from that identified in the 2002 BAs and BO), and the resulting increase in the buffer for occupied habitat by expanding the CNR, will reduce the potential for detrimental effects due to trespass, invasion by noxious weeds, and other potentially negative influences.

Destruction of Known Plants

As for Colusa grass, UC would not destroy any San Joaquin Orcutt grass through it's construction activities. Destruction of Orcutt grass plants could occur during management activities on Tier 1 mitigation lands designed to protect and benefit the species, including livestock grazing, pond maintenance, and invasive species control, as conducted under the approved *Management Plan for Conservation Lands*. Thus, any incidental take that may occur will be designed to maintain and enhance long-term conditions for the species.

In summary, the Campus and Community North would have no direct or indirect detrimental effect on San Joaquin Valley Orcutt grass habitat or individuals and will protect and beneficially manage an important proportion of the known occupied habitat for the species and thereby contribute to meeting the goals of the *Vernal Pool Recovery Plan.*

Community South Effects

The April 2008 adjustment of the boundary of the Community South project to remain on the west side of the Fairfield canal (Figure 2) avoids impacts on a portion of a nearby wetland area that supports a population of the San Joaquin Valley Orcutt grass and vernal pool tadpole shrimp. Therefore, there would be no direct or indirect impacts on the habitat or individuals of the San Joaquin Valley Orcutt grass.

Total Effects of the Proposed Action

The construction of the Proposed Project will not result in effects on the San Joaquin Valley Orcutt grass, and protection of this species will occur on the Project's conservation lands.

Comparison of Effects with the 2002 Proposed Project

Effects of the Proposed Action and the 2002 Proposed Project on San Joaquin Valley Orcutt grass are similar for the Campus and Community North (Table 7). Although most of the protections included in the 2002 BA and BA Supplement remain the same, they have been developed in greater detail in the Conservation Lands Management Plan. As noted under *Habitat Effects* above, adding former Campus Land Reserve lands to the CNR provided a greater buffer distance between the Campus and the population on CNR lands.

The distance from the lands in University Community to the San Joaquin Valley Orcutt grass population on the adjacent Ichord Ranch has decreased under the Proposed Action compared with the 2002 Proposed Project. Indirect impacts will be avoided through implementation of avoidance and minimization measures during design, construction, and operation of the Community North. Therefore, the Community North will not pose any substantial additional risk for indirect impacts on the adjacent San Joaquin Valley Orcutt grass population.

Conservancy Fairy Shrimp

Campus and Community North Effects

Habitat Effects

No sites occupied by the Conservancy fairy shrimp would be affected by project construction. Protections identified in the 2002 BAs and 2002 BO for the Conservancy fairy shrimp remain in place, including incorporation of the entire watershed for the large vernal pool into the CNR. In addition, protection, management, and monitoring measures for the species and its habitat have been incorporated into the Conservation Lands Management Plan, including measures to deter trespassing, manage other human uses, ensure proper grazing use, and control invasion of habitat by noxious weeds. Overall, the Campus and Community North will protect and provide conservation management for 14 acres of occupied Conservancy fairy shrimp habitat. This area

comprises 13% of the 107 acres of known occupied habitat (and one of four known point locations) in eastern Merced County.

The recent reconfiguration of the Campus has increased the distance between developed campus lands and the occupied pool and its watershed, thereby reducing the potential for trespassing, introduction of noxious weeds, and other potentially negative influences. In addition, the commitment to incorporate the former Campus Land Reserve into the CNR, with full protection via a conservation easement and conservation management of lands, provides additional long-term protection from previously reserved potential future use of the site for the campus expansion.

The second closest population of Conservancy fairy shrimp is on the private Ichord Ranch, more than 1.5 miles from the Community North. Therefore, the University's Proposed Project would not result in indirect impacts to this population.

Take of Individuals

Campus and Community North construction activities will not result in incidental take of individual Conservancy fairy shrimp. Management of conservation lands has the potential to result in incidental take of the species, but will be avoided to the maximum extent possible and will only occur if management actions were determined to be warranted to protect the species or its habitat.

Community South Effects

No occurrences of the Conservancy fairy shrimp occur within the Community South area. The nearest occurrence, on the Ichord Ranch, is over 1.5 mile away. Therefore, the Community South would not result in any direct or indirect impacts on Conservancy fairy shrimp.

Total Effects of the Proposed Action

The Campus and University Community would have effects as described above for the Campus and Community North. The Proposed Action will benefit the Conservancy fairy shrimp by protecting, managing, and monitoring the species population and habitat, and thereby contribute to species recovery.

Comparison of Effects with the 2002 Proposed Project

Although most of the protections included in the 2002 BAs remain the same, they have been developed in greater detail in the *Management Plan for Conservation Lands*. The addition of the former Campus Land Reserve to the CNR, however, provides a permanent protection buffer for the watershed lands of the occupied pool on the CNR. The net effect is that the Proposed Action will improve protection for the Conservancy fairy shrimp.

Vernal Pool Fairy Shrimp

Updated Status within Project Lands

The species is relatively common in eastern Merced County, with 2,384 acres of known occupied habitat. No surveys have been conducted for the vernal pool fairy shrimp since the 2002 BAs and 2002 BO, and no incidental sightings have been reported.

Campus and Community North Effects

Habitat Effects

UC Merced Campus and Community North construction will result in direct or indirect impacts to 61 acres of occupied habitat representing 211 known point locations (Tables 4a and 4b). This loss represents 2.6% of the 2,384 acres of known occupied vernal pool fairy shrimp habitat within the eastern Merced County. Mitigation lands will protect 1,143 acres of occupied habitat and 670 known point locations of the vernal pool fairy shrimp, representing 48% of the known habitat in the study region, including 490 acres within Tier 1a mitigation areas (21% of the total known habitat). Mitigation ratios achieved are 8:1 for Tier 1a mitigation lands and 19:1 for all Conservation Lands, substantially above the 3:1 minimum target specified in the 2002 BO. Known point locations of the species also are found on mitigation lands at a ratio of greater than 3:1.

Take of Individuals

An unknown number of individual vernal pool fairy shrimp will be taken as a result of the loss or disturbance of the 61 acres of vernal pool and swale habitat considered occupied by the species. The effect of take may be reduced by salvaging soils and accompanying cysts for use in wetland restoration and creation. The effects of take are compensated in part by the permanent protection and conservation management of 1,143 acres of occupied habitat and 490 acres on Tier 1a mitigation lands.

Community South Effects

The Community South would eliminate or disturb less than one acre of occupied vernal pool fairy shrimp habitat. The 2002 BO requires that impacts to this species habitat be compensated at a ratio of 3:1.

Total Effects of the Proposed Action

Even without a specified compensation program for the Community South lands, the combined effects of proposed compensation will achieve a mitigation ratio of 19:1 relative to the impacts of the Proposed Action, substantially above the 3:1 minimum target specified in the 2002 BO.

Comparison of Effects with the 2002 Proposed Project

The University's reconfiguration of the UC Merced Campus reduced the effect on habitat for the vernal pool fairy shrimp by nearly half, from 116 acres to 61 acres (Table 7). Conserved lands increased by 47 acres (4%), more than doubling the mitigation ratios for Tier 1a (to 8:1) and all mitigation lands (to 19:1) (Table 7).

Vernal Pool Tadpole Shrimp

Campus and Community North Effects

Habitat Effects

Vernal pool tadpole shrimp do not occur within the construction footprint on the proposed UC Merced Campus. Construction of the Community North would directly or indirectly impact 4 acres of occupied vernal pool tadpole shrimp habitat (Table 4a). This loss represents 1.2% of the 318 acres of known occupied tadpole shrimp habitat within eastern Merced County. Mitigation lands will protect 14 acres of occupied habitat for the tadpole shrimp, representing 4% of the known habitat in the region, nearly all of which is within Tier 1a mitigation areas (Table 4a). The achieved mitigation ratio of 3.5:1 for Tier 1a mitigation is above the 3:1 minimum target specified in the Conservation Measures in the 2002 BO. In addition, potentially suitable habitat will be restored and created as part of the compensatory wetland mitigation.

Take of Individuals

An undetermined number of individual vernal pool tadpole shrimp will be taken as a result of the loss or disturbance of the 4 acres of vernal pool and swale habitat considered occupied by the species and one known point location (Table 8). The effect of take may be reduced if soils and accompanying cysts are salvaged from the Community North lands and used in wetland restoration and creation.

Community South Effects

As described for the San Joaquin Valley Orcutt grass, the April 2008 reconfiguration of the Community South lands to avoid lands on the east side of the Fairfield Canal eliminated the potential for direct or indirect impacts on the vernal pool tadpole shrimp and its habitat.

Total Effects of the Proposed Action

The UC Merced Campus and University Community would result in 4 acres of impacts on vernal pool tadpole shrimp and will preserve population of the species in Tier 1a lands at a ratio that exceeds the 3:1 compensation requirements of the 2002 BO.

Comparison of Effects with the 2002 Proposed Project

Based on the analysis of the Conservation Strategy, the 2002 Proposed Project did not cause impacts on occupied habitat for the vernal pool tadpole shrimp. The 2008 reconfiguration of the Campus and University Community resulted in impacts to a small amount of habitat (4 acres; Table 7), representing 1.2% of known occupied habitat available regionally. The amount of conserved habitat (14 acres) did not change.

Vernal Pool Species Critical Habitat

The designated boundary for critical habitat for vernal pool species adopted by the Service avoided the Proposed Project construction footprint. Therefore, no critical habitat will be adversely affected through direct impacts. Indirect effects of the campus on adjacent designated critical habitat will be minimized through the implementation of adopted Conservation Measures to avoid, minimize, and compensate for potential impacts (See *Status of Conservation Measures*). Beneficial effects from the protection and management of conservation lands will benefit critical habitat for vernal pool species.

Valley Elderberry Longhorn Beetle

Campus and Community North Effects

Habitat Effects

No elderberry shrubs were found during surveys of the UC Merced Campus and Community North sites or within the VST or CNR lands (Service 2002; EIP Associates 2002; Jones & Stokes 2002a, ICF Jones & Stokes 2008). Although specific information is lacking on elderberry occurrence on mitigation lands under easement, it is likely that some are present (Vollmer 2002, Service 2002). The Campus and Community North have no potential to affect existing VELB habitat. Elderberry seedlings, however, are dispersed by fruit-eating birds, which are likely to increase in abundance as the Campus landscape matures. Therefore, considering the 30-year build-out schedule for the campus, it is possible that elderberries could grow on Campus or on Conservation Lands.

Dispersal of seeds by fruit-eating birds attracted to the campus landscape (e.g., cedar waxwings, American robins, European starlings) could in the establishment elderberry host plants within both the undeveloped and developed portion of the campus. The extent and rate of this colonization would depend on the availability of elderberry shrubs on adjacent lands (e.g. near Yosemite Lake). Any colonization of the Campus, Community North, and Conservation Lands by elderberries would benefit the VELB. Benefits will likely be long-term within UC controlled Conservation Lands because elderberries could be maintained over time. Within the developed campus, some colonizing elderberries likely will be maintained as a part of the long-term landscape (i.e., within protected stream courses, floodwater retention areas, and recreation lands and trails). Some colonized shrubs in future development areas would likely require eventual

removal for construction of various Campus and Community North phases. Even colonization of predevelopment habitat areas provides a temporary benefit to the species, however. Therefore, the Campus and Community North will result in net benefits to VELB habitat and presumably the species.

Take of Individuals

The UC Merced Campus and Community North would not cause take of existing VELB individuals because no suitable habitat is present. Based on current Service guidance, elderberries that grow to have stems larger than a diameter greater than 1 inch are considered suitable habitat and their removal in certain circumstances can be presumed to result in take of the species (since determination of occupancy of shrubs cannot be made nondestructively). Therefore, removal of elderberry shrubs that colonize currently undeveloped portions of the UC Merced Campus and Community North could result in take of VELB. Take also may occur during future operations, including vegetation management in parks and detention basins and along trails.

The impact of this potential VELB take is considered minor. The potential benefits of wider colonization of the Campus, Community, and Conservation Lands by elderberry shrubs in protected areas would offset take of VELB and result in the potential for an increase in VELB population.

In summary, UC Merced Campus and Community North development may increase habitat for VELB in the short-term, but it could result in a later loss of a portion of this habitat and resulting take of a portion of the future-established population. The net effect of the project on VELB habitat and populations is beneficial.

Community South Effects

Elderberry shrubs have not been reported for the Community South area. Effects of the Community South development on VELB are expected to be similar to those described for the UC Merced Campus and Community North, including establishment of new habitat and potential take of the species during future construction phases and operations. Overall effects are expected to be beneficial.

Total Effects of the Proposed Action

Overall effects of the UC Merced Campus and University Community are expected to increase habitat for VELB. Some take may occur as some of the elderberry habitat that becomes established in the future is removed during future construction phases and operations. Overall, however, elderberry habitat is expected to increase in open space areas, and therefore effects are considered beneficial.

