Part IV - Environmental Impacts

1. Natural Resources General Comments

The City owns 19 Natural Areas comprising 1,423 acres, four parks and over 27 miles of trail associated with the Cache la Poudre River. These facilities have an estimated value of well over $30 million. In addition, the City has made substantial investments in, and bears significant responsibilities for, the planning and management of the Poudre River floodplain and related stormwater matters. In addition, the City's center and Downtown redevelopment efforts are built upon a healthy and sound Poudre River flowing through the heart of Fort Collins. Thus, the City has a substantial interest in the environmental consequences of the proposed action (*See* Table at the end of this Section IV.1 and Table in Section V.1a of these Comments).

Both the DEIS and Vegetation Technical Report acknowledge certain riparian areas to be sensitive through Fort Collins. (Figure 3-14 of the DEIS lists several of Fort Collins' Natural Areas as "Sensitive Riparian Areas along the Poudre River. These include: #3 Butterfly Woods, #4 North Shield Pond, Magpie Meander, McMurry, Salyer, Lee Martinez, Rivers Edge; #5 Williams, Springer; and #6 Cattail Chorus and Riverbend Ponds). These areas were acquired by the City to protect their ecological, recreational, social, aesthetic and economic values in perpetuity for the benefit of the citizens of Fort Collins. For these reasons, these areas qualify for review and protection under Sections 230.40, 230.51, 230.52 and 230.54 of the Section 404(b)(1) Guidelines. The riparian corridor provides ecological services such as flood control, river bank stability, filtration of nutrients and contaminants from agricultural and urban runoff, and critical wildlife habitat within a semi-arid landscape.

Under Clean Water Act Section 404(b), the potential adverse impacts to City Natural Areas must be carefully evaluated to ensure that the integrity of the natural values and "ecological services" of these areas are maintained or improved. *See* 73 Fed. Reg. 19,594 (April 10, 2008). *See e.g.*, Sections 230.40, 230.51, 230.52 and 230.54 of the Section 404(b)(1) Guidelines. The DEIS fails to fully analyze the adverse effects to the natural environment of the Poudre River, and the related impacts to City Natural Areas and other facilities in the vicinity of the River.

The Corps must evaluate and address the adverse impacts from the substantial reductions in flow from NISP and must fully address the expected impacts in accordance with the Section 404(b)(1) Guidelines. *See* Section II.1a of these Comments for further discussion in this regard. This must be done in an SDEIS, Revised Section 404(b)(1) Analysis and subsequent documents.

It is important to note that three Natural Areas (McMurry Natural Area, Cattail Chorus Natural Area, and Running Deer Natural Area), are encumbered by legally-binding conservation easements held by Legacy Land Trust for the State Board of the Great Outdoors Colorado Trust Fund. These legally-binding documents require the City of Fort Collins "*to prevent the significant impairment or interference with conservation values*" which include natural habitat, open space and scenic values of these properties. The City

is legally bound to the citizens and to the State of Colorado to preserve and protect the conservation values of these properties.

With respect to mitigation, the adaptive management approach suggested in the DEIS is inadequate. As proposed in the DEIS, the adaptive management approach generally results in segmentation of the review and analysis of the impacts from NISP, rather than a meaningful and recognizable mitigation strategy. An adaptive management program must first be based on a detailed mitigation plan.

Development of a detailed mitigation plan would need to fully involve the City and other stakeholders and should follow the process developed by The Nature Conservancy and the Army Corps of Engineers and outlined in Richter et al. (2006) and would include and address the following:

- A series of workshops attended by stakeholders to determine an environmental flow plan similar to that described by Richter et al. (2006). An environmental flow plan should be pursued that is based on the best available science developed by river scientists, water managers, and other important stakeholders.
- The magnitude, frequency and duration of flows required for maintaining each specific element of river health should be determined. The key elements include (but are not limited to); river morphology and sediment transport, water quality, fisheries and aquatic biota, recharge of alluvial water table, overbank flooding of specific riparian areas.
- A commitment with binding, enforceable assurances from the Corps and project proponent on the long-term funding, monitoring, and maintenance to meet desired outcomes.
- A commitment to maintain recreation flows as related to the city's substantial recreation and economic interests.

Finally, although each of the mitigation measures proposed (including management of in-channel and riparian vegetation, installation of in-stream structures to control sediment movement, and flow regulation/exchanges, etc.) may be useful and promote desired effects, they will not reduce the impacts of the proposed project to the level of non-significance. The mitigation measures are localized, whereas the potential impacts from the proposed action are systemic. To further reduce the annual peak flows that structure and maintain all aspects of the river system implicates several Section 404(b)(1) Guidelines criteria that have not been addressed in the DEIS. The City is not aware of any way to reduce this to a level of non-significance or to satisfy Section 404(b)(1) based on the current record.

City of Fort Collins Natural Areas along the Poudre River.

Property	Site Acres	Total Cost	Year of purchase	Management Purpose	Miles of Trail	Recreational Uses	Impact by NISP
Arapaho Bend	278	$ 1,601,240	1995	Natural area	2	walk, wildlife, bike, equestrian, dogs, fishing, boating	Fishing, boating, aesthetics, possible wildlife impacts
Butterfly Woods	24	$ 191,208	1996	Natural area	0.4	walk, wildlife, bike, equestrain, dogs, handicap accessible	Fishing, boating, aesthetics, possible wildlife impacts
Cattail Chorus	40	$ 589,901	1997	Natural area	0.25	walk, wildlife, bike, dogs, handicap accessible	Fishing, boating, aesthetics, possible wildlife impacts
Cottonwood Hollow	93	$ 255,241	1995	Natural area	0.4	walk, wildlife viewing	Fishing, boating, aesthetics, possible wildlife impacts
Gustav Swanson	12	$ 18,735	1955	Natural area	0.3	walk, wildlife, bike, dogs, handicap accessible, fishing, boating	Fishing, boating, aesthetics, possible wildlife impacts
Kingfisher Point	134	$ 1,214,691	1997	Natural area	0.8	walk, wildlife, bike, equestrian, dogs, handicap accessible, fishing, boating	Fishing, boating, aesthetics, possible wildlife impacts
Magpie Meander	11	$ 62,878	1995	Natural area	0.2	walk, wildlife, dogs, handicap accessible, fishing	Fishing, boating, aesthetics, possible wildlife impacts
McMurry	45	$ 249,905	1998	Natural area	1.5	walk, wildlife, bike, equestrian, dogs, fishing, boating	Fishing, boating, aesthetics, possible wildlife impacts
North Shields Pond	10	$ -	1962	Natural area	0.6	walk, wildlife, bike, equestrian, dogs, handicap accessible, fishing, boating	Fishing, boating, aesthetics, possible wildlife impacts
Nix	34	$ 762,125	1979	Natural area	0.3	walk, wildlife, bike, equestrain, dogs, handicap accessible	Fishing, boating, aesthetics, possible wildlife impacts
Prospect Ponds	25	$ -	1974	Stormwater / Natural area	1.3	walk, wildlife, bike, equestrian, dogs, handicap accessible, fishing, boating	Fishing, boating, aesthetics, possible wildlife impacts
Riverbend Ponds	223	$ 259,861	1977	Natural area	4	walk, wildlife, bike, equestrian, dogs, handicap accessible, fishing, boating	Fishing, boating, aesthetics, possible wildlife impacts
River's Edge	8	$ 31,810	1994	Natural area	0.1	walk, wildlife, bike, equestiran, dogs	Fishing, boating, aesthetics, possible wildlife impacts
Running Deer	370	$ 2,850,449	1998	Natural area	2.4	walk, wildlife, handicap accessible	Fishing, boating, aesthetics, possible wildlife impacts
Salyer	24	$ -	1985	Natural area	0.6	walk, wildlife, bike, equestrian, dogs, fishing	Fishing, boating, aesthetics, possible wildlife impacts
Springer	24	$ 10	1990	Natural area	0.5	walk, wildlife, bike, equestrian, dogs, fishing	Fishing, boating, aesthetics, possible wildlife impacts
Sterling	44	$ 1	2007	Natural area	1	walk, wildlife, bike, equestrian, dogs, fishing, boating	Fishing, boating, aesthetics, possible wildlife impacts
Udall	25	$ 335,592	1994	Stormwater/ Natural area	0	not open to public	Fishing, boating, aesthetics, possible wildlife impacts
Williams	1	$ -	1990	Natural area	0.1	walk, wildlife, bike, equestrian, dogs, handicap accessible	Fishing, boating, aesthetics, possible wildlife impacts

2. River Morphology

2a. General Comments

The impacts to stream morphology are identified in the DEIS as:

- channel narrowing
- greater sediment deposition and less sediment flushing
- vegetation encroachment into the channel
- increase in size of in-channel islands
- flow obstruction and flooding
- reducing scouring and channel rejuvenation
- bank erosion

Among the shortcomings of the DEIS geomorphic analysis is a lack of any serious discussion regarding the potential for decreased flood conveyance capacity and increased flood depths associated with channel aggradation, narrowing, and vegetation encroachment in the City of Fort Collins segment. Although Alternative 2 is very likely to increase vegetation encroachment and reduce channel conveyance capacity in the absence of periodic channel maintenance flows, it would not reduce the magnitude of the most extreme flow events delivered to the Fort Collins river segment (e.g., exceedance p = 0.01-0.02 in the annual maximum series). This is a point that must be addressed with regard to public safety and as well as potential costs to the City.

Additional impacts not specifically discussed in the DEIS include

1. Fining of bed sediment and lack of scouring of coarse, immobile sediment;
2. loss of channel complexity;
3. Potential for a threshold in-channel response to altered flows.

At the heart of these three additional impacts is the central role of seasonal snowmelt floods in structuring and maintaining the type of cobble- to boulder-bed, pool-riffle channels represented by the Poudre River between the canyon mouth and Interstate 25. This portion of the Poudre is subject to rainfall-generated flash floods that generate tremendous hydraulic forces and strongly influence channel planform, bedforms, and the diversity of aquatic and riparian habitat. These storms have a recurrence interval of decades to centuries (Shroba et al., 1979; Jarrett, 1989; Grimm et al., 1995). Although they recur infrequently with respect to the lifespan of most aquatic and riparian organisms, the very large rainfall floods set the large-scale physical template of the river system (Shroba et al., 1979), as explained in the DEIS.

In addition to potential decreased flood conveyance and increased flood depths, sediment deposition can change the size distribution of bed sediment. Reduced flows can result in a shift toward finer grained bed sediment that can alter periphyton and macroinvertebrate communities and spawning habitat for fish. Reduced flows can also fail to mobilize sand and gravel size sediment. Under larger, more natural snowmelt peak flows, sand and gravel in transport scours or abrades periphyton from larger, relatively stable cobbles and boulders. The absence of this annual scouring can change periphyton and macroinvertebrate communities (Bunn and Arthington, 2002).