Comparison of Effects with the 2002 Proposed Project

Effects of the Proposed Action on VELB are similar to those of the 2002 Proposed Project.

California Tiger Salamander

The effects analysis for the California tiger salamander considers effects on the species and on designated critical habitat.

Campus and Community North Effects

Habitat Effects

The reconfigured Campus and Community North will eliminate one known breeding site for the California tiger salamander and 1,884 acres of occupied upland habitat (i.e., within 1.25 miles of this and other breeding ponds) (Table 4a; also see ICF Jones & Stokes 2008: Figure 3-16, where one observation with UC lands represents an aestivating individual). Tier 1a mitigation lands will protect and conserve 6,242 acres of breeding habitat (3.3:1 ratio) and 13 breeding locations (13:1 ratio). Tier 1b and Tier 2 lands will protect an additional 13,902 acres of upland habitat, resulting in total protection of over 20,100 acres, representing a total acreage mitigation ratio of nearly 11:1, and 17 additional known breeding locations (a 30:1 ratio). Implementing the Compensatory Wetland Mitigation Plan will restore wetland and associated upland habitat that will provide additional suitable breeding and upland habitats for the salamander.

Effects on Critical Habitat

The Campus and Community North will eliminate 229 acres of critical habitat for the California tiger salamander (Table 4a). Over 5,900 acres of critical habitat will be protected on Tier 1a Conservation Lands (a 26:1 ratio to critical habitat lands to be lost). Tier 1b and Tier 2 lands will protect an additional 6,187 acres of critical habitat, for a total of over 12,100 acres protected on Conservation Lands, representing a 53:1 mitigation ratio.

Take of Individuals

Individual tiger salamanders likely would be taken during construction and operation of the UC Merced Campus. Removal of the one occupied breeding pond within the Community North area could kill adults, larvae, or eggs of the tiger salamander. Because most of the upland grasslands with the UC Merced Campus and Community North are within the 1.75 mile potential travel distance of the salamander, disturbance of 1,884 acres of grassland habitat and one known breeding location (Table 8) could result in take through most of these areas. The level of take (number of individuals), however, is difficult to estimate precisely.

UC will minimize take through measures specified in construction mitigation plans to be prepared and approved by The Service for each major construction phase. In summary, these

measures include:

- Fencing construction site perimeters to prevent incursion into undeveloped areas.
- Conducting preconstruction surveys of potential breeding habitat within construction areas and adjacent lands within 600 feet.
- Trapping and translocating adult and metamorphosed juvenile salamanders to suitable off-site breeding habitat on Conservation Lands during the breeding season prior to construction.
- When applicable, constructing drift fencing to prevent entry of migrating adult or juvenile salamanders to construction areas.

Despite the implementation of measures to minimize take, an unquantifiable amount of take of the California tiger salamander is anticipated. Such take is likely to occur during ground excavation because the adopted exclusion and translocation methods are likely to be only partially effective in removing salamanders from upland positions of construction sites, and unoccupied but suitable habitat for translocation may be difficult to identify.

With application of conservation measures, effects of this unavoidable take are expected to be minimized for the following reasons:

- All but one breeding pond was avoided through UC Merced Campus and Community North siting and reconfiguration, while at least 21 breeding ponds are protected on Conservation Lands.
- The University will conserve occupied habitat on Tier 1a lands at a 3.3:1 ratio to habitat eliminated, while all Tier 1 and 2 Conservation Lands will conserve lands at an 11:1 mitigation ratio (Table 4a).
- The University will conserve designated critical habitat for the California tiger salamander at a 26:1 ratio on Tier 1a lands and at a 53:1 ratio for all conservation lands.
- Therefore, project conservation efforts will protect and provide conservation management for a substantial amount of known occupied habitat, known occurrences, and critical habitat.
- Construction mitigation measures will minimize the amount of take by capturing and relocating salamanders from the breeding pond and excluding salamanders on adjacent areas from accessing construction sites.

Community South Effects

Lands on the Community South are not considered occupied habitat because of their agricultural uses, and were not included within the critical habitat designation. Therefore, no occupied habitat or critical habitat would be affected.

Total Effects of the Proposed Action

The impacts of the Proposed Action are the same as for the Campus and Community North because the Community South would have no effect on the California tiger salamander or on critical habitat for the species.

Comparison of Effects with the 2002 Proposed Project

Reconfiguration of the Campus and University Community reduced impacts to the area of occupied habitat for the California tiger salamander by 159 acres (8%), while the amount of occupied habitat conserved increased by over 275 acres (1.4%)(Table 7).

San Joaquin Kit Fox

Campus and Community North Effects

Habitat Effects

The reconfigured UC Merced Campus and Community North would result in direct or indirect effects on 1,293 acres of primary habitat suitable for San Joaquin kit fox residence and an additional 676 acres of additional secondary dispersal habitat (Table 4a). Therefore, the UC Merced Campus and Community North would affect 0.7% of the total amount of primary habitat and 0.5% of the total area of secondary habitat in the 371,000-acre eastern Merced County study area (ICF Jones & Stokes 2008, Table 2-2). Through preservation and management of Conservation Lands and other Tier 1 and Tier 2 Conservation Lands, the University's Proposed Project will conserve over 25,700 acres of habitat suitable for kit fox, of which 94% (24,183 acres) are primary habitat (Table 4a).

Mitigation ratios achieved for kit fox habitat are summarized in Tables 4a and 4b. In evaluating mitigation lands values for compensation, mitigation ratios achieved for kit fox primary habitat is of greatest interest because it provides not only suitable habitat for kit fox residence but also provides greater dispersal capability than does secondary habitat. Therefore, this discussion focuses on the ratios achieved for residence and for total habitat (i.e., residence and dispersal habitat combined) by Tier 1a lands and by all compensation lands (i.e., Tier 1 and 2 combined). Project compensation from Tier 1a lands alone exceed the minimum 3:1 compensation ratios specified in the 2002 BO for the UC Merced Campus and Community North (4.7:1 for primary habitat and 3.1:1 for all kit fox habitat, Table 4b). With incorporation of Tier 2 lands, compensation achieves ratios of nearly 19:1 for primary habitat and over 13:1 for both habitats. These compensation ratios substantially exceed the ratios specified in the 2002 BO.

The Conservation Strategy also has specified installation of a canal crossing to enhance kit fox dispersal in the project region. The 2008 Biological Assessment Supplement has identified potential sites for installation of a new crossing, based on quality of adjacent habitats, the

location of existing crossings, and the canal configuration to identify potential crossing sites where they will serve animals that are naturally funneled by the shape of the canal. (Figure 5).

The *Management Plan for Conservation Lands* has incorporated 2002 BO requirements to manage grazing to provide suitable grass height and to install artificial kit fox dens as specified in the 2002 BO. The plan also includes extensive measures to prevent invasion of Conservation Lands by noxious weeds and to control wildfire, human uses, free-ranging dogs, and red foxes.

Take of Individuals

Take of individual kit foxes is not likely to occur because foxes have not been observed within lands proposed for the Campus and Community North. Take, however, is possible in the future if kit foxes colonize lands designated for the Campus and Community North. Implementation of Conservation Measures will minimize the incidence and effects of any take. Protection and management of Conservation Lands for conservation purposes also will assist in offsetting potential effects of take by providing high quality managed habitat for the kit fox.

The Proposed Project includes appropriate avoidance, minimization and compensation measures, in campus siting, design, construction, and operation, as well as the protection and conservation management of substantial areas of kit fox habitat.

Community South Effects

The Conservation Strategy analysis determined that only a limited area (61 acres) of the Community South was determined to be suitable residence (primary) habitat for the kit fox, while the entire site was suitable dispersal (secondary) habitat (Table 4a).

Total Effects of the Proposed Action

The UC Merced Campus and University Community will eliminate 1,354 acres of primary kit fox habitat and 1,962 acres of secondary habitat. This impact represents 0.7% of suitable residence habitat and 1.3% of dispersal habitat in eastern Merced County. Compensation habitat will substantially exceed the 3:1 minimum ratios identified in the 2002 BO for primary habitat (18:1) and all habitat (8:1; Table 4b). As described for the Campus and Community North, measures to avoid, minimize, and compensate for impacts during siting, planning and design, construction, and operation will reduce effects on kit foxes. Reconfiguration of the UC Merced Campus has further improved the quality of dispersal habitat for the kit fox east of the UC Merced Campus and University Community lands.

Comparison of Effects with the 2002 Proposed Project

Reconfiguration of the Campus and University Community reduced the amount of impacted kit fox primary habitat by 308 acres (19%; Table 7). The amount of lower value secondary habitat affected by the project increased by 103 acres (6%) as a result of efforts to avoid primary habitat.

The kit fox is the only species for which impacts occur to occupied habitat within the Community South, which is not part of the University's Proposed Project, but is a part of the broader Proposed Action. Therefore, the evaluation of project-wide changes in mitigation ratios between the 2002 and 2008 configuration incorporates impact in the Community South that were not previously addressed as part of impacts and mitigation evaluation of the Proposed Action. This comparison, therefore, is intended to show changes in conservation effects and should not be used to judge mitigation adequacy for the Proposed Project.

Comparison of 2002 and 2008 conditions under the Proposed Action shows that dedication of former Campus lands and the Campus Land Reserve to conservation management, combined with the reduction in acreage impacts, contributed to an increase in the Action-wide mitigation ratios for primary (residence) kit fox habitat from 3.4:1 to 4.5:1 for Tier 1a lands and from 14:1 to 18:1 for all conservation lands. For all kit fox habitat, including primary and secondary (dispersal) habitat, ratios increased from 1.6:1 to 1.9:1, while ratios incorporating all conservation lands increased from 7:1 to 8:1. Again, these ratios are intended only to show the relative effects of changes in the configuration of the Proposed Action, not as a basis for evaluating mitigation adequacy.

Reconfiguration of the Campus and University Community since issuance of the 2002 BO has increased the area available for kit fox movement to the east, thereby improving potential for kit fox residence and dispersal within these lands. In summary, in comparison to the 2002 Proposed Project, the present Proposed Action will reduce the potential for impact on kit fox habitat and increase Conservation Lands for the species.

Effects of Interrelated and Interdependent Actions

The University Community was addressed in the 2002 BO as a project that was interrelated and interdependent with the 2002 Proposed Project and Infrastructure Project. The Proposed Action has since been expanded to include development of the Community North and the Community South (see *Revised Description of the Proposed Action*).

Community South Development

The Community South is an interdependent and interrelated action. As an aspect of the interdependent and interrelated University Community evaluated in the 2002 BO, the Community South development therefore was previously addressed in the 2002 BO as an interdependent and interrelated action. This 2009 BO Amendment likewise evaluates impacts related to the Community South development as an interdependent and interrelated action.

The applicant for development of the Community South would be required to initiate further consultation with the Service if a Section 404 permit or Federal incidental take authorization is required for this development.

As specified in the 2008 BA Supplement, the effects of the interrelated and independent Community South development are expected to include take of the vernal pool fairy shrimp. With described avoidance and minimization measures, however, the small number of acres of habitat destroyed will not jeopardize the existence of the vernal pool fairy shrimp. No critical habitat will be affected.

Other Development

Several other projects also were incorporated into the 2002 BAs and 2002 BO as interrelated and interdependent actions, including off-site utility connections for the Campus, off-site road intersections, and potential construction of off-site water supply wells by MID. These actions will require separate review for compliance with the Act under section 7 or 10.

Because interrelated and interdependent projects have already been identified and analyzed in the 2002 BO and measures to mitigate their effects have been determined, the Service does not think they will contribute substantially to effects on species that are affected by the University's Proposed Project.

Cumulative Effects

Cumulative effects are defined under the Act as effects of non-federal actions that are reasonable certain to occur within a project's action area for consultation and that are not related to the project. The 2002 BO identified the following construction-related impacts that could occur cumulatively, presumably as a result of other projects and activities: direct loss of habitat, dust emissions, erosion, sedimentation, hazardous material spills, introduction of invasive non-native plant species, and injury or direct mortality of wildlife. Longer-term cumulative effect could include changes in hydrology and water quality and impacts from pesticide use, human disturbance, invasive species, and habitat fragmentation.

Habitat loss has been minimized to the extent feasible through the reconfiguration of the campus. Measures incorporated into the *Management Plan for Compensation Lands*, the Conservation Strategy, and EIS/EIR will reduce the potential impact associated with effects of the Proposed Project and Proposed Action on hydrology, water quality, erosion and sedimentation, pesticide use, invasive species, and human disturbance. The 2002 BO notes that preservation of high quality habitat under the Proposed Project will compensate for potential fragmentation of habitat resulting from project implementation. Effects of development of the Community South were addressed in the 2008 BA supplement, the Conservation Strategy, and the EIS/EIR. Consistent with Parameter 3 in the 2002 BO, Merced County will provide assurance that it will require discretionary projects under its jurisdiction within the BO Study Area to comply with the Federal Act.

As was noted in the 2002 BAs and 2002 BO, many of the species considered in this consultation are wetland species, and unrelated actions that will result in filling of their wetland habitats will

require a Section 404 permit and will be subject to consultation. As a result, such actions are not considered as cumulative impacts.

Recent changes to the definition of waters of the U.S. and treatment of isolated waters could allow some wetlands occupied by listed plants and animals to be filled without issuance of a 404 permit. Even without a 404 permit, actions that resulted in take of listed animals of wetland habitats (Conservancy and vernal pool fairy shrimp, vernal pool tadpole shrimp, California tiger salamander) will require a Federal permit under section 10(a) of the Act. However, because nonfederal actions that result in effects on listed plants are not prohibited under the Act, projects that modified nonjurisdictional wetlands and other waters, without affecting animal species, could proceed, and such effects will be considered a cumulative impact.

Potential future actions that could result in cumulative impacts were identified in the 2002 Biological Opinion as construction of urban areas; water and flood control projects; highways, roads, and utilities; and conversion to agricultural uses. The Biological Opinion noted, however, that many of these projects would be subject to environmental review and permits that would trigger compliance with the Act. Agricultural conversion could occur unnoticed, however, and thus without Federal Endangered Species Act compliance. However, some of the lands that support vernal pool species are not suitable for agricultural use because their soils support hardpans that reform rapidly after conversion, and water, necessary for agriculture, is becoming less available.

Cumulative impacts would not occur on the substantial areas of Tier 1 and Tier 2 Conservation Lands, where incompatible uses are prohibited. These 26,639 acres were selected to maximize protection for important resources, thereby reducing potential for regional cumulative effects.

A substantial amount of habitat in eastern Merced County already has been converted to non-species-compatible uses as a result of past development and agricultural conversion. In addition, it is reasonable to expect that other future development in eastern Merced County could occur under the existing City General Plan, as well as under the General Plan Update that is underway. Although all projects would be required to reduce their individual impacts to a less-than-significant level as defined under the California Environmental Quality Act (CEQA), and mitigate for impacts to wetlands and listed threatened and endangered species, some reduction in habitat would still occur. Therefore, notwithstanding protection measures incorporated into the Proposed Project and Proposed Action, and into other land use regulatory projects, past, current, and future projects would have cumulative effects on federally listed species.

In summary, although potential exists for cumulative impacts on the species addressed in this Biological Opinion, existing land use protections, regulatory mechanisms, and physical limitations are available to limit these effects.

Recovery Needs

Vernal Pool Species

In 2005, the Service approved the *Vernal Pool Recovery Plan* (Service 2005), which covers all plant species and invertebrates addressed in the 2002 BAs and 2002 Biological Opinion.

Recovery Criteria.

The *Vernal Pool Recovery Plan* lists eastern Merced County as among the most valuable areas for protection of four species (succulent owls-clover, Colusa grass, vernal pool fairy shrimp, vernal pool tadpole shrimp) that have been documented on the Proposed Project's Conservation Lands, as well as for several other species that are not known to occur on these Conservation Lands but occur in vernal pool habitats elsewhere in the region (Hoover's spurge, hairy Orcutt grass, and Greene's tuctoria; Table 9). Although eastern Merced County was not identified as part of core recovery areas for the San Joaquin Valley Orcutt grass and Conservancy fairy shrimp, which both occur on Conservation Lands, the Service's recovery criteria call for protection of 100% of any newly discovered populations for both species. Reintroduction to formerly occupied or suitable sites is specified for all Merced County species except the vernal pool fairy shrimp (Table 9).

General recovery criteria are summarized below.

1. **Habitat Protection**. Accomplish habitat protection that promotes vernal pool ecosystem function sufficient to contribute to population viability of the covered species. This protection includes protecting suitable vernal pool habitat (including supporting hydrology) within each prioritized regional core area and throughout the species' range, reintroducing and introducing the species in areas where needed, and conducting surveys to locate new species occurrences.

2. **Adaptive Habitat Management and Monitoring**. Develop adaptive habitat management plans for protected habitats, including provision for appropriate grazing, fire management, management of invasive non-native species, and incorporating new information. Ensure provisions for management in perpetuity and for long-term monitoring. Establish seed banks where needed for reintroduction efforts.

3. **Status Surveys**. Conduct status surveys and reviews that show that populations are viable.

4. **Conduct Research to Support Recovery**. Research actions have been identified and incorporated into the recovery plan. A process for identifying other priority research has been included.

Contributions of the UC Merced Project to Species Recovery.

The UC Merced's program of Campus and Community siting, design, construction, operation, and compensation thought the Conservation Lands program provides substantial support to the vernal pool species recovery program. The campus location, design, construction, and operation all have been developed to minimize impacts to listed species, directly affecting occupied habitat of the succulent owl's-clover, vernal pool fairy shrimp, and vernal pool tadpole shrimp. Protection of over 26,000 acres of high quality vernal pool grasslands protects populations of 6 listed recovery plan species (succulent owls-clover, Colusa grass, San Joaquin Valley Orcutt grass, Conservancy fairy shrimp, vernal pool fairy shrimp, vernal pool tadpole shrimp) and one species of concern included in the *Vernal Pool Recovery Plan* (midvalley fairy shrimp), thereby contributing to Recovery Plan criteria 1.

The *Management Plan for Conservation Lands* applies permanent protection and adaptive management to nearly 6,428 acres of UC-owned and managed vernal pool grasslands (Tier 1a lands), while over 20,100 additional acres are protected through conservation ownership or easements to protect habitat values (Tier 1b and Tier 2 lands). . Management actions for UC Merced's Conservation Lands include management of livestock grazing, fire, invasive species, and human uses to ensure protection of habitat values in perpetuity. The plan thereby contributes to criterion 2.

The management of all Conservation Lands requires monitoring of management compliance and effectiveness and of habitat quality, thereby supporting criterion 3.

The management plan encourages research on UCM Conservation Lands. A portion of these lands are likely to be incorporated into the University's Natural Reserve System, which encourages research and conservation. Therefore, these lands and the associated management program will support conservation and recovery efforts, thereby contributing to criterion 4.

San Joaquin kit fox

The Service's *Recovery Plan for Upland Species of the San Joaquin Valley* (Service 1998) identifies general recovery criteria for the kit fox as:

- maintaining 3 core populations and more than 3 satellite populations for the species, with approved management plans
- achieving stable or increasing populations in core and satellite populations, and
- achieving genetic interchange between one or more core populations and at least 3 satellite populations.

For the north valley floor subregion, which includes Merced and Madera Counties, the plan also identifies the "site-specific protection requirement to meet delisting criteria" of protecting 80% of existing potential habitat.

The UC Merced project contributes to the kit fox recovery goals by protecting over 24,000 acres (13%) of the 180,000 acres of the potential primary habitat for the species (i.e., suitable for residence) in eastern Merced County. These lands also have either a management plan and/or conservation easements in place to ensure compatible management for kit fox use (Airola 2008b). The lands do not appear to currently support a kit fox population, but occasional sightings in the area by trained biologists give rise to the possibility that protection and conservation management of these lands makes it more likely that a kit fox population could become re-established in the future.

Conclusion

The Service has determined that the Proposed Project is in compliance with the Parameters laid out in the 2002 BO, and it is our biological opinion that the Proposed Project is not likely to jeopardize the continued existence of succulent owl's-clover, Colusa grass, San Joaquin Valley Orcutt grass, vernal pool fairy shrimp, Conservancy fairy shrimp, vernal pool tadpole shrimp, California tiger salamander, Valley elderberry longhorn beetle and San Joaquin kit fox, or result in the destruction or adverse modification of critical habitat for the California tiger salamander. We base this conclusion on the entire package of commitments and actions proposed and already taken as described in the project description; our review of the current status of each species; and the effects of the project on each species.

Additionally, for the California tiger salamander we have made the determination that the Proposed Project will not result in adverse modification to Critical Habitat. We have not relied on the regulatory definition of "destruction or adverse modification" of critical habitat at 50 CFR 402.2. Instead, we have relied upon the statutory provisions of the Act to complete our analysis with respect to critical habitat.

INCIDENTAL TAKE STATEMENT

Section 9(a)(1) of the Act and Federal regulations pursuant to section 4(d) of the Act prohibit the take of endangered and threatened fish and wildlife species without special exemption. Take is defined as harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harass is defined by the Service as an intentional or negligent act or omission which creates the likelihood of injury to a listed species by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering. Harm is defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by impairing behavioral patterns including breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with this Incidental Take Statement.

Sections 7(b)(4) and 7(o)(2) of the Act, which refer to terms and conditions and exemptions on taking listed fish and wildlife species, do not apply to listed plan species. However, section 9(a)(2) of the Act prohibits removal, reduction to possession, and malicious damage or destruction of listed plant species on Federal lands and the removal, cutting, digging up, or damaging or destroying such species in knowing violation of any State law or regulation, including State criminal trespass law. Actions funded, authorized, or implemented by a Federal agency that could incidentally result in the damage or destruction of such species on Federal lands are not a violation of the Act, provided the Service determines in a biological opinion that the actions are not likely to jeopardize the continued existence of the species.

Amount or Extent of Take Anticipated

Despite substantial avoidance and minimization measures, incidental take of the following listed species is considered likely to occur: vernal pool fairy shrimp, vernal pool tadpole shrimp, California tiger salamander, and San Joaquin kit fox. The extent of take cannot be precisely determined, in terms of numbers of individuals. Therefore, the number of acres of occupied habitat and number of known point locations of species is the best indication of the relative magnitude of take for these species.

Vernal pool fairy shrimp, vernal pool tadpole shrimp, and California tiger salamanders. An unknown number of adult, juvenile and cysts of vernal pool fairy shrimp are found on 61 acres within the Proposed Project construction footprint. An unknown number of adult, juvenile and cysts of vernal pool tadpole shrimp are found on 4 acres within the Proposed Project construction footprint. California tiger salamander adults, juveniles, and eggs, are estimated to occur on 1,884 acres within the Proposed Project construction footprint. In addition there are more than 26,639 lands to be managed for conservation that are a part of this project, as detailed in the Project Description. Conservation activities on these lands, including an unknown acreage of vernal pool restoration, may result in all forms of incidental take of an unknown number of vernal pool fairy shrimp, vernal pool tadpole shrimp, and California tiger salamander, and this incidental take will be exempt from the prohibitions described under section 9 of the Act.

Valley elderberry longhorn beetle. Take of VELB could occur in the future, as elderberry bushes and VELB could be introduced to future Campus, University Community and Conservation lands; no take of VELB is authorized by this Biological Opinion.

San Joaquin kit fox. The Service expects that incidental take of San Joaquin kit foxes will be difficult to detect or quantify for the following reasons: their relatively small body size make the finding of a dead specimen unlikely, losses may be masked by seasonal fluctuations in numbers, or other causes, and the species occur in dens and burrows. Due to the difficulty in quantifying the number of San Joaquin kit foxes that will be taken as a result of the proposed action, the Service is quantifying take incidental to the project as the number of acres of habitat that will become unsuitable for the species as a result of the action.

Therefore the Service estimates permanent loss of 3,316 acres of kit fox habitat. Upon implementation of all the commitments in the Project Description of this Biological Opinion, incidental take associated with the Proposed Project for these acres in the form of harm or harassment to San Joaquin kit foxes from habitat loss, capture, relocation, excavation of dens and burrows, and loss of forage/prey will become exempt from the prohibitions described under section 9 of the Act for direct impacts. Harassment from management of more than 26,639 acres of conserved lands will also be exempt from the prohibitions described under section 9 of the Act.

No take of plants can be authorized under the Act.

Effect of the Take

The Service has determined that the level of anticipated take for the Proposed Action would not result in jeopardy to any listed species or the adverse modification of designated or proposed critical habitat.

Reasonable and Prudent Measure

The Service believes the following reasonable and prudent measure is necessary and appropriate to minimize the impacts of incidental take of vernal pool fairy shrimp, vernal pool tadpole shrimp, VELB, and California tiger salamander. No additional measures are required.

Fully implement management and monitoring programs identified in this 2009 BO Amendment, Conservation Strategy, Management Plan for Conservation Lands, Compensatory Wetland Mitigation and Monitoring Plan, and EIS/EIR.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, the Corps must comply with the following terms and conditions, which implement the reasonable and prudent measure described above. These terms and conditions are mandatory.

(1) As provided within the parameters of the project description, the university will consult with the Service regarding the selection of sites for wetland mitigation. The Service will additionally review and approve of all plans for, restoration, conservation and management purposes on the preservation lands.

(2) The University will fully implement management and monitoring actions identified in the 2009 BO Amendment, Conservation Strategy, Management Plan for Conservation Lands, Compensatory Wetland Mitigation and Monitoring Plan, and EIS/EIR. These actions include commitments regarding siting, project design, construction, and operation of the Campus and Community North projects, as well as protection and management of Conservation Lands to serve as compensation for project effects.