Working on a portion of the Poudre River above Boxelder Creek and just downstream from Fort Collins, Milhous (2007) identified a threshold discharge of 2,050 cfs as necessary to flush sand and finer sediment from the streambed. While this study did not measure or model the duration required for 2,050 cubic feet per second (cfs) to flush sand and sediment, a span of seven days has been estimated by the author of the study (Milhous, 2008). Under the present conditions of regulated flow on the Poudre River, such flushing has occurred during 12 of the past 32 years, with no flow reaching this threshold during the past 7 years (Milhous, 2007). The changes in flow along this portion of the Poudre that are proposed as part of NISP would further reduce the frequency and magnitude of flows capable of flushing sand and fine sediment from the streambed. The frequency of flows above 2,050 cfs under NISP conditions is not known since stream stage was modeled at a monthly time-step. The Spells analysis developed in the River Morphology and Sediment Transport Technical Report provides some daily flow data, however, the results do not indicate the frequency of flows at 2,050 cfs.

The loss of channel complexity refers to reduced physical diversity in the form of bedform sequences (e.g., pools and riffles), secondary or overflow channels, and irregularities in the channel margin that typically result in enhanced age and species diversity of riparian vegetation (Poff et al., 1997). Annual flood peaks of varying magnitude, at least some of which are capable of mobilizing gravel- to cobble-size material, are critical to maintaining channel complexity (Stanford et al., 1996; Poff et al., 1997; Hohensinner et al., 2004). When this complexity is reduced, age and species diversity of aquatic and riparian communities declines (Poff et al., 1997; Galat and Lipkin, 2000; Baron et al., 2002; Bunn and Arthington, 2002). Statements such as that on page 4-30 of the DEIS, "… *this reach is well armored and is stable except during very large flood flows,*" although correct, overlook the importance of annual floods that do not necessarily mobilize the coarsest bed sediment but do produce bed scouring and maintain or enhance channel complexity.

Similarly, statements such as those on page 4-32 of the DEIS *("Impacts from NISP would likely be progressive rather than sudden, could occur over decades, and may be small compared to changes that are already occurring"*) and page 5-15 of the DEIS *("… the response of and changes to the Poudre River associated with the action alternatives are anticipated to be less than the historical morphologic changes that have occurred and continue to occur"*) ignore the possibility of non-linear change in the Poudre River in response to reduced flows. Complex systems, including physical and ecological processes in rivers, are inherently non-linear (Stanford et al. 1996; Ward et al., 2001). Numerous investigators have demonstrated that rivers commonly exhibit complex responses to single external changes such as reduced flow or sediment supply (Schumm, 1974; Merritt and Wohl, 2003).

The DEIS makes no mention of the possibility that further reducing the critically important annual snowmelt peak could cause the Poudre River in the study area to cross a threshold and respond in a non-linear manner that would result in much greater loss of channel complexity and physical and ecological function. Although it is appropriate to start with the simplest scenario and assume continued linear change in a river as annual peak flow is progressively reduced, the potential significant adverse impacts that could result from crossing a geomorphic threshold must be addressed in an SDEIS.

Due to the failure to address critical issues regarding sedimentation and river morphology, the DEIS fails to comply with its obligations under both NEPA and the Section 404(b)(1) Guidelines. *See e.g.*, Section 404(b)(1) Guidelines §§ 230.20 (substrate), 230.23 current patterns), 230.24 (normal water fluctuations), and 230.45 (riffle and pool complexes). These issues must be adequately addressed in an SDEIS.

2b. Specific Comments on DEIS

DEIS Section 1.9.1 Key Issues Identified for Analysis in the EIS, page 1-48
Statement: *"This section identifies the significant issues to be addressed in the EIS. During scoping, comments were submitted, then categorized into several specific areas (ERO 2005a). Based on the issues and recommendations identified in the scoping comments, as well as guidance from NEPA, the following general categories of significant issues will be the focus of the EIS:*

1. Surface Water
2. Stream Morphology
3. Water Quality
4. Water Rights
5. Ground Water
6. Geology
7. Soils
8. Vegetation
9. Noxious Weeds
10. Wetlands and Other Waters
11. Riparian Resources
12. Wildlife
13. Fish and Other Aquatic Life
14. Species of Concern
15. Recreation Resources
16. Cultural Resources
17. Aesthetics and Visual Quality
18. Traffic and Transportation
19. Land Use
20. Socioeconomic Resources
21. Hazardous Sites
22. Noise
23. Air Quality
24. Energy

Comment: The deposition of fine sediments as a result of significantly reduced peak flows is cause for concern under any of the action alternatives. The Scoping Report identified sedimentation as a *"major category"* related to comments received. Sedimentation is a major issue for 404(b)(1) analysis, specifically particulate deposition (see Part 230.21(b)) and changes in current patterns and water circulation related to deposition of suspended particulates (Part 230.23). However, sedimentation was not directly called out in the above list of "significant issues" for the DEIS, but rather was incompletely incorporated into other categories, most notably stream morphology, aquatic habitat and vegetation encroachment. Given the importance of sedimentation in scoping and the Guidelines, this topic should have been directly addressed as an independent topic. Regardless, the Section 404(b)(1) Analysis (Appendix D) does not adequately address this issue**.**

DEIS Section 3.4 Stream Morphology, page 3-22
Statement: *"Most of the Poudre River in the study area is slightly entrenched. The Fort Collins, Greeley Channelized and Greeley Downstream reaches have been channelized due to past human activities such as gravel mining and levee construction, which has resulted in entrenchment of the channel. These areas are unstable, continually working toward the reestablishment of functional floodplains inside the confines of a continually widening channel."*

Comment: First, this statement is partly contradicted by the next paragraph on the same page which states that: *"The streambed through the Laporte and Fort Collins reaches is armored and will remain stable during all but large flood events. During large floods, some channel adjustment would be expected and the armor layer could be disturbed or breached in places, resulting in some instability and bank erosion."* Such contradictory statements in the DEIS make it difficult to understand whether this channel is considered stable or unstable.

Second, the statement that the Fort Collins Reach of the River (defined in the DEIS as the reach extending from the Larimer and Weld Canal to the Fort Collins Wastewater Treatment Plant #2) is unstable and that the channel is continuing to widen is unsupported and is based on the unreliable Rosgen methodology for stream classification. These statements are from the Level 1 Classification Results on page 2.14 of the River Morphology and Sediment Transport Technical Report (ACE, 2008) (RMSTTR), which states that: *"The bankfull width was taken from hydraulic models of top width at "bankfull" flow in the Poudre River…This range encompasses values for both stream types "C" and "F". The bias in the range is toward stream type "C"…The difference between type "C" and type "F" channels is essentially the level of entrenchment, which can be difficult to visually discern in marginal channels (i.e., those stream channels that may be transitioning from one stream type to another)…Entrenched type "F" channels are characteristically unstable and continually work towards the re-establishment of functional floodplains inside the confines of a continually widening channel, which eventually results in the re-establishment of a type "C" stream. This appears to be the case along much of the Fort Collins, Greeley Channelized and Greeley Downstream reaches."*

Roper et al. (2008) has shown that there can be considerable variation in determining Rosgen stream types because of major discrepancies in the determination of bankfull depth which can lead to potentially large differences in determination of flood prone width and consequent values of entrenchment. In addition, Rosgen found that "…the Rosgen method can yield nonunique solutions (multiple channel types), with no clear guidance for resolving these situations" and found that "…some assigned stream types did not match the appearance of the evaluated stream." Based on current conditions, this appears to be the case for the Fort Collins Reach. Existing conditions in this reach, which include extensive bank revetment in many areas, stable banks in the unrevetted areas, and confinement through man-made and bedrock controls in other areas, indicate that the River is "locked in place" and is no longer adjusting laterally. Existing conditions also indicate that the River has developed or re-established an inset floodplain in places. This demonstrates that the DEIS has not accurately characterized the Fort Collins Reach, undermining the analyses of stream morphology in the DEIS.

Finally, the classification of the Fort Collins Reach in the DEIS as being unstable and continuing to widen is also based on the Level II Classification Results on page 2.14 of the River Morphology and Sediment Transport Technical Report which states that: *"The "reference reach" approach was not utilized in the Level II effort, as the purpose is to classify the channel as it currently exists. Channel cross sections were identified that were considered representative of the conditions that were present within each study reach."* However, the description for the Fort Collins Reach from the RMSTTR, in contrast, states on page 2.21 that: "*The combined effect of the natural transitional location and the range of anthropogenic impacts is a highly variable river character in this reach. Channel geometry varies significantly from station to station as is evidenced by the wide variability in bankfull flow characteristics."* Yet, the DEIS characterizes this highly variable reach with 2 cross sections that are supposed to be "representative" of the reach.

Since the Fort Collins Reach is not accurately characterized by the DEIS, then it must be concluded that the DEIS analyses of the impacts of the project on stream morphology and sediment transport/deposition are flawed and inadequate.

DEIS Section 4.2.1.2 Stream Morphology, page 4-8
Statement: *"From the canyon mouth to Fort Collins, the action alternatives would be expected to increase bed and bank stability, but episodic erosion would still occur in response to large flood events. Some channel contraction would be expected in deposition zones."*

Comment: The DEIS does not accurately portray the severity of the impacts on the stream morphology of the Poudre River through Fort Collins. The DEIS discussion regarding this reach focuses on increased channel stability resulting from reduced stream flow. This same conclusion is found in discussion of the effects of the alternatives by resource, in Section 4.4.2.2, Stream Morphology, Fort Collins Reach (DEIS page 4-30). The DEIS primarily relies on the River Morphology and Sediment Transport Technical

Report (Corps, 2008) (RMSTTR) for this conclusion (e.g. see page 4-14 of the RMSTTR).

However, there are many potential adverse impacts to the channel from the significantly reduced flow that are not properly identified or analyzed in the DEIS. The Biological Assessment provided as Appendix B to the DEIS (BA) correctly identified potential adverse impacts stating *"…potential changes include channel narrowing, greater sediment deposition and less sediment flushing, vegetation encroachment into the channel, increase in the size of the in-channel islands, flow obstruction and bank erosion."* (BA, page 29). These concerns are repeated on page 34 of the BA in a discussion of the Poudre River upstream of Interstate 25.

The presentation of potential impacts in the DEIS is also not consistent with the field observations described in the RMSTTR. On page 2.21 of the RMSTTR, based on field observations, it is concluded that throughout the Fort Collins Reach: *"Deposition of fine sediments and subsequent growth of stabilizing vegetation on the channel margins and bars is a common process…"* Specifically, upstream of Shields they observe that *"Bed material is typically cobbles overlain by a veneer of fine sediment…"* From Shields to College the RMSTTR observes: *"…fine material continues to deposit and supports vegetation on channel margins and mid-channel bars*." Finally, below College RMSTTR observes: *"…deposits of fine material support encroaching vegetation…"*

Adding to the confusion, DEIS Table 4-20 (page 4-120), Summary of Estimated Effects for the Alternatives, seems to highlight the BA conclusions, not the DEIS conclusions. Under item 2, Stream Morphology, Table 4-20 indicates that the impacts of reduced peak season flows include channel narrowing, greater sediment deposition and less sediment flushing, vegetation encroachment, larger in-channel islands, flow obstruction, flooding and bank erosion. Yet DEIS Table 4-1 (page 4-4) states that these *"effects would be greatest below Fort Collins to above Greeley"* even though the greatest impact of the project on average monthly flows (e.g., 71% reduction in May for average year) will be in the Fort Collins Reach (see DEIS Table 4-2, pg. 4-5).

The increased deposition of fine sediments under the action alternatives was also not properly addressed in the Section 404(b)(1) Analysis. The Guidelines require that this issue be addressed. *See* Sections 230.21 and 230.24. The DEIS considers only potential changes in suspended sediment concentrations, and not issues related to particulate deposition (DEIS Appendix D, pgs. D-3 and D-4). The Guidelines also address sediment deposition related to changes in current patterns and water circulation. *See* Section 230.23. However, the Section 404(B)(1) Analysis related to this section of the Guidelines does not include any discussion of sediment deposition issues in the Poudre River (DEIS pgs D-11 to D12).

Finally, the Guidelines require addressing changes to riffle and pool complexes (*see* Section 230.45), and cite loss of value related to sedimentation induced through hydrologic modification that can clog riffle and pool areas and destroy habitats. The Section 404(B)(1) Analysis in the DEIS incorrectly concludes, based on a reference to the

RMSTTR, that the *"Impacts to riffle and pool complexes are expected to be minor"* (DEIS Appendix D, pg. D-19). As discussed throughout this section of the Comments, the overwhelming weight of evidence suggests that there will be significant impacts associated with increased sedimentation from NISP that would have serious impacts on riffle and pool complexes - - diminishing some and eliminating many.

The potential adverse impacts related to increased sedimentation of the channel through Fort Collins, as identified in the BA, are of great concern, and the discrepancy between the BA and the DEIS/RMSTTR regarding the range and severity of potential impacts must be resolved in an SDEIS. A Revised Section 404(B)(1) Analysis must also properly analyze the sediment deposition issue in the Poudre River.

DEIS Section 4.2.1.2 Stream Morphology, page 4-9
Statement: "*The most significant impacts of the action alternatives on stream morphology and sediment transport would be expected to occur between Fort Collins and Greeley. The existing process of channel contraction via sediment deposition and vegetation encroachment would be expected to accelerate."*

Comment: This same conclusion is found in the River Morphology and Sediment Transport Technical Report (Corps, 2008) (RMSTTR) on page 4.14, specifically: *"Through Fort Collins and upstream to the canyon, the Project is expected to increase bed and bank stability…"* However, the analysis completed for the RMSTTR does not support this conclusion. For example, the "Spells Analysis" found that the number of significant overbank flows at two stations in the Fort Collins Reach goes from 4 or 5 under baseline conditions to zero with the project, and concludes that this will influence colonization of vegetation and sediment movement and morphology of the channel (RMSTTR, pg. 4.6). The discussion further points out that the longer time between scouring events and the shorter duration of those events will promote vegetation encroachment. This suggests that the Fort Collins reach will also experience widespread deposition and vegetation encroachment, a finding which is more consistent with the field observations reported on page 2.21 of the RMSTTR.

Similarly, the stream power frequency analysis found that the biggest difference in stream power distribution between baseline and project conditions is actually upstream of Fort Collins in the Laporte Reach. Between 2,800 and 800 cubic feet per second (cfs) there is a 48% reduction in flow energy to do work such as moving bed sediments, eroding banks, cleaning out pools, and controlling vegetation (RMSTTR, pgs. 4.6-4.7). This discussion goes on to say that a similar impact will occur in the Fort Collins and Timnath Reaches, but the effect progressively decreases in the downstream direction. The discussion on page 4.8 concludes that the stream power results "*…represent significant decreases in available flow energy, sufficient to lead to noticeable changes in sediment accumulation, reduced scouring of pools, increased vegetative encroachment and decreased bank erosion."* This analysis also seems to suggest more significant changes will occur in the Fort Collins Reach and upstream, rather than the other way round.

The conclusions regarding potential stream morphology impacts in the Fort Collins Reach need to be revised in light of the supporting analysis that was completed. Based on the technical analysis completed for the DEIS, major changes to the channel through Fort Collins (with regard to fine grained sedimentation and vegetation encroachment) would result from the action alternatives. This is a great concern to the City of Fort Collins. As previously discussed, the 404(B)(1) Analysis does not adequately address the sediment deposition issue in the Poudre River under project conditions with regard to Sections 230.20 (substrate), 230.23 current patterns), 230.24 (normal water fluctuations), and 230.45 (riffle and pool complexes). The Corps must evaluate and address the sediment deposition issue and fully address the expected impacts in accordance with the Section 404(b)(1) Guidelines. *See* Section II.1a of these Comments for further discussion in this regard.

DEIS Section 4.4.2 Stream Morphology – Cache la Poudre River, page 4-30
Statement: *"The overall effect of the action alternatives throughout the study area would be that morphologic and sediment transport processes that depend on moderately high flows would become less dominant."*

Comment: It is well established in the scientific literature that western rivers are not only dependent on large flood events, but are equally dependent on the pulse of annual peak flows for maintaining physical and ecological diversity. The Poudre River is not exceptional in this regard.

Although snowmelt floods are of lower magnitude and generate less hydraulic force per unit area of the channel than rainfall flash floods (Jarrett, 1989), these floods occur every year at differing magnitudes and transport the majority of sediment moved each year, govern the annual pattern of floodplain inundation, deposition and erosion, maintain the bedform sequence and grain-size distribution of the bed sediment, and control the movement of aquatic and riparian organisms and propagules longitudinally and laterally within the river system (Andrews, 1984; Andrews and Erman, 1986; Merritt and Wohl, 2006; Rathburn et al., in press). An assumption underlying much of the DEIS seems to be that, because the River in the study area has coarse bed sediment that is not mobilized annually, infrequent rainfall flash floods not affected by NISP or other flow regulation projects will maintain channel complexity and function. Past changes along the Poudre River in the study area and changes along other, similar river systems, however, indicate that further reducing the annual peak flow will reduce channel complexity and function in a manner that is not adequately recognized by the piecemeal list of expected impacts in the DEIS.

The City has a vested interest in maintaining a healthy and functional river system which retains an open channel capable of transporting flood flows. The process of sediment deposition without the process of sediment flushing through scouring and erosion will lead to vegetation encroachment and subsequent channel constriction. These changes will significantly change the River's function as a conveyor of flood water and result in

flow obstruction, increased flood stages and possibly greater flood damage in the future. The DEIS and 404(b)(1) Analysis are inadequate in their treatment of this issue.

DEIS Section 4.4.2.2 Fort Collins Reach
General Comment: Secondary impacts (modification) from NISP related to channel contraction and reduced capacity could significantly impact how the City manages the Poudre's floodplain and related stormwater protection.

DEIS Section 4.4.2.2 Fort Collins Reach, page 4-30
Statement: *"In these depositional areas such as upstream of Mulberry St, acceleration in channel contraction would be expected and channel capacity reduced."*

Comment: Flood control and stormwater management has been a significant issue since the settlement of Fort Collins. In modern times, the City has experienced a number of flood events (1983, 1997, 1999, etc.) and over the last twenty plus years, the City has adopted a stormwater master plan for the Poudre River (Ayres, 2001) and has invested over $3 million on river stormwater modeling, planning, and construction of flood protection projects. For example, levees to protect the City's Drake Water Reclamation Facility (DWRF) and the residences in the Buckingham neighborhood have been constructed. The river bank has been stabilized in a number of locations through town. Furthermore, the acquisition and relocation of structures from the floodplain have also taken place. With the potential for increased base flood elevations due to sedimentation, these flood protection structures may become inadequate and the properties they are protecting would be at risk of loss and destruction again. The DEIS ignores this vital issue of public safety.

The floodplain along the Poudre River is federally designated by the Federal Emergency Management Agency (FEMA) (Larimer County Flood Insurance Study, 2006). This Flood Insurance Study establishes flood elevations and floodplain limits which are used to administer the floodplain. Channel contraction and vegetation encroachment from NISP would likely have significant adverse effects on base flood elevations (BFEs) and the resulting extent of flood inundations during large recurrence interval floods such as, the 100- and 500-year flood events. Reduced channel conveyance in the Poudre River would likely increase BFEs through the City. In turn, this would widen the limits of the floodplain and potentially add structures and properties into the floodplain and /or floodway that were not previously at risk of flooding. Addition of any new structures or properties to the floodplain would deviate from the City's goal of promoting the public health, safety and general welfare by minimizing future public and private flood losses. Flood risks could affect property values and business relocations, and, therefore, tax revenues. As remapping of the floodplain occurs, additional properties included in the floodplain by FEMA will be subject to the City's floodplain regulations and the mandatory flood insurance purchase requirements of the National Flood Insurance Program. The DEIS does not adequately address these impacts, or the related costs or cumulative adverse impacts to the City.

If the capacity of the Poudre River channel to convey floodwater is materially reduced, new river modeling, planning and prevention measures would need to be put in place to ensure the safety of the citizens of Fort Collins. Unless addressed in the DEIS, subsequent costs of designing, constructing and maintaining additional flood protection facilities or modifying existing structures would be borne by the citizens of Fort Collins. Additional multi-million dollar investments may be necessary. The DEIS does not adequately address these potential cumulative adverse impacts and the related costs to the City of Fort Collins and its Stormwater Utility rate payers, and is particularly deficient in meeting the criteria of Section 230.10(c)(1) and Section 230.11(b) promulgated under Section 404(b)(1).

DEIS Section 4.4.2.5 Summary of Effects to the Cache la Poudre River, page 4-31
Statement: *"Some channel contraction would be expected in depositional zones. The most significant impacts of the action alternatives on stream morphology and sediment transport would be expected to occur between Fort Collins and Greeley. The existing process of channel contraction via sediment deposition and vegetation encroachment would be expected to accelerate."*

Comment: This statement continues the DEIS premise that sediment deposition impacts through Fort Collins will be relatively insignificant. As discussed above, NISP will substantially reduce both river flows and associated channel flow velocities needed to maintain an open channel. Because of these diminished flows and flow velocities, deposition of fine sediments within the gravel and cobble bed of the Poudre River is likely to occur. A resulting cascade of adverse effects could follow, including increased vegetation encroachment into the channel causing the channel to narrow and constrict flows under normal conditions and subsequently obstruct flows under higher flow (flood) conditions.

The DEIS does not accurately define the severity or potential cumulative adverse impacts of fine sediment deposition impacts on the Poudre River through Fort Collins, nor does the Section 404(b)(1) Analysis adequately address the indirect impacts with regard to Section 230.11(b), Section 230.24(b), and Section 230.45(b). Instead, the DEIS concludes that the action alternatives would generally increase channel stability (see DEIS pg. 4-8 as discussed above). This conclusion contradicts the Biological Assessment (BA), which as part of the DEIS, correctly identified potential adverse impacts resulting from large flow reductions during spring runoff in wet and average years. The BA states: *"…potential changes include channel narrowing, greater sediment deposition and less sediment flushing, vegetation encroachment into the channel, increase in the size of the in-channel islands, flow obstruction and bank erosion…"* (Biological Assessment, DEIS Appendix B, page 29). This contradiction between the BA and the DEIS regarding the range and severity of potential impacts of sedimentation on the River through Fort Collins must be resolved in an SDEIS, Revised Section 404(b)(1) Analysis, and revised BA.