(3) The University will report annually on compliance with the requirements of regulatory documents and management plans as specified above.

The reasonable and prudent measure, with its' implementing terms and conditions, is designed to minimize the impact of incidental take that might otherwise result from the proposed action. The Service believes that the action will result in mortality of individuals of vernal pool fairy shrimp, vernal pool tadpole shrimp, and California tiger salamander, but that the affected individuals represent only small proportions of the regional populations of each species (as quantified by the amounts of known occupied habitat described in Table 8).

If, during the course of this action, the levels of incidental take described herein are exceeded, such incidental take represents new information that would require the reinitiation of consultation and review of the reasonable and prudent measures provided above. The Corps must immediately provide an explanation of the causes of the taking, and review with the Service the need for possible modification of the reasonable and prudent measure.

Reporting Requirements

The following reporting requirements will assist the Service in tracking the success or failure of the Conservation Measures proposed by the University. The activity, type of reporting requirement, reporting format, and timing of reporting are listed in the project EIS/EIR Mitigation Monitoring Plan (Impact Sciences 2008).

The University must provide the Service with annual reports to describe the progress of implementation of all the commitments in the Conservation Measures of this biological opinion. The first report is due January 31, 2010, and annually thereafter, until performance criteria are met.

The Sacramento Fish and Wildlife Office is required to be notified within three working days of the finding of any dead listed wildlife species or any unanticipated harm to the species addressed in this biological opinion. The Service contact person for this is the Chief, Endangered Species Division at (916) 414-6600. The Sacramento Fish and Wildlife Service Office must be notified immediately if any dead or sick listed species is found in or adjacent to pesticide-treated areas. Cause of death or illness, if known, also should be conveyed to this office.

The Corps must require the Applicants to report to the Service immediately any information about take or suspected take of listed wildlife species not authorized in this opinion. The Corps must notify the Service within 24 hours of receiving such information. Notification must include the date, time, and location of the incident or of the finding of a dead or injured animal. The Service contact is the Service's Law Enforcement Division at (916) 414-6660.

Any contractor or employee who during routine operations and maintenance activities inadvertently kills or injures a listed wildlife species must immediately report the incident to their representative. This representative must contact the California Department of Fish and Game immediately in the case of a dead or injured animal. The California Department of Fish and Game contact for immediate assistance is State Dispatch at (916) 445-0045.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to use their authorities to further the purposes of the Act by conducting conservation programs for the benefit of endangered and threatened species. Towards this end, conservation recommendations are discretionary activities that an action agency may undertake to minimize or avoid the adverse effects of a proposed action, help implement recovery plans, or develop information useful for the conservation of listed species.

The Service recommended that the Corps and the University implement the conservation recommendations listed in the 2002 BO to achieve Federal conservation requirements of the Act. These recommendations are included in this 2009 BO Amendment, and the University's comments on these recommendations are set forth below.

1) The University and the County should assist the Service in recovery actions identified in the Valley Elderberry Longhorn Beetle Recovery Plan, Recovery Plan for Upland Species of the San Joaquin Valley, the Pacific Bald Eagle Recovery Plan, and The Recovery Plan for Vernal Pool Species (in preparation).

The bald eagle was delisted in 2007 and the Service has proposed to delist the Valley elderberry longhorn beetle. The 2002 BO and the 2009 BO Amendment determined that the University's Proposed Project would have little or no impact on these species.

Implementation of the Conservation Strategy, *Management Plan for Conservation Lands*, Compensatory Wetland Mitigation Plan, as well as adherence to the commitments of the BA Supplement, RMP, 2002 BO, 2009 BO Amendment, section 404 permit, and EIR/EIS mitigation measures will contribute to meeting the recovery criteria specified in the recovery plans for upland San Joaquin Valley species and vernal pool species. Specifically, meeting the commitments within these regulatory documents will minimize the impacts of the Campus and Community North by minimizing the size of the footprint and locating these project components on lands with lower values for these species than on preserved lands. It also will minimize disturbance from campus construction and operation.

The University's Proposed Project also will protect an estimated total of more than 27,700 acres of mitigation lands supporting high quality vernal pool-grassland habitat, including nearly 9,498 acres in the Tier 1 mitigation areas, 17,141 acres in the Tier 2 mitigation areas, and an additional currently unquantified area within wetland restoration and creation mitigation sites. This level of land compensation exceeds the amounts required under the 2002 BO, and thereby contributes to

species recovery. Tier 1 and wetland restoration and creation sites will be actively managed to conserve listed species, while conservation easements on Tier 2 lands restrict potentially detrimental land uses.

2) Conduct scientific studies on the California tiger salamander and midvalley fairy shrimp to support conservation activities.

The Service declined to list the midvalley fairy shrimp in 2004, because it concluded that the threats to the species were limited and were largely being addressed by existing regulatory mechanisms (see previous section, *Changes in Consultation Requirements*). Surveys for the species and the analysis and conservation measures included in the Conservation Strategy contributed useful information for this determination. Midvalley fairy shrimp habitat will be monitored incidentally on Tier 1 mitigation lands as well as within compensatory wetland restoration and creation areas.

The UC will conduct monitoring of tiger salamander populations and its competitors as specified in the *Management Plan for Conservation Lands*.

Scientific research will be permitted within Tier 1 lands owned by the UC (the VST Preserve and CNR) subject to conditions described in the *Management Plan for Conservation Lands*. Research on the genetics of the California tiger salamander has been conducted on UC Conservation Lands since the 2002 Biological Assessment (Fitzpatrick and Shaffer 2007).

3) Evaluate species of concern, particularly the midvalley fairy shrimp and the California tiger salamander and their associated habitats to assess possible adverse effects of the UC Merced campus and community and implement Conservation Measures that could protect these species.

UC has assessed the effects of the Campus and Community North, as well as the entire Proposed Action, on both species in the Conservation Strategy and the 2008 BA Supplement. Conservation measures adopted to protect other vernal pool species will provide protection for the midvalley fairy shrimp and tiger salamander. As documented in the BA Supplement and this 2009 BO Amendment (see *Effects of the Proposed Action*), the efforts to reduce the size of the Campus and Community footprint reduced impacts to habitat for both species and increased the amount of conserved habitat. The *Management Plan for Conservation Lands* also identifies a variety of specific measures to protect and enhance California tiger salamander breeding habitat.

4) Implement actions to conserve the California tiger salamander and midvalley fairy shrimp in eastern Merced County.

See response to Conservation Recommendations 1 and 3 above. Measures implemented to conserve other vernal pool and grassland species (described in the *Management Plan for Conservation Lands*) and to restore vernal pool habitats (described in the Compensatory Wetland

Mitigation and Monitoring Plan) will also conserve these species, as documented in the 2008 BA Supplement and the Conservation Strategy.

5) Provide outreach to the public and to schools on protecting listed species, establishing safe harbors, forming partnerships that foster conservation and habitat conservation planning.

The *Management Plan for Conservation Lands* identifies policy and guidelines for encouraging education of the students, faculty, and staff at the Campus and residents of the Community North regarding conservation resources. These measures are currently being implemented. Conservation lands under UC ownership will be available for educational uses, under the plan's guidance. UC has established extensive partnerships with TNC regarding management of lands and easements for conservation lands.

6) The University of California should review current management on lands it holds conservation easement for, to determine compatibility with wildlife use, and adjust if appropriate and feasible.

Management of Tier 1 and 2 lands has been specified in the *Management Plan for Conservation Lands*. This plan specifies detailed management commitments for Tier 1a lands and summarizes Tier 1b and Tier 2 management and monitoring authorities. The management priority for Tier 1a lands, for which the University holds title and will conduct management, are to protect and enhance biological resource values. The plan substantially alters management of these lands by monitoring and controlling invasive species and establishing other protection and enhancement measures.

7) The University should coordinate with the Service, CDFG, the County and private landowners to continue to participate in the development of an NCCP/HCP consistent with the Planning Agreement.

Through extensive cooperation with the Service, DFG, Corps, USEPA, County, private landowners, and regional and local conservation interests, the UC Merced planning and permitting process has contributed to the conservation of listed species and other conservation resources in eastern Merced County. Although the NCCP/HCP planning process has been inactive for several years, UC has agreed to cooperate in future planning efforts should they be reinitiated.

REINITIATION – CLOSING STATEMENT

This concludes formal consultation on the action(s) outlined in the Description of the Proposed Action. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been maintained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new

information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

We appreciate your continuing efforts to conserve listed species. Please contact Susan Jones, San Joaquin Valley Branch Chief, or Cay Goude, Assistant Field Supervisor of this office at (916) 414-6600, if you have any questions.

Sincerely,

Cay C. Moore

Susan K. Moore
Field Supervisor

Enclosures

Enclosure A. Parameters from the 2002 Biological Opinion (pages 9-11).

Table 1. Recent Consultation Meetings on Endangered Species Issues Related to the University of California Merced's Proposed Project
Table 2. Conservation Lands Units and Sizes
Table 3. Summary of the Status of Compliance with the Parameters Included in the 2002 Biological Opinion for The University of California Merced Campus and Infrastructure Project
Table 4a. Habitat Impacts, Conserved Lands, and Mitigation Ratios Achieved for Federally Listed and Other Key Species for the UC Merced Campus and University Community
Table 4b. Numbers of Known Species Point Locations within Project Lands and Conserved Lands, and Mitigation Ratios Determined from Numbers of Occurrences
Table 5. Summary of Management and Monitoring Requirements for UC-owned Lands Included in the 2002 BO and the Status of Compliance
Table 6. Suitable Habitats and Distances from Known Occurrences Used in Defining Occupied Habitat for Listed Species
Table 7. Comparison of Impacts, Conserved Lands, and Mitigation Ratios Achieved in the 2002 Proposed Action for Construction of the UC Merced Campus and University Community (North and South)

cc.
University of California at Merced, Merced, California (attention Brad Samuelson)
California Department of Fish and Game, Fresno, California (attention Julie Vance)
Airola Environmental Consulting, Sacramento, California (attention Dan Airola)
Gibson and Skordal, Sacramento, California, (attention Tom Skordal)
Clark Morrison, San Francisco, California

LITERATURE CITED

Airola, D. A. 2007. Bald eagle nesting in relation to human disturbance sources in the Lake Almanor region, California. *Transactions of the Western Section of the Wildlife Society* 43:19–26.

———. 2008a. *Supplement to the Biological Assessment for the University of California, Merced campus and the University Community North.* (September 2008). Prepared for University of California, Merced.

———. 2008b. *Management Plan for Conservation Lands and the Adjacent Campus Buildout Lands for the University of California, Merced.* (September 2008). Prepared for University of California, Merced.

Anderson, J. D. 1968. Comparison of the food habits of *Ambystoma macrodactylum sigillatum*, *Ambystoma macrodactylum croceum*, and *Ambystoma tigrinum californiense*. Herpetologica 24(4): 273-284.

Anderson, P. R. 1968. The reproductive and developmental history of the California tiger salamander. Masters thesis, Department of Biology, Fresno State College, Fresno, California. 82 pages.

Barry, S. J. and H. B. Shaffer. 1994. The status of the California tiger salamander (*Ambystoma californiense*) at Lagunita: A 50-year update. Journal of Herpetology 28(2): 159-164.

EIP Associates. 2002. Biological Assessment CWA Section 404 permit applications for UC Merced Campus Project and County of Merced Infrastructure in Support of UC Merced Project. (February). Prepared for University of California, Merced, and County of Merced Public Works Department, CA.

Feaver, P. E. 1971. Breeding pool selection and larval mortality of three California amphibians: *Ambystoma tigrinum californiense* Gray, *Hyla regilla* Baird and Girard and *Scaphiopus hammondi hammondi* Girard. Master's thesis, Department of Biology, Fresno State College, Fresno California. 58 pages.

Fitzpatrick, B. M. an H. B. Shaffer. 2004. Environmental-dependent admixture dynamics in a tiger salamander hybrid zone. Evolution 58(6): 1282-1293.

Gibson and Skordal. 2008. Compensatory wetland mitigation and monitoring plan (Revised June 2008). Prepared for University of California, Merced.

ICF Jones & Stokes. 2008. *Proposed Conservation Strategy for the UC Merced Project.* (September 2008). Prepared for University of California, Merced.

Impact Sciences. 2008. UC Merced and University Community Project, Draft Environmental Impact Satement/Environmental Impact Report. November. Prepared for the U.S. Army Corps of Engineers, Sacramento District.

Jennings, M. R., and M. P. Hayes. 1994. Amphibian and reptile species of special concern in California. Report prepared for the California Department of Fish and Game, Inland Fisheries Division, Rancho Cordova, California, 255 pages.

Jones & Stokes 2002a. *Supplement to the Biological Assessment for the UC Merced Campus Project.* (J&S 01549.) Sacramento, CA. Prepared for the University of California, Merced, and the County of Merced Department of Public Works.

———. 2002b. *Resource Mitigation Plan for Federally Listed Species That May Be Affected by the Establishment of the University of California, Merced.* February 8. Prepared for University of California, Merced.