DEIS Section 4.4.3 Mitigation
General Comments:
A 25 % to 71% reduction in flows from NISP, as predicted in the DEIS, will result in major adverse impacts to the Poudre River Corridor through Fort Collins. The City's goal is to maintain existing flows and/or provide enhanced flows to support a healthy, functioning, and dynamic river system that is a solid foundation for recreation, pleasing aesthetics, economic benefits and values and diverse wildlife.

The DEIS proposes a few mitigation measures relevant to the Poudre River. While some of the mitigation proposed in the DEIS (including management of in-channel and riparian vegetation, installation of in-stream structures to control sediment movement, and flow regulation/exchanges, etc.) may be useful and promote local desired effects, they are not likely to reduce the impacts of the proposed project to the level of non-significance. In addition, any proposed mitigation strategies that require the installation of structural measures on the River to control sedimentation would have their own direct and indirect impacts on the River which have not been analyzed and must be addressed in an SDEIS.

The few proposed mitigation measures are localized, whereas the proposed alternative is systemic. The City has serious concerns about the proposed mitigation because restoration efforts that "target small reaches through artificial measures are very costly, may require perpetual effort, and often fail" (Rood et al, 2003b). The "adaptive management" proposal is fundamentally flawed as the assessment of the current resource condition is inadequate as is the assessment of environmental consequences associated with the proposed alternative. The Corps must evaluate and address the sedimentation impacts to the River and must fully address the expected impacts in accordance with the Section 404(b)(1) Guidelines. *See* Section II.1a of these Comments for further discussion in this regard.

Any substantial reduction in future flows from present conditions will functionally eliminate the existing biological values of the Poudre River system. Spring flow reductions of 25% to 71% are expected to have severe impacts. The following excerpt from a feature article in *Environmental Management* emphasizes the importance of the flow regime to river ecosystems:

> "*Physical processes in streams and rivers largely are driven by the magnitude, intensity, duration, and frequency of water discharge in combination with the catchments lithology and streamside vegetation. Additionally, flow regularity as well as variations in amplitude, frequency, duration, base flow, and rate of change, is also ecologically significant…* ***These characteristics provide the template for the ecological processes and are the underpinning of every major theoretical and conceptual advance made about the ecology of rivers in the last three decades.*"** (Naiman et al., 2002) (emphasis added).

A suite of "overview" papers in the scientific literature have been written in the last decade to advance the science of river management, protection, mitigation, and restoration. The following technical publications written by several of the world's

leading river scientists should be considered in evaluating and addressing these river impacts in an SDEIS and Revised 404(b)(1) Analysis:

- Legitimizing Fluvial Ecosystem As Users of Water: An Overview (Naiman et al, 2002)
- The Natural Flow Regime; A Paradigm for River Conservation and Restoration (Poff et al., 1997)
- Meeting Ecological and Societal Needs for Freshwater (Baron et al., 2002)
- Entering an Area of Water Scarcity: The Challenges Ahead (Postel 2000)
- Process-Based Ecogical River Restoration: Visualizing Three-Dimensional Connectivity and Dynamic Vectors to Recover Lost Linkages (Kondolf et al., 2006)
- Ecology, Planning, and River Management in the United States: Some Historical Reflections (Reuss 2005)
- River Flows and Water Wars? Emerging Science for Environmental Decision-Making (Poff et al., 2003)
- Landscapes to Riverscapes: Bridging the Gap Between Research and Conservation of Stream Fishes (Fausch et al., 2002)

The evaluation of impacts to the River and consideration of ways to address those impacts should not operate in isolation from the world scientific and water resources communities. Currently, there are ongoing research and management efforts in Australia, South Africa, Europe and North America aimed at describing the quantity, quality, and timing of flows necessary for ecological functions to perform while also providing opportunities for human uses (Arthington et al., 1998, Arthington et al., 2000, Commonwealth of Australia; 1996, Bunn 1999; Kingsford, 2000; Pigram, 2000; Humphries and Lake, 2000; Patten et al., 2001). The DEIS ignores state-of-the-art research regarding flow regimes and ecological functions, focusing on a discredited and invalid static approach to river health.

As discussed above in Section IV.1 of these Comments, future river management planning should be made in a collaborative manner following the process developed by The Nature Conservancy and the Corps, and outlined in Richter et al. (2006).

DEIS Section 4.4.3 Mitigation, page 4-31
Statement: "*While it is likely that changes to stream morphology and sediment transport would occur in the Poudre River, there is uncertainty in the extent of change that would occur and in the timing of changes*."

Comment: The degree of uncertainty in the DEIS suggests the review of potential environmental impacts is inadequate.

Changes to the River through Fort Collins both in terms of river dynamics and vegetation response are poorly understood. Part of the statement made above acknowledges this, yet throughout the DEIS conclusions are drawn based on no or little data, and one deeply speculative in favor of the proposed action. The analysis in the DEIS of these changes and related impacts is insufficient. The Corps must evaluate and address the stream morphology and sedimentation impacts to the River and must fully address the expected impacts in accordance with the Section 404(b)(1) Guidelines. *See* Section II.1a of these Comments for further discussion in this regard.

DEIS Section 4.4.3 Mitigation, page 4-32
Statement: "*Further impacts attributable to the chosen NISP action alternative would be additive to the impacts that already drive change. Impacts from NISP would likely be progressive rather than sudden, could occur over decades, and may be small compared to changes that are already occurring."*

Comment: This statement is highly conjectural. The overall tenor of the DEIS does not acknowledge the real potential for complex and threshold responses in the river system. The geomorphic and ecological literature provides countless examples of such responses. (Merritt and Wohl, 2003, Schumm, 1974, Stanford et al. 1996, Ward et al., 2001). For example, impacts associated with interactions between water quality/quantity are likely to be episodic and occur at time scales less than modeled monthly averages.

Planning and allocation of water resources involves choices among uses, users, and generations. Doing this wisely requires knowing the "bank balance" and having thoughtful projections of future "income" and "expenses.". The typical 20 to 30 year planning horizon of most NEPA studies does not account for the fact that many of the decisions being made have implications that extend well beyond this time horizon. A new reservoir is often assigned a useful life of 100 years and investments made to mitigate impacts to aquatic ecosystems seek to conserve the viability of ecosystem amenities in perpetuity, not just for a few decades (Purkey et al., 2007). In terms of this longer view, the DEIS analyzes the lowest level of possible impact rather than the average or worse-case level of possible impact. This is misleading and insufficient, and must be corrected in an SDEIS.

DEIS Section 4.4.3 Mitigation, page 4-32
Statement: *"These considerations do not lead to a recommendation for an immediate set of mitigation actions. Instead, they suggest that the optimum course of action is a detailed river monitoring program leading to a long-term adaptive management program…The adaptive management program should be considered a toolbox of mitigation measures that could be accessed depending on the monitoring efforts."*

Comment: The integration of adaptive management and NEPA is a relatively new concept that adds the "monitor and adapt" steps to the traditional NEPA "predict-mitigate-implement" model (Aligning National Environmental Policy Act Processes with Environmental Management Systems, CEQ, April 2007). The resulting adaptive management approach in a NEPA context can be described as "predict-mitigate-implement-monitor-adapt." In other words, the basic premise still requires starting with proposed outcomes and mitigation measures, and then by adaptive management adjusting as required in the future. However, the DEIS proposes use of adaptive management that jumps directly to the monitoring step, bypassing the predict-mitigate-implement steps. This violates both NEPA and Clean Water Act requirements to specifically list and describe the mitigation measures that will be implemented to achieve specific goals. *See* Section II.5 and Section II.7 of these Comments. The City of Fort Collins considers the definition of "mitigation" in the CEQ regulations, 40 C.F.R. § 1508.20, to be comprehensive and accurate and incorporates that definition for its references to mitigation throughout these Comments.

The concept of adaptive management, as contemplated in this DEIS, is not sufficient to mitigate potential NISP-related flood damage. The effects of channel contraction and vegetation encroachment must first be fully quantified and corresponding effective mitigation efforts identified in an SDEIS and Revised Section 404(b)(1) analysis. NISP participants should pay all costs for planning, design, construction, and ongoing maintenance of those mitigation efforts.

In addition, a sensitivity analysis should be performed and incorporated into an SDEIS to determine the range of effects the channel constriction will have on channel flood carrying capacity and resulting flood elevations. The results of this study could then proactively be used to determine effective mitigation efforts, if any exist, and their associated costs. The City should be included as an active participant in the development, design, and approval of any sensitivity analysis and any subsequent implementation efforts.

DEIS Section: 5.1.2.2 Enhancement of Streamflows through Fort Collins, page 5-4
Statement: *"To mitigate for impacts to aquatic resources associated with Alternative 2, the District commits to work with CDOW to enhance Poudre River winter flows primarily through Fort Collins for the purpose of enhancing a fishery on this reach of the Poudre River. The primary target reach starts at the Larimer-Weld Canal headgate just west of Shields Street and extends downstream to Mulberry Street, a distance of 3.7 miles."*

Comment: Any mitigation that compensates for flow depletions is of particular interest and concern to the City of Fort Collins. However, it is not possible to evaluate this mitigation proposal without more specific information. The District's commitment to work with DOW to establish a fishery in the river section between the headgate of the Larimer and Weld canal to Mulberry Street needs to be more specific, definite and enforceable to constitute minimization or mitigation under Section 404. There is no information as to the minimum target flow rates and the duration of such flows to which the District will commit to provide for the fishery. A specific plan must be developed and described in an SDEIS that will specify minimum wintertime flows, summertime flows, types of fish these flows will support, where the water will come from and how the District and the Corps will insure that the program be implemented. Without additional detail or commitments, these vague assertions do not suffice to address the serious harms to the aquatic ecosystem in the City.

DEIS Section: 5.1.2.2 Enhancement of Streamflows through Fort Collins, page 5-4
Statement: *"Release flow from Glade Reservoir for recapture at the SPWCP pump station."*

Comment: The District's commitment to release water from Glade Reservoir for recapture in Galeton Reservoir to improve flows through town needs to be more specific to constitute minimization or mitigation under Section 404. There is no information as to the minimum target flow rates and the duration of such flows to which the District will commit to provide for this purpose. A specific plan must be developed and described in an SDEIS that will specify minimum wintertime flows, summertime flows, where the water will come from and how the District and the Corps will insure that the program be implemented. Without additional detail or commitments, these vague assertions do not suffice to address the serious harms to the aquatic ecosystem in the City.