———. 2002c. *Construction Mitigation Plan for Biological Resources for Phase 1 of the University of California, Merced Project.* Prepared for University of California, Merced.

Loredo, I., and D. Van Vuren. 1996. Reproductive ecology of a population of the California tiger salamander. Copeia 1996(4):895-901.

Loredo, I., D. Van Vuren and M. L. Morrison. 1996. Habitat use and migration behavior of the California tiger salamander. Journal of Herpetology 30(2): 282-285.

Morey, S. R. 1998. Pool duration influences age and body mass at metamorphosis in the western spadefoot toad: implications for vernal pool conservation. Pages 86-91 *in* Witham, C.W., E.T. Bauder, D. Belk, W.R. Ferren Jr., and R. Ornduff (editors). Ecology, Conservation, and Management of Vernal Pool Ecosystems - Proceedings from a 1996 Conference. California Native Plant Society. Sacramento, California. 1998.

Pechmann, J. H. K., D. E. Scott, J. W. Gibbons, and R. D. Semlitsch. 1989. Influence of wetland hydroperiod on diversity and abundance of metamorphosing juvenile amphibians. Wetlands Ecology and Management 1(1):3-11.

Petranka, J. W. 1998. Salamanders of the United States and Canada. Smithsonian Institution Press, Washington, D.C.

Riley, S. P. D., H. B. Shaffer, S. R. Voss, and B. M. Fitzpatrick. 2003. Hybridization between a rare, native tiger salamander (*Ambystoma californiense*) and its introduced congener. Biological Applications 13(5): 1263-1275.

Scott-Graham, E. 1994. A proposal for incentive-driven habitat creation and enhancement on farmlands in the San Joaquin Valley under the Federal Endangered Species Act. American Farmland Trust. Visalia, California. 34 pp.

Semlitsch, R. D., D. E. Scott, and J. H. K. Pechmann. 1988. Time and size at metamorphosis related to adult fitness in *Ambystoma talpoideum*. Ecology 69: 184-192.

Semonsen, V. J. 1998. Natural history notes: *Ambystoma californiense* (California Tiger Salamander). Survey technique. Herpteological Review 29:96.

Shaffer, H. B., R. N. Fisher, and S. E. Stanley. 1993. Status report: the California tiger salamander (*Ambystoma californiense*). Final report for the California Department of Fish and Game. 36 pages plus figures and tables.

Shaffer, H. B., G. B. Pauly, J. C. Oliver, and P. C. Trenham. 2004. The molecular phylogenitics of endangerment: cryptic variation and historic phylogeography of the California tiger salamander, *Ambystoma californiense*. Molecular Ecology 13: 3033-3049.

Stebbins, R. C. 2003. A field guide to western reptiles and amphibians. Houghton Mifflin Company, Boston, Massachusetts.

Storer, T. I. 1925. A synopsis of the amphibia of California. University of California Publications in Zoology, 27:1-1-342.

Sweet, S. 1998. Letter to Dwight Harvey, U.S. Fish and Wildlife Service with a report titled "Vineyard development posing an imminent threat to *Ambystoma californiense* in Santa Barbara County, California." University of California, Santa Barbara, California.

Trenham, P. C. 1998a. Radio Tracking Information, unpublished manuscript. 6 pp.

_____ 1998b. Demography, migration, and metapopulation structure of pond breeding salamanders. Ph.D. dissertation. University of California, Davis, California 96 pp.

_____ 2001. Terrestrial habitat use by adult California tiger salamanders. Journal of Herpetology 35: 343–346.

Trenham, P. C., W. D. Koenig, and H. B. Shaffer. 2001. Spatially autocorrelated demography and interpond dispersal in the salamander *Ambystoma californiense*. Ecology 82: 3519-3530.

Trenham, P. C., H. B. Shaffer, W. D. Koenig and M. R. Stromberg. 2000. Life History and Demographic variation in the California Tiger Salamander *Ambystoma californiense*. Copeia 2000(2): 365-377.

Trenham, P. C., and H. B. Shaffer. 2005. Amphibian upland habitat use and its consequences for population viability. Ecological Applications 15:1158–1168.

Twitty, V. C. 1941. Data on the life history of *Ambystoma tigrinum californiense* Gray. Copeia 1941 (1):1-4.

University of California, Merced (UC Merced). 2002. *Long Range Development Plan Final Environmental Impact Report.* (SCH No. 2001021065). January.

University of California Regents (University of California). 2008. *University of California at Merced Revised D. A. Permit Application Supplement to Eng Form 4345.* Submitted to U.S. Department of Army, Corps of Engineers, Sacramento District, Sacramento, California.

———. No date. *Integrated Pest Management Program Manual.* Merced, California.

U. S. Fish and Wildlife Service. 1998. *Recovery Plan for Upland Species of the San Joaquin Valley, California.* Authors: D. F. Williams, E. A. Cypher, P. A. Kelly, K. J. Miller, N. Norvell, S. E. Phillips, C. D. Johnson, and G. W. Colliver. For U.S. Fish and Wildlife Service Region 1, Portland, Oregon.

———. 2002. *Final Biological Opinion on the proposed University of California, Merced Campus, Phase 1 and Campus Buildout.* August 19. (1-1-02-F-0107.) Sacramento, California.

_____.2004. Endangered and threatened wildlife and plants; determination of threatened status for the California tiger salamander; and special rule exemption for existing routine ranching activities; final rule. **Federal Register** 69: 47212-47248.

———. 2005. *Recovery Plan for Vernal Pool Ecosystems of Southern Oregon and California.* December 15. Region 1. Portland, Oregon.

———. 2006. *Valley Elderberry Longhorn Beetle (Desmocerus californicus dimorphus) 5-Year Review and Evaluation.* September. Sacramento, California: Sacramento Fish and Wildlife Office, Sacramento, California.

Vollmar, J. E. (ed.). 2002. Wildlife and rare plant ecology of eastern Merced County's vernal pool grasslands. Vollmar Consulting, Berkeley, California.

Wilbur, H. M. and J. P. Collins. 1973. Ecological aspects of amphibian metamorphosis. Science (n.s.), 182(4119): 1305-1314.

PERSONAL COMMUNICATIONS

Vollmar, J. E. Plant Ecologist. Vollmar Consulting. Conversation with Brad Samuelson. May 2008.

course access road, which will be used for construction access to the Phase 1 site, and they are located outside of the footprint of the construction area. Thus, because all Phase 1 construction will occur within the Phase 1 boundary and outside of the watersheds of existing vernal pools, swales, and other wetland resources, Phase 1 will not impact downgradient or upgradient wetlands.

Although Section 404 authorizations are not required for Phase 1, these development activities are an integral part of the Main Campus. Accordingly, this analysis addresses the potential effects of the development of Phase 1.

The Parameters

As described above, the University and the County have agreed that the Parameters will apply to any Preferred Alternative that may be selected by the Corps within the Study Area. These Parameters are not, however, intended to control the Corps' analysis under the laws and regulations applicable to the Corps. Where applicable, these Parameters apply both to the development projects specifically proposed by the University, the County, and to other development occurring within the Study Area. In addition to the Parameters, the University and the County have proposed a number of additional "Conservation Measures" which, in many cases, will serve to implement the Parameters described and are considered part of the Proposed Actions.
The Parameters are as follows:

1. Development of Conservation Strategy

   a. The Applicants will prepare and implement, in coordination with the Service and CDFG, a comprehensive strategy that incorporates the Conservation Measures for the San Joaquin kit fox, vernal pool plant species and branchiopods, and other protected species to guide the development and implementation of specific conservation for the Proposed Actions and as needed to assure that other development within the Study Area is consistent with the Conservation Strategy as described in parameter 1b, below.

   b. The Conservation Strategy will include monitoring and adaptive management measures and be consistent with and intended to implement the Recovery Plan for Upland Species of the San Joaquin Valley, California, and any future federal recovery planning efforts.

2. Parameters for Covered Projects

   a. All conservation actions described below will be developed and implemented by the appropriate party, including the CDFG where

appropriate. These conservation actions include, among other things, completion by the Applicants of the Conservation Strategy; completion of a review by the Service of all preserve lands which have been acquired (i.e., in fee or easement) to date to determine the applicability for conservation for protected species; advance Service review and approval of further fee or easement acquisitions; and completion of a Resource Mitigation Plan (to be prepared for the Main Campus as described below) and Habitat Mitigation Plan (to be prepared for the Infrastructure Project as described below) consistent with the parameters set forth herein. The Resource Mitigation Plan and Habitat Mitigation Plan will include, among other things and in addition to the measures set forth in the BA supplement, management strategies and financial assurances for the monitoring and management of preserve lands and a strategy for addressing indirect effects. All the above, including the terms and conditions of conservation easements and management plans, and the adequacy of funding assurances, will be subject to review and approval by the Corps and the Service.

b. The Applicants will develop, in coordination with the Service, Corps, and CDFG, a plan to address potential effects to the San Joaquin kit fox, which will be consistent with the Conservation Strategy and may be included in the Resource Mitigation Program and/or Habitat Mitigation Plan. This plan, at a minimum, will address a migration corridor to the north and northeast of the Proposed Actions (as presently proposed by the Applicants) to be protected and maintained through acquisitions and other possible actions (e.g., passage over canals). Any such acquisitions will be consistent with the establishment of a connection to the Sandy Mush Road area.

c. The extent and nature of proposed conservation, and any proposed ratios, for grassland and vernal pool species will be at least equivalent to those set forth in the BA and will be approved by the Service and the Corps together with any avoidance and minimization measures.

d. Management plans and adequate financial assurances for long-term monitoring and management of identified preserve lands will be provided to and approved by the Service and the Corps.

e. No direct impact to Conservancy fairy shrimp, including its watershed, will occur. Indirect effects to the Conservancy fairy shrimp will be minimized and avoided to the maximum extent practicable. Any unavoidable indirect effects to occupied Conservancy fairy shrimp habitat will be compensated through the preservation of habitat within areas

approved by the Service and the Corps as set forth more specifically below and found in the BA supplement.

f. For San Joaquin Valley Orcutt grass, Colusa grass, fleshy owl's-clover, hairy Orcutt grass, Hoover's spurge, Greene's tuctoria, and Hartweg's golden sunburst, the University will, to the maximum extent practicable, avoid and minimize effects on these federally listed plant species through siting, design, and conservation measures. Any occupied habitat of these seven listed species will be preserved within areas approved by the Service as set forth more specifically below in the Conservation Measures. For effects to vernal pools and associated habitats, as well as any other wetlands, the Applicants will develop and implement a restoration/creation plan focusing on areas where the vernal pool signature or suitable extirpated habitat is still present or other suitable areas. This plan will include appropriate monitoring and adaptive management measures, together with adequate financial assurances, to be reviewed and approved by the Service and the Corps.

3. Parameters Regarding Development and Other Discretionary Projects in the Study Area

a. Merced County will provide written assurance to the Service and the Corps that for all discretionary projects permitted by the County within the Study Area, other than the Proposed Actions, that may result in take of a listed species, Merced County will require compliance with the Endangered Species Act. This provision will include projects served by state or federally-funded roadways or other infrastructure that may be developed to serve the Campus or the Campus Community.

b To ensure no effect on Merced River and delta species (which are not subject to this consultation), withdrawals from the Merced River resulting from the Covered Projects (i.e., for recharge purposes) will be within the parameters of the existing OCAP biological opinion and formal consultation. The Applicants will also provide evidence that groundwater pumping and stormwater discharges will not affect listed species.

Conservation Measures

This section describes conservation measures that the University and the County have agreed to apply in order to avoid, minimize, and compensate for potential effects that the Proposed Actions could have on listed species. Conservation measures for the Proposed Actions are presented first; these are followed by specific conservation measures for the Phase 1 Campus project.

Table 1. Recent Consultation Meetings on Endangered Species Issues Related to the University of California Merced's Proposed Project

Date	Attendee Groups*	Major Subjects Covered
6/20/06	UC, USFWS, DFG, NGOs	BO requirements, project mitigation
9/27/06	UC, USFWS, NGOs	Conservation Strategy, habitat mitigation lands
12/12/06	UC, USFWS, DFG, USEPA, NGOs	Conservation Strategy, Draft EIS, and 404 permit status,
1/3/07	UC, USFWS, DFG, NGOs	Conservation Strategy, Draft EIS, Management Plan
5/17/07	UC, USFWS, DFG, NGOs	Campus planning, Conservation Strategy, Management Plan, Draft EIS, and 404 permit process.
6/1/07	UC, USFWS, USEPA, NGOs, Merced County	404 Permit Application
6/13/07	UC, USFWS, USEPA, NGOs, Merced County	Campus planning requirements
7/2/07	UC, USFWS, USACOE, USEPA	Campus Footprint
8/30/07	UC, USFWS, DFG, NGOs	Regulatory process, Management Plan
10/25/07	UC, USFWS, DFG, NGOs	Proposed cooperative agreement, project schedule
1/8/08	UC, USFWS, DFG, NGOs	NEPA process, schedule, Management Plan, Conservation Strategy
3/4/08	UC, USFWS	ESA consultation schedule, BA outline, Conservation Strategy, mitigation lands
3/4/08	UC, USFWS, DFG, NGOs	Campus and community planning, compliance schedule

Notes:

Numerous additional meetings were held during 2003 through mid-2006 involving the Conservation Strategy and Compensatory Wetlands Mitigation and Monitoring Plan.