DEIS Section: 5.1.4 Environmental Streamflows, page 5-6
Statement: *"The District has stipulated the Grey Mountain water right to three streamflow requirements on the Poudre River used to benefit fishery, recreation, and other environmental purposes (Table 5-1). The District will curtail its diversions from the Poudre River for NISP when the streamflow requirements for each of the facilities listed in Table 5-1 occur and CDOW (Watson Lake Fish Hatchery) or Fort Collins (boat chute and nature center) places a call on the river for the streamflows."*

Comment: This statement is misleading. The District's commitment to subordinate the Grey Mountain decree to the City's two recreational in-channel diversion water rights (RICDs) and to the Watson Lake diversion does not guarantee minimum streamflows through Fort Collins. The RICDs (which are for flows ranging from 5 to 30 cubic feet per second) and the Watson Lake water rights (which are for flows ranging from 25 to 50 cubic feet per second) only apply to very short segments of the River and are for relatively low flow amounts, and because they are very junior water rights, they do not guarantee minimum streamflows through town for a healthy Poudre River riparian

corridor. A specific plan must be developed and implemented and described in an SDEIS that will specify minimum wintertime flows, summertime flows, where the water will come from and how the District and the Corps will insure that the program be implemented. Without additional detail or commitments, these vague assertions do not suffice to address the serious harms to the aquatic ecosystem in the City.

DEIS Section: 5.1.4 Environmental Streamflows, page 5-6
Statement: *"The District also will curtail its diversions from the Poudre River for NISP when the streamflow requirements for each of the facilities listed in Table 5-1 occur, provided the District can be assured that the passed water will reach the facilities and not be diverted by junior appropriators."*

Comment: The District's commitment to curtail diversions from the Poudre River does not guarantee minimum streamflows through town. A specific plan must be developed and implemented and described in an SDEIS that will specify minimum wintertime flows, summertime flows, where the water will come from and how the District and the Corps will insure that the program be implemented. The District and the Corps need to develop a legally defensible plan, conforming to Colorado water law, to ensure the maintenance of a minimum streamflow through town to protect the viability of the Poudre River riparian ecosystem. Without additional detail or commitments, these vague assertions do not suffice to address the serious harms to the aquatic ecosystem in the City.

DEIS Section: 5.16 Riparian Resources, page 5-7
Statement: *"Riparian resources along reaches of the Poudre River may be affected by reduced streamflows during the growing season."*

Comment: The stream habitat enhancement project (DEIS Section 5.1.2.2) is cited as one of the measures that will provide mitigation, however, that project will enhance winter flows, not flows during the growing season. The proposed plan to periodically curtail diversions during high flows has some promise, but without technical or legal specifics, its value and ability to reduce impacts to a level of non-significance cannot be determined and is insufficient for NEPA and Section 404 purposes. As discussed above, any mitigation that compensates for flow depletions is of great interest to the City of Fort Collins, and mitigation for lost peak flows is particularly significant, but without more information it is not possible to evaluate how this might impact flows through Fort Collins.

DEIS Section: 5.1.6 Riparian Resources, page 5-7
Statement*: "The District will also develop a plan to be approved by the Corps for periodically curtailing diversions from the Poudre River for at least 24 hours during high flows, which could provide the riparian areas with periodic disturbance and inundation. The diversion curtailment plan will be implemented provided the District and Corps can*

be assured that the passed water will flow to at least I-25 and not be diverted by junior appropriators."

Comment: The District's commitment to work with the Corps to develop a plan to periodically curtail diversions from the Poudre River for a minimum of 24 hours during the high flows to provide disturbance and inundation requires more detail. More information is needed about the target flow rates, the timing and the duration of these flows and the target reach over which they will occur. The District and the Corps need to develop a legally defensible and enforceable plan, conforming to Colorado water law, and describe it in an SDEIS to ensure that these flows will not be diverted by junior appropriators. Without additional detail or commitments, these vague assertions do not suffice to address the serious harms to the aquatic ecosystem in the City.

DEIS Section: 5.2.3 Enhance River Flows Through Fort Collins, page 5-8
Statement: *"The District will seek an agreement with the Lake Canal Company to move diversions from the Lake Canal intake…"*

Comment: The proposed addition of 50 cubic feet per second (cfs) to the River for about 6 weeks is inadequate to compensate for lost high flows. While this proposed flow enhancement is offered to mitigate impacts to recreational needs of the City's proposed water craft course, it is not adequate because the water craft course requires minimum flows of 250 cfs. *See* Section V.2 of these Comments. There is no information or analysis in the DEIS as to what the base flows would be during various times of the year to evaluate whether the additional 50 cfs would materially improve the prospects for a water craft course if NISP proceeds. Furthermore, high flows are critical to more than just recreation. Reduced high flows as part of the proposed action will negatively affect stream morphology, water quality, riparian resources, fisheries, and socioeconomic values in the Fort Collins river reach. More than 50 cfs will be required to reduce the impacts to river flows through Fort Collins to a level of non-significance (see comments related to hydrology, morphology, fisheries, vegetation, and wildlife**.**

DEIS Section: 5.2.3 Enhance River Flows through Fort Collins, page 5-8
Statement: *"The District will also explore agreements with other water providers to retime their direct flow rights by temporarily storing water in Glade Reservoir and/or its forebay for release during late July and August. Such agreements would add to the flows of the Poudre River through Fort Collins during the summer."*

Comment: The District's commitment to work with water providers to retime their direct flow rights requires more detail. More information is required to describe how the mitigation would improve the flows above those reported in the DEIS in this section of the River. The District and the Corps must develop a plan and describe it in an SDEIS that illustrates the location and magnitude of the improvements to summertime flows, how these will enhance recreational opportunities, and how the plan will be implemented

and enforced. Without additional detail or commitments, these vague assertions do not suffice to address the serious harms to the aquatic ecosystem in the City.

DEIS Section: 5.2.3 Modify Diversion Structures for Boat Passage, page 5-8
Statement: *"The District will explore the modifications of the…Fort Collins Water Treatment Plant diversion to facilitate boat passage."*

Comment: The Fort Collins water treatment plant diversion is a unique structure that allows direct diversion of Poudre River water while minimizing the amount of organic material (particularly pine needles) and inorganic (sediment) passing into the pipeline. While the City could support the idea of modifying the structure to open up more of the River for boating recreation, it is very concerned about any modifications to a structure that is critical to the water supply for the City. This concern is amplified given the potential for additional pine needle problems as the pine beetle epidemic moves east over the Continental Divide. Before the City would consider any modifications to its structure, extensive studies and investigations would be required, including but not limited to laboratory physical model studies of proposed changes to the structure. While not clearly stated, it must be assumed that any such modifications to the City's structure for the benefit of the NISP project would be paid for entirely by the NISP project. Even then, the City would proceed very cautiously and, should it allow structural modifications, it would require agreements for future remedial action in case the performance of the modified structure is not acceptable. It should also be noted that the DEIS and Section 404(b)(1) Analysis were deficient in that they did not address this issue.

DEIS Section: 5.7 Stream Morphology, page 5-15
Statement: *"Based on an evaluation of historic data (Anderson 2008), the response of and changes to the Poudre River associated with the action alternatives are anticipated to be less than the historical morphologic changes that have occurred and continue to occur. Distinguishing the effects of NISP from current trends in river changes will likely be challenging and most effectively determined through a monitoring and adaptive management program."*

Comment: Aside from a review of a limited number of previous studies, the River Morphology and Sediment Transport Technical Report (Corps, 2008) (RMSTTR) does not provide a comprehensive assessment of the historical geomorphologic changes that have occurred on the Fort Collins Reach of the River. A detailed historic aerial photo and map analysis could have been used to identify and document detailed, long-term changes in planform characteristics for specific segments of the Fort Collins Reach, which could then have been used to qualitatively predict what the potential impacts of the project would be to those segments. Instead, the RMSTTR only examined 1937/1941 and 2005 aerial photography and only compiled and provided limited data on 2005 average sinuosity, meander wavelength, and meander amplitude. The only comment regarding historical changes is provided on page 3.63 of the RMSTTR which states that: "*For example, the review of aerial photography indicated changes in the channel*

alignment and planform at the specific locations identified below…Within the Fort Collins Reach, channel planform changes have occurred at two locations; from Station 209,500 to Station 211,300 and from Station 221,600 to Station 223,600." However, the RMSTTR did not provide any details on what those changes were. A more detailed analysis of historic conditions and changes needs to be included in an SDEIS to identify specific problem areas for conditions under the proposed alternatives and to address related impacts.

DEIS Section: 5.7 Stream Morphology, page 5-15
Statement: *"For any of the action alternatives, the District will develop and initiate a monitoring and adaptive management program…"*

Comment: The District's commitment to develop an adaptive management plan to address the stream morphology impacts requires more detail and does not substitute for adequate analysis of project impacts and a detailed evaluation of how those impacts would be addressed. The Corps must evaluate and address impacts and must fully address the expected impacts in accordance with the Section 404(b)(1) Guidelines. *See* Section II.1a of these Comments for further discussion in this regard. Without additional detail or commitments, the vague assertions about possible mitigation do not suffice to address the serious harms to the aquatic ecosystem in the City. *See also* discussion in this Section above related to DEIS Section 4.4.3 (DEIS page 4-32).

DEIS Section: 5.7 Stream Morphology, page 5-15
Statement: *"These mitigation measures may include, but are not limited to… accelerate establishment of channel forming by managing in-channel or riparian vegetation."*

Comment: This statement is confusing. If the proponents intend to accelerate the formation of an inset channel and floodplain based on the potentially flawed Rosgen classification of the river reach (as discussed above) the effort may be counterproductive. Without a firm understanding of the river hydrology (volume, sediment loading, grade, flood timing, etc.) which is the ultimate driver of the channel's physical condition (planform, depth, bank characteristics, etc.), channel modifications become an exercise in river aesthetics when not matched with the existing and future hydrology. While local channel modifications can create habitat, the proposed action is systemic, not localized, and the modified river hydrology is likely insufficient to perpetuate in-channel mitigation efforts.

DEIS Section: 5.7 Stream Morphology, page 5-15
Statement: *"These mitigation measures may include, but are not limited to… check structures or weirs to control the inundation of riparian vegetation."*

Comment: This would only encourage more sediment deposition and all the associated adverse impacts that the City of Fort Collins is concerned about, including channel narrowing, less sediment flushing, vegetation encroachment, larger in-channel islands,

flow obstruction, reduced conveyance and increased risk of flooding, and bank erosion. Also, as previously stated, the proposed mitigation strategies that require the installation of structural measures on the River to control sedimentation would also have direct and indirect impacts to the River that were not addressed in the DEIS Section 404(b)(1) Analysis.

DEIS Section: 5.7 Stream Morphology, page 5-15
Statement: *"These mitigation measures may include, but are not limited to… manage flows to provide flushing in selected river reaches."*

Comment: This is a valuable mitigation strategy, but it cannot be evaluated without more specific technical and legal information about how flows could and would be managed to provide flushing in selected reaches (including what reaches would be selected).

2c. Comments on River Morphology and Sediment Transport Technical Report (RMSTTR)

RMSTTR Section: 3.5.3 SIAM Analysis, page 3.54
Statement: *"The incipient motion analysis indicates that the armor layers will not be penetrated in the upper portion of the study reach from Laporte through Timnath for Baseline and Project conditions. In these upper reaches, the size of the bed material that composes the armor layer is large enough to withstand the hydraulic forces that would be necessary to transport the material…*

The results of the incipient motion analysis determined the bed gradation selected for the SIAM analysis. The bed gradations representing the armor layer were applied to SIAM in reaches where the armor layer was determined to be unbreakable for the flows represented by the annual flow duration curve…"

Comment: Bed mobility calculations are used to assess potential project impacts and to justify simplifying assumptions of sediment transport modeling. The general message seems to be that the armored riverbed through Fort Collins is already immobile except at the most extreme flows (DEIS pg. 3-22). Two implications the DEIS thereby relies on are that: 1) reductions in peak flows by the project would have a minimal effect with regard to scour processes that prevent vegetation encroachment; and 2) deposition of subsurface bed sediments released by armor breaching need not be accounted for in SIAM modeling aimed at assessing deposition potential.

Tables 3.13 and 3.14 (pg. 3.53) are interpreted by the authors to suggest that mean values of shear stress (averaged across entire cross-sections) estimated from hydraulic modeling are insufficient to mobilize median sizes of the existing surface armor layer. This interpretation is flawed. First, cross-section average values of shear stress were averaged throughout the entire segment. Solely using these values to make conclusions about pre-

and post-project bed mobility essentially ignores spatial heterogeneity in shear stress distributions at the cross-section scale and within the entire segment. The maximum values of shear stress reported are clearly sufficient to mobilize armor material. The highest values also occur with a greater frequency and *duration* in the baseline flow series.

Second, the analysis is based on critical dimensionless shear stress values averaging approximately 0.047 for most of the grain sizes examined. In the new edition of the ASCE Sedimentation Engineering Manuel, Parker (2008a) recommends a value of 0.03 for the initiation of significant bed mobility. Previous research on gravel bed rivers indicates that a large fraction of the long term sediment load is associated with "marginal" transport at critical shear stress values substantially less than 0.047 (*e.g.*, Andrews and Nankervis, 1995) report a measured value of 0.035 for the Poudre at Rustic). Indeed, if the simple average stress values for Fort Collins Reach B1 are reassessed using a critical dimensionless shear stress value of 0.035, one reaches the opposite result, i.e. baseline conditions of 0.037 and project conditions of 0.033. As such, the conclusions regarding potential changes in sediment transport and bed mobility should be reconsidered with an accounting of changes in frequencies and durations of flows exceeding incremental values of critical dimensionless shear stress down to 0.03 for the median bed material.

Magnitude-frequency analyses based on stream power and the SIAM model were also used to explore potential changes in sediment transport capacity. Like the incipient motion analysis described above, the analyses are inadequate for assessing pre- vs. post-project changes in sediment transport capacity. First, the magnitude frequency analyses are based on total stream power. Because bedload transport scales with stream power to exponents greater than one (much greater than one at lower transport rates), the pre- and post-project cumulative stream power distributions underestimate actual differences in bedload transport capacity. Second, the bedload transport analyses conducted with SIAM are based on the Meyer-Peter and Mueller (MPM, 1948) bedload relation. This equation was recently recalibrated and corrected by Wong and Parker (2006) and is applicable to high transport rates. Parker (2008b) states: "According to MPM, then, these [gravel] rivers can barely move sediment of the surface median size Ds50 at bankfull flow. Yet most such streams do move this size at bankfull flow, and often in significant quantities. There is nothing intrinsically "wrong" with MPM. In a dimensionless sense, however, the flume data used to define it correspond to the very high end of the transport events that normally occur during floods in alluvial gravel-bed streams. While the relation is important in a historical sense, it is not the best relation to use with gravel-bed streams."

Using this equation in the SIAM analyses basically means there is no transport of particles subjected to dimensionless shear stresses less than 0.047. The assumption described above, namely that there is no release of sediments from beneath the armor layer, also decreases the potential for deposition due to specification of the SIAM model. This is not physically correct. The SIAM analysis correctly indicates increased deposition of relatively fine sediments which can be transported according to the model parameterization.

The analyses described above do not provide what is needed to assess potential changes in bed mobility and bedload transport:

- Use of a range of critical shear stress values ranging from 0.03-0.047 to assess the frequency and duration of bed mobility, pre- and post-project, with better accounting for spatial variability;
- Use of a hydraulic parameter that actually scales with sediment transport capacity in the magnitude-frequency analyses; and
- Use of a continuous bedload function (e.g., Parker, Wilcock and Kenworthy, or Wilcock and Crowe as opposed to the outdated MPM threshold approach) to account for differences in cumulative sediment transport capacity and aggradation potential.

Reliable estimates of bed mobility and scouring potential are integral to predicting encroachment of vegetation, channel narrowing, and associated increases in flow resistance that diminish channel capacity during flood events. Bed scouring is also linked to preventing proliferation of algae and other periphyton along with other factors such as temperature and light. Bed mobility is also associated with reduced substrate embeddedness and rejuvenation of benthic habitat. Given that the SIAM analysis based on MPM probably underestimates deposition potential, the potential effects of substrate changes on benthic communities are more difficult to evaluate. A more robust scour analysis is an essential step toward assessing these potential responses and impacts.

RMSTTR Section: 4.1.8. Sediment Transport Analysis, page 4.9
Statement: *"In summary, the results of sediment transport analysis indicate that it is reasonable to represent the Laporte and Fort Collins reaches as transport reaches. That is, all sediment arriving in the reach is transported through the reach…"*

Comment: The sediment transport analysis in the RMSTTR was not adequate to address the potential deposition of fine sediments in the Poudre River channel through Fort Collins that could occur given the large flow reductions projected under the action alternatives. The sediment transport analysis was based on SIAM using a maximum wash load size of 8 mm in the upper Fort Collins Reach, and 4 mm in the lower Fort Collins Reach. As described on page 3.55, *"SIAM will pass all material equal to and smaller than the selected maximum grain size…"* Sediment particles in the 4-8 mm range are classified as medium gravels, and so the potential deposition of sand-sized materials, which is already occurring under existing conditions and embedding cobble-sized particles in the channel bottom, was ignored by this analysis. This is a significant oversight given that one of the most significant adverse impacts expected from the flow reductions that will occur under project conditions is deposition of fine sediments throughout the Fort Collins reach.

Additionally, even though the RMSTTR states that the Fort Collins Reach is a transport reach, Table 3.16 on page 3.56 indicates that the average annual sediment balance for

Reach B1 under Project conditions is more than 2.5 times greater than under Baseline conditions; in other words it would be significantly aggradational under Project conditions. Although the volume is not as large as downstream reaches, it is significant locally. Over time this could be problematic with regard to increased spawning gravel embeddedness, bed and bar siltation, and vegetation encroachment. For example, a quick calculation of what this balance would produce in terms of average annual sedimentation along the Fort Collins Reach B1 under Project conditions is about 0.6 inches per year or about 6 inches in 10 years, based on the SIAM results. This volume would likely be significantly greater if grain sizes used in the SIAM analysis accurately reflected the fine grained nature of current deposits along the river bed.

The hydrologic analysis conducted for the DEIS indicates that the average monthly streamflow at the Lincoln Avenue Stream Gage for the District's Proposed Action could be reduced by as much as 74.5% for an average year (DEIS Appendix A). Given this significant reduction in flows for May through August, this could have a significant impact on sediment distribution in the River, especially if major tributary sources of sediment remain uncontrolled. The RMSTTR does not adequately address this potential reduction in flow and the direct impacts on sediment transport nor does it adequately address the sources and potential contributions of tributary sources of sediment. Instead of conducting the SIAM analysis for a Wet, Average, and Dry year, the analysis is conducted using the mean annual hydrograph for the period of record. Conducting the SIAM analysis for a Wet, Average, and Dry year using more representative grain sizes for the Fort Collins Reach would yield more accurate and useful results.

RMSTTR Section: 4.2.3 Laporte and Fort Collins Reaches, page 4.12
Statement: *"…However, there are areas where the moderately high flows are contributing to channel maintenance by scouring of fine material and limiting vegetation encroachment. In these depositional areas (such as upstream of Mulberry Street), accelerated channel contraction can be expected. The sediment modeling supports this contention, indicating that small volumes of fine and medium gravels deposit in this reach and this trend is slightly increased with the Project.*

If deposition and vegetation lead to a reduction in channel capacity, this may have an impact on flood profiles and could lead to isolated instances of accelerated bank erosion during floods. This is already a trend in some areas, suggesting an active monitoring and adaptive management approach is required.

Bank erosion occurs sporadically within the reach. Other than the situation described above, changes due to the Project are more likely to contribute to bank stability than bank erosion. Elsewhere, minor vegetation encroachment would continue on channel margins and bars and may be slightly accelerated by the Project."

And;

RMSTTR Section: 4.2.3 Laporte and Fort Collins Reaches, page 4.14

Statement: *"The vegetation-sedimentation process is threshold dependent and it is not realistic to make quantitative predictions about this change.* ***It is reasonable, however, to predict that the rate of channel contraction will increase between Fort Collins and Greeley as a result of the Project.*** *The magnitude of this increase cannot be quantified but the increase could vary from minor to moderate in its impact on the river system. Reliable quantification of existing and future rate of channel contraction will require extensive monitoring."*

Comment: Although the authors of the RMSTTR assert that vegetation encroachment will be "minor" through the Fort Collins segment, no sound factual basis is provided for this conclusion. If the response is "threshold dependent", "accelerated," and complex, what is the basis for predicting it will be "minor"? In addition, the SIAM analysis is also the basis of the conclusion that deposition below canyon "is expected to be undetectable." No reference is made to time scale or degree of precision necessary for detection. The rationales for these conclusions should be reassessed and clearly articulated in an SDEIS based on corrections to the bed mobility and sediment transport analyses described above.

3. Riparian Vegetation and Wetlands

3a. General comments

The following comments focus specifically on impacts to the Poudre River riparian corridor through the City of Fort Collins between Overland Trail to Interstate 25. In general, the City has significant concerns with the information presented in the Vegetation Technical Report that lead to the conclusion presented in Section 4.2 and 4.12 of the DEIS. The conclusions presented in the Vegetation Technical Report (VTR) seem to rely on the judgment of the authors rather than data collection, literature review, and analysis.

Analysis related to vegetation and wetlands along the Poudre River is deficient in its review of the scientific literature and accepted principles of western river ecology as they relate to anthropogenic modification of flow regime. In one instance an analysis in the VTR uses an incorrect numerical data set which led to false conclusions (see comments regarding Section 6.2.5 in Section IV.4c of these Comments, below**)**. Similarly, analysis of existing conditions failed to identify jurisdictional wetlands along the riparian corridor through Fort Collins and evaluate the environmental consequences of the proposed action on those wetlands. Other specific concerns include:

- Failure to evaluate wetland resources according to Section 404(b)(1) guidelines;
- Use of single snapshot field observations to draw important conclusions related to surface and groundwater hydrology;
- Use of a monthly hydrologic time step in the modeling effort that fails to address short term changes (day to day) critical to vegetation and related limitations;

- Failure to assess impacts to the entire stretch of the River through Fort Collins and focusing on presumed "sensitive areas;"
- Failure to address anticipated vegetation encroachment into the channel (terrestrialization), the likelihood of non-native plant encroachment and its ecological and economical consequences;
- Failure to use groundwater well monitoring through several seasons and years to support significant assumptions on groundwater movement within a highly complex watershed;
- Failure to consider potential sub-lethal physiological and morphological stress to cottonwoods; and
- Failure to identify a long term effect as an "environmental consequence".