*Key to attendees:

UC	=	University of California administration, staff, attorneys and/or consultants
USFWS	=	U. S. Fish and Wildlife Service staff
DFG	=	California Department of Fish and Game
USACOE	=	U. S. Army Corps of Engineers and consultants
USEPA	=	U. S. Environmental Protection Agency
NGOs	=	Nongovernmental organizations (The Nature Conservancy, California Native Plant Society, Vernal Pools.org, San Joaquin Raptor-Wildlife Rescue Center, Defenders of Wildlife, San Joaquin Valley Conservancy, Protect Our Water, Butte Environmental Council)

Table 2. Conservation Lands Units and Sizes

Major Land Category	Land Unit	Size (Acres)	Owner	Easement Holder
Tier 1a				
	Virginia Smith Trust (VST) Preserve	5,030	UC	The Nature Conservancy (TNC)
	Campus Natural Reserve (CNR)	1,307	UC	Not yet conveyed
	Myers Easterly	91	UCLC	TNC
Tier 1b				
	Cyril Smith Trust	3,070	TNC	Not yet conveyed
Tier 1 Subtotal		*9,498*		
Tier 2				
	Carlson	305	Private	California Rangeland Trust (CRT)
	Chance	7,619	Private	TNC
	Cunningham	1,761	Private	CRT
	Nelson	3,861	Private	CRT
	Robinson	3,595	Private	TNC
Tier 2 Subtotal		*17,141*		
Total: All Conservation Lands		**26,639**		

Table 3. Summary of the Status of Compliance with the Parameters Included in the 2002 Biological Opinion for The University of California Merced Campus and Infrastructure Project (see *Status of Conservation Measures,* for more details)

Parameter	Subparameter Requirements for Applicants	Status of Compliance
1. Development of Conservation Strategy	a. Prepare and implement a comprehensive strategy that incorporates Conservation Measures for San Joaquin kit fox, vernal pool plants and branchiopods, and other protected species to guide development and implementation of specific conservation for the proposed actions	These requirements have been met through commitments outlined in the Conservation Strategy, Conservation Lands Management Plan, Compensatory Wetland Mitigation Plan, and 2008 BA Supplement, and forthcoming EIR/EIS.
	b. Include monitoring and adaptive management measures consistent with and implementing species recovery plans	Monitoring and adaptive management measures are incorporated in to management of UCM Conservation Lands, other Conservation Lands, and compensatory wetland mitigation planning, as outlined in the Conservation Strategy, Conservation Lands Management Plan, Compensatory Wetland Mitigation Plan, and 2008 BA Supplement
2. Parameters for Covered Projects	a. (1) USFWS to review all preserve lands that have been acquired to date to determine the applicability for conservation of protected species	This review has been accomplished through the Service's review of the 2002 BAs, as addressed in the 2002 BO, and subsequently through reviews of several drafts of the Conservation Strategy and Compensatory Wetland Mitigation Plan, and numerous discussions regarding the configurations of the Campus and University Community (see Table 1-1). This parameter will be further addressed in the Service's forthcoming review of the final Conservation Strategy, 2008 BA Supplement, Conservation Lands Management Plan, and Compensatory Wetland Mitigation Plan, and 2008 BA Supplement
	a. (2) USFWS to review and approval of future fee or easement acquisitions	No additional acquisitions have been made since the 2002 BO. Lands formerly proposed as a part of the Campus and designated as the Campus Land Reserve have been incorporated into the CNR at the urging for the Service.
	a. (3) Prepare a Resource Mitigation Plan (for Main Campus)	Preparation of the Conservation Lands Management Plan has met this requirement.
	a. (4) Prepared a Habitat Mitigation Plan (for Infrastructure Project and Campus Community)	A Habitat Mitigation Plan was prepared by the County and submitted to the Service. The Infrastructure Project has now been subsumed into the University's proposed project for the Campus and Community North. Habitat mitigation for the Infrastructure and Community North portions of the project has been incorporated into the Conservation Strategy, Compensatory Wetland Mitigation Plan, and the 2008 BA Supplement.
	b. Develop a plan to address potential effects on kit fox, including a migration corridor to the north and northeast of the proposed actions, to be protected and maintained through acquisitions and other possible actions (e.g., passage over canals)	This measure was addressed in the final Conservation Strategy. The Campus and University Community were reconfigured through extensive discussion with the Service and other agencies (see ***Consultation Subsequent to Issuance of the 2002 BO)***. Maintenance of a corridor for kit

Parameter	Subparameter Requirements for Applicants	Status of Compliance
		fox movements was an important goal of this reconfiguration. Construction of a passage across the canal is proposed, as discussed in the Conservation Strategy and in this 2008 BA Supplement.
	c. Ensure that the extent and nature of proposed conservation, and any proposed ratios, for grassland and vernal pool species will be at least equivalent to those in the BA	Land conservation for listed species remains consistent with the approach described in the BA and 2002 BA Supplement. The acreage of impacts on listed species habitat has declined as a result of the Campus reconfiguration, while the assignment of former campus lands and the Campus Land Reserve to the CNR has increased the acreage of Conservation Lands. Therefore, ratios of compensation to impact acreages, which previously exceeded minimum ratios in the 2002 BA, have now increased (see Chapter 6). Summaries of impacts and mitigation acreages to occupied habitats and "occurrences" for listed species are presented in the Conservation Strategy and in this BA Supplement (Table 4-1 and 6-1).
	d. Ensure long-term funding assurances for management and monitoring of preserve lands	Funding for management and monitoring is assured through an endowment established by the University. Funding Assurances are discussed in Chapter 9 of the Conservation Lands Management Plan.
	e. Avoid any direct impact on Conservancy fairy shrimp; Avoid and minimize indirect impacts to the maximum extent practicable; compensate for any unavoidable indirect impacts though preservation of approved area.	Direct impacts on Conservancy fairy shrimp have been avoided through incorporation of the entire watershed of the pool occupied by the species within the CNR, which will protected with a conservation easement and managed according to the measures described in the Conservation Lands Management Plan. The potential for indirect impacts have been further reduced since the 2002 BO by incorporation of additional lands (the former Campus Land Reserve) adjacent to the watershed of the occupied pool in to the CNR during campus reconfiguration. The Conservation Lands Management Plan also outlines a full range of management measures to prevent unauthorized disturbance of the CNR lands, and ensure proper management for conservation values, as well as monitoring to detect and address threats of invasive species. Conservation for this species is addressed in detail in the 2002 BA and BO, Conservation Strategy, Conservation Lands Management Plan, and elsewhere in this 2008 BA Supplement.
	f. (1) Avoid and minimize effects on seven listed vernal pool plants to the maximum extent practicable through siting, design, and conservation measures	Avoidance and minimization measures implemented during Campus siting, design, and operation, and related conservation measures were previously incorporated in the 2002 BA and BA Supplement and in the 2002 BO. With the exception of the succulent owl's clover, impacts on listed vernal pool plant species were avoided during siting of the Campus and Community North. Conservation lands are protecting habitat for two species, the San Joaquin Valley Orcutt grass and Colusa grass. The project

Parameter	Subparameter Requirements for Applicants	Status of Compliance
		would result in direct and indirect impacts to 32 acres of occupied habitat for the succulent owl's clover, but would protect 689 acres (a 22:1 ratio). Conservation values for listed plants are detailed in the Conservation Strategy. Measures for managing habitats for listed plants are included in the Conservation Lands Management Plan, and in this 2008 BA Supplement.
	f. (2). Develop and implement a restoration/creation plan for vernal pools and associated habitats and other wetlands, focusing on areas where the vernal pool signature is still present or other suitable areas; include provisions for monitoring and adaptive management, and adequate financial assurances	The program outlined in the Compensatory Wetland Mitigation Plan meets these requirements.
3. Parameters Regarding Development and Other Discretionary Projects in the Study Area	a. Merced County will provide written assurances that all other projects in the study area will comply with the ESA	This requirement is the responsibility of Merced County.
	b. Applicants will provide evidence that groundwater pumping and stormwater discharges will not affect Merced River and Delta species	This issue was addressed in the 2002 project BA and in the BO. No changes to the project have altered the conclusions of these analyses that use of groundwater for the Campus and University Community will not result in impacts on the Merced River flows and Delta species

Table 4a. Habitat Impacts, Conserved Lands, and Mitigation Ratios Achieved for Federally Listed and Other Key Species for the UC Merced Campus and University Community

	Impacts of Project Components of Proposed Action[a] (acres)					Conserved Lands (acres)			Mitigation Ratios		
Species	Campus[b]	Community North[b]	Total: Proposed Project	Community South[c]	Total: Proposed Action	Tier 1a	Tiers 1b and 2	Total: All Conservation Lands	Tier 1a: Campus and Community North	Tier 1 & 2: Campus and Community North	Tier 1 & 2: Campus, and Community North and South
Succulent owl's clover	27	4	31	0	31	313	376	689	10.1	22.2	22.2
Colusa grass	0	0	0	0	0	156	0	156			
SJV Orcutt grass	0	0	0	0	0	16	0	16			
Conservancy fairy shrimp	0	0	0	0	0	14	0	14			
Vernal pool fairy shrimp	42	19	61	<1	61	490	653	1,143	8.0	18.7	18.7
Vernal pool tadpole shrimp	0	4	4	0	4	14	0	14	3.5	3.5	3.5
California tiger salamander											
Occupied habitat	971	913	1,884	0	1,884	6,242	13,902	20,144	3.3	10.7	10.7
Critical habitat	193	36	229	0	229	5,914	6,187	12,101	25.8	52.8	52.8
San Joaquin kit fox											
Primary habitat	720	573	1,293	61	1,354	6,128	18,055	24,183	4.7	18.6	17.8
Secondary habitat	196	480	676	1,286	1,962	64	1,460	1,524	0.1	2.1	0.8
All habitat	919	1,053	1,969	1,347	3,316	6,192	19,515	25,707	3.1	13.1	7.8

[a] Includes both direct and indirect impacts.

[b] Components that comprise the University's Proposed Project.

[c] This area is not part of the University's Proposed Project, but is an interrelated and interdependent project under the Proposed Action.

Table 4b. Numbers of Known Species Point Locations within Project Lands and Conserved Lands, and Mitigation Ratios Determined from Numbers of Occurrences

	Impacts of Project Components of Proposed Action[a]			Conserved Lands		Mitigation Ratios		
Species	Campus[b]	Community North[b]	Community South[c]	Tier 1a	Tiers 1b and 2	Tier 1a: Campus and Community North	Tier 1 and 2: Campus and Community North	Tier 1 and 2: Campus, and Community North and South
Succulent owl's clover	8	1		244	495	27.1	82.1	82.1
Colusa grass				5				
SJV Orcutt grass				1				
Conservancy fairy shrimp				1				
Vernal pool fairy shrimp	98	111	2	307	363	1.5	3.2	3.2
Vernal pool tadpole shrimp		1		4	1	4.0	5.0	5.0
California tiger salamander		1		13	17	13.0	30.0	30.0
San Joaquin kit fox								

[a] Includes both direct and indirect impacts.

[b] Components comprising the University's Proposed Project.

[c] This area not part of the University's Proposed Project, but is an interrelated and interdependent project under the Proposed Action.

Table 5. Summary of Management and Monitoring Requirements for UC-Owned Lands Included in the 2002 BO and the Status of Compliance

Measures to be Included in the Conservation Lands Management Plan	Status of Compliance
Compensation goals and objectives	Included in the Conservation Lands Management Plan
Maps and description of the management area compensation habitat within each site and areas to be enhanced, restored, or used for habitat creation	Compensation habitat within management areas are identified in the plan. Management measures to be applied to these areas to maintain and enhance habitat are identified. Because of the high quality habitat within conservation lands, the plan does not propose major enhancement of existing conditions or creation of new habitats. Measures to restore habitats in the future if they become degraded (e.g., through colonization by invasive weeds) are identified in the management policies of the plan
Description of how compensation meets preserve criteria specified in the RMP	USFWS previously approved preserve areas. Compensation ratios achieved are addressed in this BA Supplement, under *Effects of the Proposed Action*
Descriptions of the mechanisms used to protect the compensation habitat in perpetuity and land use restrictions to prevent incompatible activities	The Conservation Lands Management Plan provides extensive direction that commits UC to protect habitat by grazing lands compatibly, preventing unauthorized use, managing research and educational uses, controlling pest species, providing fire protection, and other actions. Lands have been protected in perpetuity through enactment of conservation easements or are committed for future application of conservation easements
The parties responsible for implementing the plan	Responsible parties and their roles are identified in the Management Plan. UC will conduct daily management and monitoring activities. The easement for the VST Preserve is held by TNC. The easement holder for the CNR has not yet been determined but will be either a government agency or a conservation organization approved by the USFWS and DFG.
Description of and restrictions on recreational, educational and scientific activities that will be permitted and protocols for approving uses	UC has adopted policies and procedures to ensure that recreational, educational, and scientific activities on Conservation Lands will not detrimentally affect conservation values. This program is included in Chapter 5 of the Management Plan
Methods for controlling illegal uses	UC has committed to and is implementing measures for controlling illegal uses of Conservation Lands, as described in Chapter 5 of the Management Plan

Measures to be Included in the Conservation Lands Management Plan	Status of Compliance
Details on habitat restoration and enhancement measures	Although no major habitat restoration or enhancement is contemplated, due to the high quality of habitat within UC Conservation Lands, UC has committed to measures that will address restoration after fire and invasion by pest species is outlined in Chapter 5 of the Management Plan
Monitoring measures, protocols, periods	UC has committed to a comprehensive monitoring program for Conservation Lands. Elements of the monitoring program are described in the Chapter 7of the Management Plan.
Short- and long-term adaptive management measures	UC has committed to adaptive management measures for management of UC Conservation Lands and conservation lands under easement (to the degree allowed there), as described in Chapter 8 of the Management Plan.
Funding assurance for habitat enhancement, monitoring, and reporting	UC's funding program ensures that funds for management and for monitoring and reporting, as described in Chapter 9 of the Management Plan.
Active management that allows grazing management, control of invasive species, and fuel management	UC has committed to an active management program for UC Conservation Lands, as described in Chapter 5 of the Management Plan.

Table 6. Suitable Habitats and Distances from Known Occurrences Used in Defining Occupied Habitat for Listed Species

Species	Suitable Habitats for Species							Distance Used to Define Occupied Habitat (m)[1]
	Vernal Pool	Swale Wetland	Clay Slope Wetland	Canal Wetland	Intermittent Channel	Irrigation Wetland	Annual Grassland	
Succulent owl's clover	X	X				X		200
Colusa grass	X	X				X		200
SJ Valley Orcutt grass	X					X		200
Conservancy fairy shrimp	X							200
Vernal pool fairy shrimp	X	X				X		200
Vernal pool tadpole shrimp	X	X				X		200
California tiger salamander	X	X	X	X	X	X	X	2500
San Joaquin kit fox	X	X	X			X	X	NA[2]

[1] Occupied habitat was defined as suitable habitat within the specified distance (in meters) of known occupied sites (see text).

[2] Not applicable: kit fox habitat suitability was based on a multivariable model described in the Conservation Strategy (Jones & Stokes 2008).

Table 7. Comparison of Impacts, Conserved Lands, and Mitigation Ratios Achieved in the 2002 Proposed Action for Construction of the UC Merced Campus and University Community (North and South)

	Campus and Community Impacts (ac)				Conservation Lands							Mitigation Ratios			
					Tier 1a		Tier 1b and 2	Total				Tier 1a Lands Only		All Mitigation Lands	
	2002	2008	Difference (Ac)	% Change	2002	2008	2002/ 2008	2002	2008	Difference (Ac)	% Change	2002	2008	2002	2008
Species															
Succulent owl's clover	54	31	-23	-43	228	313	376	604	689	+85	+14	4	10	11	22
Colusa grass	0	0	0		147	156	0	147	156	+9	+6				
San Joaquin Valley Orcutt grass	0	0	0		16	16	0	16	16	-15	-48				
Conservancy fairy shrimp	0	0	0		14	14	0	14	14	-13	-48				
Vernal pool fairy shrimp	116	61	-55	-47	443	490	653	1,096	1,143	+47	+4	4	8	9	19
Vernal pool tadpole shrimp	0	4	+4	100	14	14	0	14	14	0	0		3.5		3.5
California tiger salamander	2,052	1,884	-159	-8	5,967	6,242	13,902	19,869	20,144	+275	+1	3.0	5	9	11
San Joaquin kit fox															
Primary habitat	1,662	1,354	-308	-19	5,663	6,128	18,055	23,742	24,183	+441	+2	3.4	4.5	14	18
Secondary habitat	1,859	1,962	+103	+6	71	64	1,460	1,467	1,524	-57	-4	0	0	0.8	0.8
Total	3,521	3,316	-205	-6	5,734	6,192	19,475	25,273	25,707	+434	+2	1.6	1.9	7	8

Table 8. Summary of Impacts on Habitat and Known Point Locations for Species Likely to be Subject to Take from the Campus and Community North (University's Proposed Project) and Campus and University Community (Proposed Action)

	Habitat (acres)		Point Locations	
Species	Campus and Community North	Campus and University Community	Campus and Community North	Campus and University Community
Succulent owl's-clover	32	32	9	9
Vernal pool fairy shrimp	61	61	211	213
Vernal pool tadpole shrimp	4	4	1	1
California tiger salamander	1,884	1,884	1	1

Table 9 - Summary of species-specific recovery criteria for federally listed vernal pool species within Merced County areas

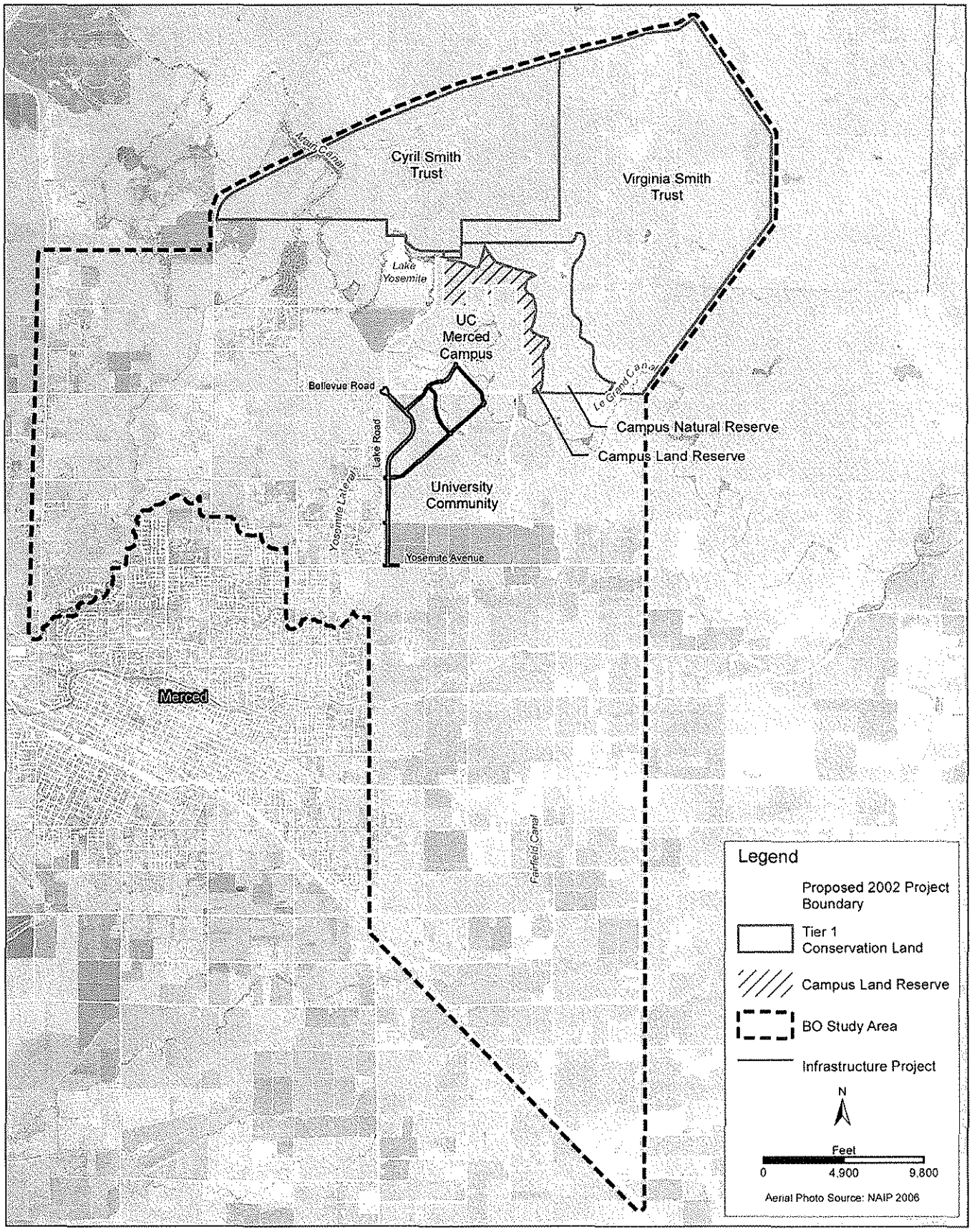
Species	Priority of Merced County for Species Conservation	Percent of Occurrences to be Protected in region	Reintroduction/ Introductions Recommended to Areas Where Species has been Extirpated?
Succulent (fleshy) owl's-clover	1	95	Yes
Hoover's Spurge	1	95	Yes
Colusa grass	1	90	Yes
San Joaquin Valley Orcutt grass	Region not included	100% of any newly discovered occurrences	Yes
Hairy Orcutt grass	1	95%	Yes
Greene's tuctoria		100% of any newly discovered occurrences	Yes
Conservancy fairy shrimp	Region not included	100% of any newly discovered occurrences	Yes
Vernal pool fairy shrimp	1	85	No
Vernal pool tadpole shrimp	1	95	Yes

Dan Airola
Airola Environmental Consulting
2700 6th Avenue
Sacramento, CA 95818

Julie Vance
California Department of Fish and Game
1234 Shaw Avenue
Fresno, California

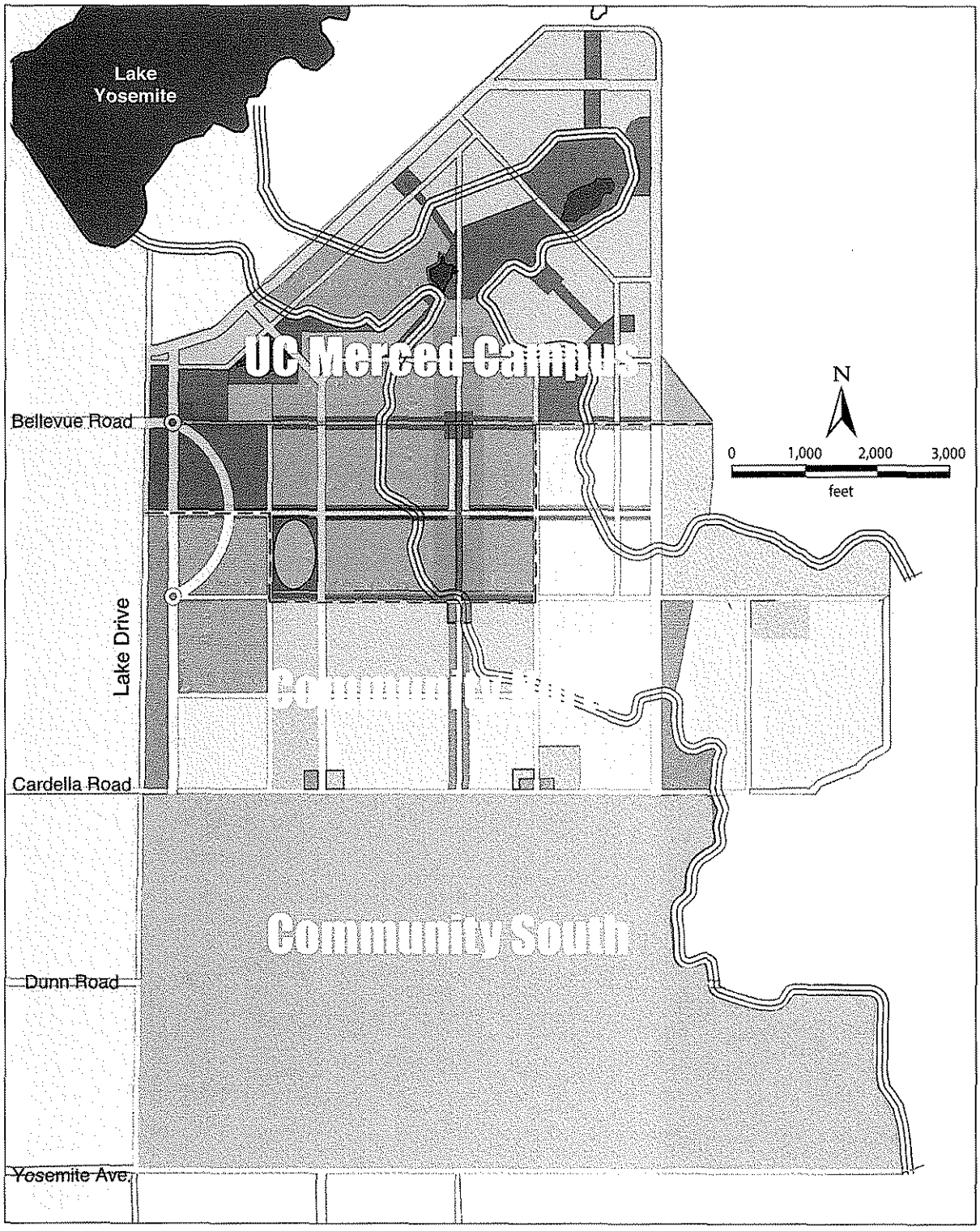
Tom Skordal
Gibson and Skordal
2277 Fair Oaks Blvd, Suite 105
Sacramento, CA 95825