Conflicting conclusions presented in the DEIS regarding impacts to riparian vegetation represent a serious shortcoming. In several locations the DEIS states there will be adverse impacts to riparian vegetation. Yet the VTR and corresponding sections in the DEIS (4.2 and 4.12) state… *the proposed action will cause no loss of riparian/wetland vegetation.*

Because ecological systems work as a set of many interdependent components and interactions, the impacts to riparian vegetation are fundamental to terrestrial wildlife, invertebrate communities, water quality and aquatic wildlife. Potential changes to the riparian corridor must also be evaluated in the context of human services such as recreation, aesthetics, nutrient filtration, stormwater management, and economic development relative to downtown businesses.

Because of these significant issues highlighted above and described in detail below, a complete understanding or review of the proposed action and its consequences is not possible at this time. Thus, an SDEIS is needed to fully address the issues highlighted in this and other sections of these Comments.

3b. Specific comments on the DEIS

DEIS Section: 4.2.1.3 Wetlands, page 4-9
Statement: *"Reductions in streamflow may affect wetlands directly linked and supported by flows in the Poudre River."*

And;

Section 5.6 page 31 (Vegetation Technical Report)
Statement: *"Palustrine Persistent Emergent and Palustrine Scrub-Shrub Wetlands have established adjacent to the active channel and in depressions in the floodplain."*

Comment: The DEIS fails to identify jurisdictional wetlands along the Poudre River through Fort Collins. According to 404(b) Guidelines, it is necessary to delineate the jurisdictional wetlands along the Poudre River. Such secondary or indirect impacts of the project are clearly within the range of impacts that must be evaluated, and in this case an SDEIS and Revised 404(b)(1) Analysis are needed to do so. *See* Part II of these Comments. Use of the CDOW riparian maps coupled with single-day, field observations is insufficient to adequately evaluate the impacts of the proposed action on wetlands and wildlife habitat along the Poudre River. Additional investigation is required by the Clean Water Act:

> *The degradation or destruction of special aquatic sites,… is considered to be among the most severe environmental impacts covered by these Guidelines. The guiding principle should be that degradation or destruction of special aquatic sites may represent an irreversible loss of valuable aquatic resources.* Section 230.1(d) (Emphasis added).

Furthermore, the environmental consequences should be evaluated by treating Natural Areas as sanctuaries, wildlife refuges and parks (see Sections 230.40, 230.54 of the 404(b) Guidelines). *See also* Section II.2 of these Comments. The potential damage to human use characteristics in this habitat must also be evaluated for compliance and consistency with Section 404(b)(1) Guidelines Sections 230.51, 230.52, and 230.53.

Finally, the analysis presented in the Vegetation Technical Report (VTR) does not provide "*appropriate factual determinations, evaluations, and tests on the physical…*" for the riparian resource, in violation of Section 230.11 of the Section 404(b)(1) Guidelines.

> *For actions subject to NEPA the analysis of the alternatives… will in most cases provide the information for the evaluation of alternatives under these Guidelines. On occasion, these NEPA document…may not have considered the alternatives in sufficient detail to respond to the requirements of these Guidelines... In the latter case, it may be necessary to supplement these NEPA documents with additional information.* Section 230.10 (4)

Without proper delineation and biological evaluation of the riparian corridor it is not possible to properly evaluate and address the impacts to the riparian corridor, as required under the Section 404(b)(1) Guidelines. *See* Section II.1a of these Comments.

DEIS Section: 4.2.1.4 Riparian Resources, page 4-9
Statement: *"The reductions in stream flows on the Poudre River associated with the action alternatives are not anticipated to cause a loss of riparian and/or wetland vegetation…because this vegetation appears to be supported by the lower more frequently occurring flows."*

Comment: This is the major conclusion addressing impacts to riparian vegetation, yet it is unsupported by real data, case studies, or relevant scientific literature. Peer-reviewed scientific studies have concluded repeatedly that altered flow regimes can cause significant adverse impacts to riparian vegetation (Reily and Johnson, 1982, Rood and Mahoney, 1990, Tyree et al., 1995, Rood et al., 1995, Poff et al., 1997, Kranjcec et al., 1998, Lesica and Miles, 1999, Jansson et al., 2000, Nilsson and Berggren, 2000, Obedinski et al., 2001, Nilsson and Svedmark, 2002, Rood et al., 2003a, Rood et al., 2003b, Friedman et al., 2005, Stromberg et al., 2007). The conclusion that none of the action alternatives will impact the riparian vegetation is inconsistent with current science based on field data, peer-reviewed analysis, and valid ecological modeling, and is not based upon any credible, scientific or engineering evidence. *See* related comments in Section IV. 2.12 regarding Vegetation Technical Report. *See also* additional comments on this subject in comments on DEIS Sections 4.12.4 and 4.13, in these Comments, below.

DEIS Section: 4.2.1.4 Riparian Resources, page 4-9
Statement: "*The reductions in stream flows on the Poudre River associated with the action alternatives are not anticipated to cause a loss of riparian and/or wetland vegetation…because this vegetation appears to be supported by the lower more frequently occurring flows."*

Comment: The following four statements show the significant inconsistency within the DEIS and supporting documents to the statement immediately above.

Section: 7.2.1 page 65 (Wildlife Technical Report)
Statement: *"The action alternatives would likely result in changes to and losses of riparian and wetland vegetation, especially herbaceous vegetation, in sensitive riparian areas along the Poudre River corridor. Many species of birds, mammals, reptiles, and amphibians dependent on these habitats would in turn be affected by these changes."*

DEIS Section: 4.2.1.1 Changes to Poudre River Flows, page 4-6
Statement: *"Flow reductions are likely to have significant localized effects on water based recreation and recreation values, riparian resources, stream morphology."*

Section: 4.1.5 page 4.5 (River Morphology Report)
Statement: "The spells analysis further elaborates the likely impact of the project ….with a particular significance to geomorphology or colonization and survival of vegetation…"

Technical Memorandum: NISP Visual Impacts to Recreation Activities
Statement: *"Reduced water flows in the river would decrease the area of riparian vegetation communities and surface water."*

Comment: It is difficult, if not impossible, to evaluate the DEIS in this regard, because the document contains contradictory conclusions such as these, and provides inadequate support for any of them. The four preceding excerpts are representative of various contradictory conclusions within the DEIS regarding impacts to riparian vegetation.

DEIS Section: 4.2.1.4 Riparian Resources, page 4-9
Statement: *"However, a reduction in the infrequently occurring overbank flows in the reach above I-25 may affect the periodic disturbance of the riparian zone that can aid in creating new habitat for riparian vegetation establishment and rejuvenation of the riparian zone. Without this disturbance and a substantial reduction in the frequency of this occurrence of overbank flows, it is likely that the woody riparian vegetation will become increasingly decadent. This would be a slow process that would be difficult to separate from current trends in riparian vegetation along the Poudre River."*

Comment: Although in the previous paragraphs the DEIS anticipated no loss of riparian and/or wetland vegetation, the authors follow by predicting an effect on the long-term capacity for regeneration. The statements are in direct conflict with each other because a long-term effect is an effect. In sum, anticipated changes in vegetation under the proposed action are distinguishable from current conditions and an SDEIS must identify and analyze this long-term effect.

DEIS Section: 4.2.1.4 Riparian Resources, page 4-9
Statement: *"…reduced high flows on the Poudre River would likely contribute to or accelerate the trend of encroachment of riparian and wetland vegetation (primarily reed canarygrass and coyote willow) into the channel (Anderson 2008)."*

Comment: This is a reasonable conclusion and the magnitude and severity of this encroachment requires further examination. The Vegetation Technical Report omits this issue. It is anticipated that encroachment could have detrimental impacts to and costly management implications for City with regards to stormwater control, floodplain/FEMA compliance, mitigation of public flood hazard risks, and management of invasive species.

DEIS Section: 4.7.5 Ground Water Cache la Poudre River, page 4-40:

Statement: *"During periods of high river flow (spring runoff) for this reach of the Poudre River, the river likely recharges alluvium adjacent to the river…."*

Comment: Although the information provided here is in agreement with current scientific thought in the published literature, the Vegetation Technical Report (VTR) fails to include the role of "alluvial recharge" in supporting wetlands and riparian vegetation. *See* comments on VTR Section 6.1.2 (page 36) in Section IV.3c of these Comments.

DEIS Section: 4.10 Vegetation, page 4-44

General Comment: This section fails to address changes to, or loss of, riparian vegetation. The City has significant concerns about the future health of the riparian vegetation if the proposed action is implemented. There is a large body of scientific literature indicating reduction of spring flows result in major adverse impacts to riparian vegetation in riverine systems (Reily and Johnson, 1982, Rood and Mahoney, 1990, Tyree et al., 1995, Rood et al., 1995, Poff et al., 1997, Kranjcec et al., 1998, Lesica and Mile, 1999, Jansson et al., 2000, Nilsson and Berggren, 2000, Obedinski et al., 2001, Nilsson and Svedmark, 2002, Rood et al., 2003a, Rood et al., 2003b, Friedman et al., 2005, Stromberg et al., 2007). Failure to address riparian vegetation in this section renders the DEIS inadequate in its analysis. *See* related comments on DEIS Section 4.2.1.4, Section 4.12, and Section 4.13 in these Comments, below, and on the Vegetation Technical Report (VTR) in Section IV.3c of these Comments.

DEIS Section: 4.11 Noxious Weeds, page 4-46

General Comment: The likely increase in invasive species is a significant concern to the City. This section fails to address this issue despite a large body of scientific literature indicating how a significant reduction of spring flows would have adverse impacts to riparian vegetation and contribute or accelerate encroachment of non-native and noxious weeds into the river channel and riparian area (e.g., Lesica and Miles, 1999, Friedman et al., 2005, Stromberg et al., 2007). The City has the following specific concerns:

1. An expected reduction in native vegetation due to unprecedented drought stress and loss of opportunity for regeneration and native plant restoration. In the short term an expected loss of remnant populations of herbaceous species and of willows inhabiting higher elevations. Cottonwoods that are currently drought stressed will be affected in the near future, and healthy cottonwoods will decline in health and become increasingly disposed to disease and premature death.

2. The replacement of existing native species by non-natives with habitat needs that are distinct (different) from the native riparian species.

3. Russian olive is expected to become a significant problem under flow conditions predicted to result from NISP. This species is very difficult to eradicate once it establishes. Russian olive inhabits wetted soils but does not rely on higher spring

flow nor does it need bare areas to germinate. Russian olive has a large seed that can sprout through existing stands of grass. The City has gone to considerable expense to work to eradicate Russian olive through the Poudre River riparian corridor.