Clark Morrison
555 California Street, 10th floor
San Francisco, CA 94104



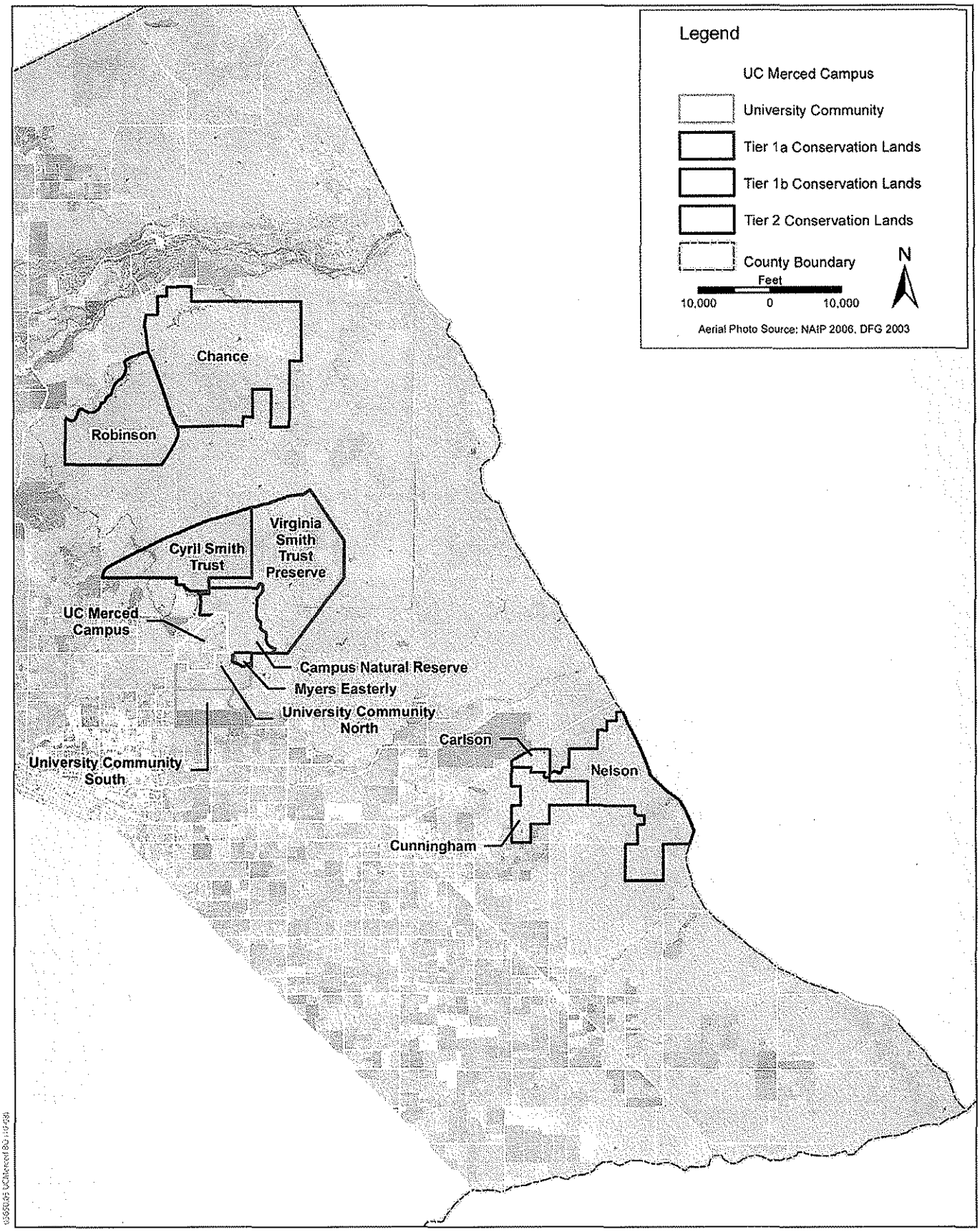
ICF Jones & Stokes
an ICF International Company

Figure 1
UC Merced Study Area and Project Components Addressed in the 2002 Biological Opinion



ICF Jones & Stokes
an ICF International Company

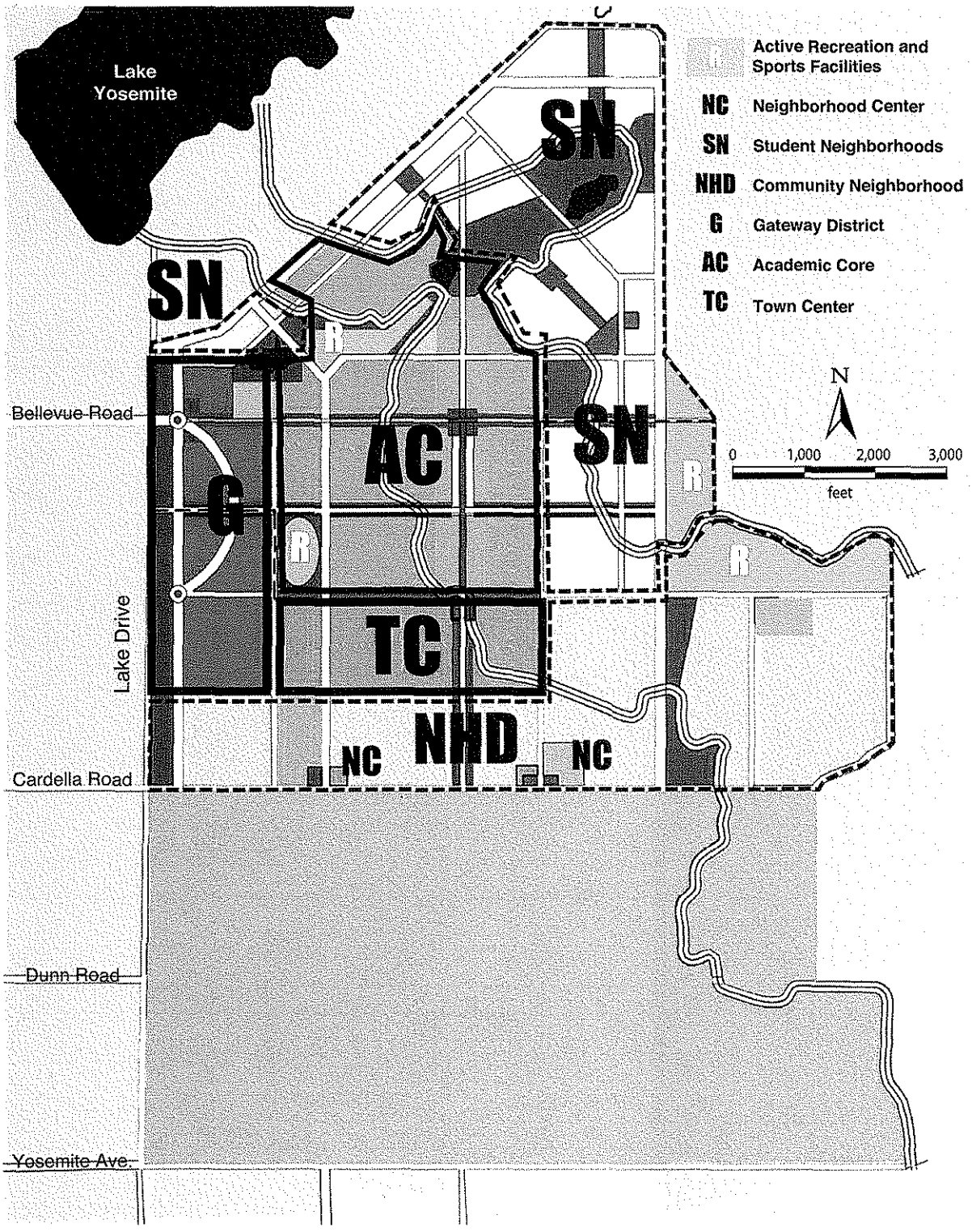
Figure 2
UC Merced Campus and University Community Project Lands



ICF Jones & Stokes
an ICF International Company

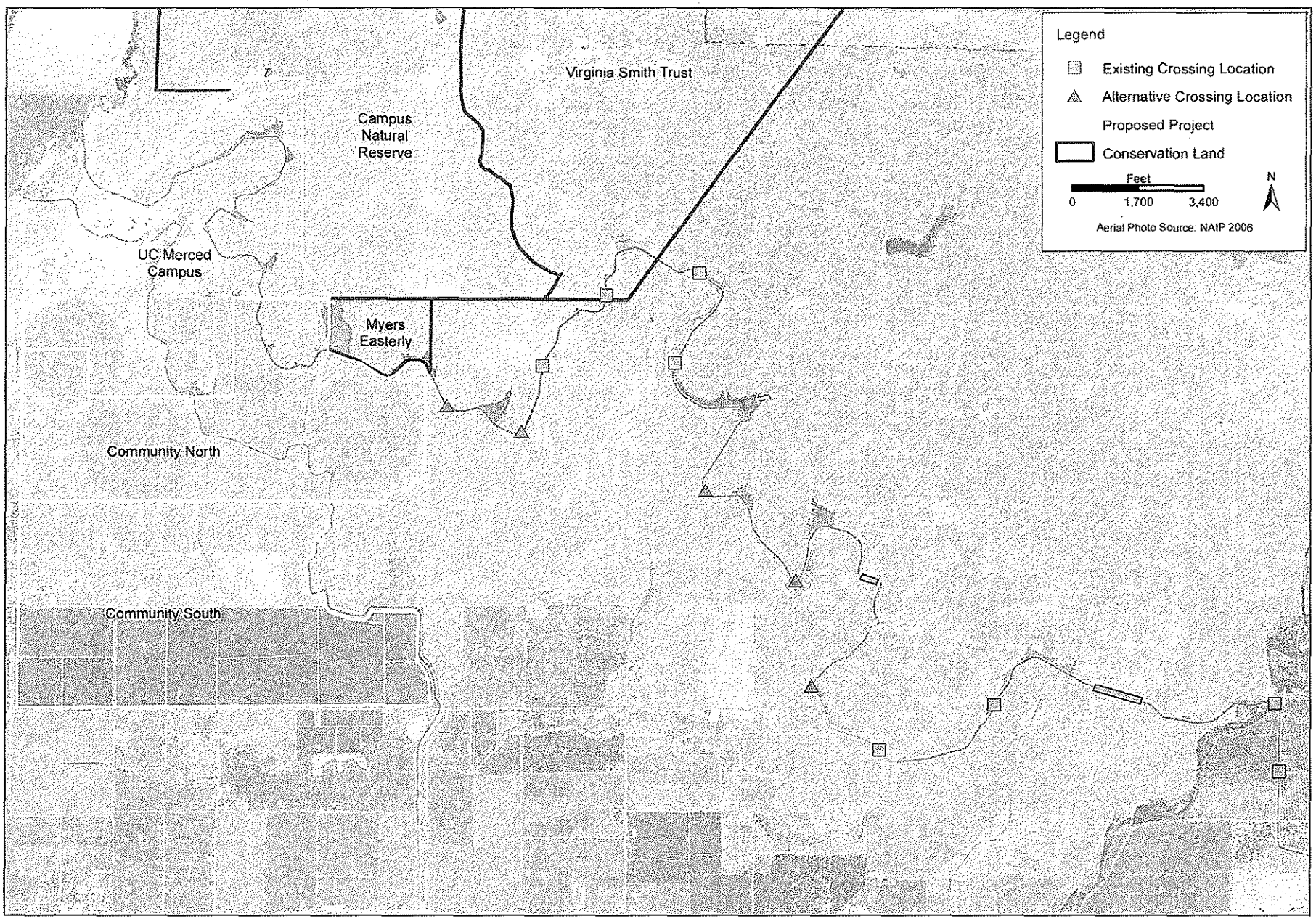
Figure 3
Conservation Lands for the UC Merced Project

Land Use Districts Key Map



ICF Jones & Stokes
an ICF International Company

Figure 4
Land Use Districts for the UC Merced Campus and Community North Areas



ICF Jones & Stokes
an ICF International Company

Figure 5
Alternative Locations under Consideration by UC for Placement of a Crossing over the LeGrande Canal to Enhance Kit Fox Movements