4. Tamarisk (salt cedar) invasion has been well documented in western river systems following flow modification alterations (Stromberg et al., 2007). Tamarisk seeds are available all summer long and can therefore establish as the new bare sediment becomes available anytime throughout the summer (as opposed to the short availability of cottonwoods seeds in the spring). The City has gone to considerable expense to work to eradicate Tamarisk through the Poudre River riparian corridor.

5. Reed canarygrass will continue to invade the riparian corridor because overbank events will occur much less frequently. The scouring that accompanies an overbank event tends to clear away the monoculture stands. Reed canarygrass will also be opportunistic invader of new bare sediment as the channel narrows.

6. As the soils in the current riparian forests becomes drier under project conditions, upland species would be expected to establish closer to the River, reducing the width and homogenizing the riparian habitat (terrestrialization), reducing channel capacity to convey floods.

Under the Colorado Noxious Weed Act, land owners are required to manage and eradicate noxious weeds. *See* Section 35-5-101, et seq., Colorado Revised Statutes. Therefore, if this shift towards non-native occurs as expected, the proposed action will produce injury to the integrity of City-owned properties adjacent to the Poudre River and will burden the City (and other property owners along the Poudre River) with significant additional weed control costs on these lands. The City already has made a long-term commitment to weed eradication along the Poudre River and has spent hundreds of hours per year and tens of thousands of dollars eradicating salt cedar and Russian olive. *See* related comments on DEIS Section 4.2.1.4, Section 4.12, and Section 4.13 in these Comments, below, and on the Vegetation Technical Report (VTR) in Section IV.3c of these Comments.

Finally, mitigation strategies could not be discussed in a meaningful fashion until the threat of noxious weeds along the Poudre River riparian corridor has been fully evaluated in an SDEIS and Revised Section 404(b)(1) Analysis for the proposed action, including analysis called for under Subpart H of the Section 404(b)(1) Guidelines. This further analysis is necessary to properly evaluate and address the impacts to the riparian corridor, as required under the Section 404(b)(1) Guidelines. *See* Section II.1a of these Comments.

DEIS Section: 4.12 Wetlands and Other Waters, page 4-51
Statement: *"Changes in streamflows are not anticipated to cause a loss in wetland and riparian vegetation for the following reasons."*

Comment: There are conflicting conclusions within the DEIS and supporting documents regarding impacts to riparian vegetation. These contradictions make it difficult to evaluate the consequences of the proposed action to riparian vegetation. *See also* comments on DEIS Section 4.2.1.3 and Section 4.2.1.4, in these Comments, above.

DEIS Section: 4.12, page 4-51
Statement: "*The greatest change in flow will occur on the Poudre River during high flows. These higher flows and their associated stream stages occur infrequently (a few days over the 50 year hydrologic record) and are unlikely to support wetland vegetation which typically occurs at lower elevations closer to the river.*"

Comment: This statement originates from the Vegetation Technical Report. Numerous mistakes or inadequacies (such as incorrect data transfer, lack of site specific data and improper application of ecological concepts) undermine the conclusion stated above. Consequently the argument is fundamentally flawed and final conclusions are not supported or proven. *See* detailed comments on Section 6.2.6 (page 55) of the Vegetation Technical Report (VTR) in Section IV.3c of these Comments.

DEIS Section: 4.13.4 Riparian Resources Mitigation, page 4-53
Comment: Due to the conflicts within the DEIS and supporting documents, and due to lack of baseline inventory data for this resource, it is impossible to evaluate mitigation strategies. As a result, the Corps has not met its obligation to address impacts under NEPA and the Section 404(b)(1) Guidelines. *See* Section II.1a of these Comments.

DEIS Section: 5.1.6 Mitigation of Riparian Resources, page 5-7
Statement: *"Riparian resources along reaches of the Poudre River may be affected by reduced streamflows during the growing season."*

Comment: The City agrees that the proposed action may have serious consequences on riparian resources on the Poudre River through Fort Collins. These consequences have not been adequately evaluated. As a result, the Corps has not met its obligation to address impacts under NEPA and the Section 404(b)(1) Guidelines. *See* Section II.1a of these Comments.

Final comments about DEIS analysis of Vegetation within the City of Fort Collins
The City is concerned that a 25% to 71% reduction in Poudre River flows from NISP will cause unprecedented drought stress to all riparian plant species. There is a significant lack of systematic data collection and analysis, and of consistent findings within the

DEIS and between the DEIS and the supporting technical documents to evaluate these impacts. It is difficult in some areas, and impossible in others, to evaluate the environmental consequences of the proposed action on riparian resources. Again, a rigorous, objective and scientifically based assessment is necessary to properly understand the relationship between altered flow regime, changes in stream morphology, stream stage, alluvial groundwater levels and consequent changes to vegetation is necessary to evaluate these impacts and is required. The Section 404(b)(1) Guidelines call for "*appropriate factual determinations, evaluations, and tests including determination of secondary effects on the aquatic ecosystem."* Section 404(b)(1) Guidelines Section 230.10 and Section 230.11(h).

3c. Comments on the Vegetation Technical Report (VTR)

VTR Section: 5.6 Cache la Poudre River and South Platte River Study Areas, page 31
Statement: *"Palustrine Persistent Emergent and Palustrine Scrub-Shrub Wetlands have established adjacent to the active channel and in depressions in the floodplain."*

Comment: The VTR acknowledges the existence of the specified wetlands along the impacted segments of the Cache la Poudre River. Wetlands in this study area were identified using the Colorado Division of Wildlife (CDOW) riparian mapping project which is based on satellite imagery. This is not sufficient for a DEIS-level analysis. Many small wetlands may be overlooked or wrongly characterized. *See* comments on DEIS Section 4.2.1.3 in Section IV.3b of these Comments.

It is important to note that similar types of wetlands identified in the proposed Glade Reservoir site and in the U.S. Highway 287 realignment study area were rated high or moderate for the following values:.

- general wildlife habitat
- sediment/shoreline stabilization
- production export/food chain support
- ground water discharge/recharge
- sediment/nutrient/toxicant removal
- dynamic surface water storage.

Wetlands along the Poudre River would probably rate moderate to high for most of these categories. In addition, Poudre wetlands might rate high for recreation and educational potential as well. *See* generally Part V of these Comments.

VTR Section: 6.1.2 Effects to Riparian Vegetation, page 35
Statement: *"The assessment of potential effects to riparian and wetland vegetation in the Cache la Poudre River and South Platte River study areas was based primarily on*

estimated changes in average monthly flows and stream stage associated with each alternative."

Comment: Riparian vegetation responds to extreme river flows (highs and lows) that are not best represented by monthly averages. For example, an average reduction of flows for the month of June of 1.77 feet may mean a range of daily reductions from 1 foot to 6 feet. If during a period of seven days the water table is 6 feet lower than current conditions, the riparian vegetation will be significantly impacted. Even though the average reduction seems modest, the consequences of the extremes are what truly matters to the vegetation. Daily flows were modeled for the Spells analysis, and this daily flow data should have been, but was not, used throughout the VTR.

Furthermore, in its scoping letter, EPA (EPA Scoping Comments Letter, page 2) recommended the following: "*The hydrologic analysis should be sufficiently detailed to provide the necessary information for the assessment of biological impacts. Monthly average discharge is usually insufficient for such analysis. At a minimum, wet, average, and dry year analysis should also be included*." The City concurs with this assessment. Analysis consistent with EPA's recommendation should be included as part of an SDEIS and Revised Section 404(b)(1) Analysis.

VTR Section: 6.1.2 Effects to Riparian Vegetation, page 35
Statement: *"Key considerations were potential changes in stream morphology, changes in stream stage or reservoir elevation, and changes in alluvial ground water elevation associated with changes in stream stage…."*

Comment: It is unclear how the analysis considers future changes to stream morphology. The issue of fine sediment deposition is omitted from this discussion despite its having been identified as an issue in the scoping process for the DEIS, and regardless of any other potential short or long term changes in stream morphology. The issue of encroachment, mentioned elsewhere in the DEIS, is not included in the VTR. *"Changes in reservoir elevation…"* is not mentioned anywhere in the analysis, nor is the specific reservoir identified. Measurements of alluvial groundwater elevations were not made. Thus, the City finds the analysis inadequate to support the findings of the VTR or DEIS and inconsistent with the Section 404(b)(1) Guidelines.

VTR Section: 6.1.2 Effects to Riparian Vegetation, page 37
Statement: *"Field visits along the Cache la Poudre River and South Platte River study areas from the Munroe diversion to the Kersey gage were used to verify aerial photos and field check: the location of riparian and wetland vegetation, the influence of flood irrigation, other land use practices, and tributary streams or ditches on riparian and wetland vegetation…."*

And;

VTR Section: 6.1.2 Effects to Riparian Vegetation, page 43
Statement: *"On August 23, September 8, and October 31, 2006 and November 5 and 6, 2007, ERO conducted field reviews along the Cache la Poudre and South Platte rivers."*

Comment: Only 5 field days over a period of 2 years were allocated to visit 12 sites that spanned a distance along the River of approximately 50 miles. It is unclear how these scattered snapshot site visits and qualitative observations provided sufficient data to assess "*the influence of flood irrigation, other land use practices, and tributary streams or ditches on riparian and wetland vegetation*."

Observation of wet soils and of "*water moving towards the river"* (page 54) is cited as key evidence for the major conclusion of this VTR section that "*the riparian vegetation appears to be supported by lower more frequently occurring flows and supplemental sources of hydrology*."

The Section 404(b)(1) Guidelines clearly indicate "*appropriate factual determinations, evaluations, and tests are necessary to assess impacts to the aquatic resources" See* Section 230.10. Five site visits to various river reaches is wholly inadequate to make a quantitative scientific assessment of these factors.

VTR Section: 6.1.2 page 36
Statement: *"Much of the Cache la Poudre River has been physically altered… These activities have limited the development of riparian vegetation by decoupling the historical floodplain from the dynamics of the river and alluvial ground water… Therefore, the evaluation of riparian resources and the potential effects of changes in streamflow focused on river reaches with riparian resources that appear to still be linked to some degree to the dynamics of river flows and shallow alluvial ground water levels that provide a supportive hydrology for riparian and wetland vegetation…. These reaches for the riparian resources appear to be linked to the river to some degree are referred to as sensitive reaches, because of their potential to be sensitive to changes in streamflows."*

Comment: While it is true that anthropogenic practices have altered the River and floodplain and that specific areas are more linked physically to River flows, there is no evidence to back the assertion that other reaches (those not identified as sensitive) have no relationship to the flows in the River due to *decoupling* of the floodplain from the River and alluvial groundwater. This "decoupling" is purely speculative and there is no scientific basis for asserting that less sensitive reaches are not influenced by the flows in the River in a significant way.

It is more likely that there is a complex groundwater flow pattern in this area where the entire Reach receives significant fluvial "recharge" in the spring via the rising stream stage and the probable corresponding rise in the alluvium. Therefore, the majority of the river segments are probably "losing reaches" during spring flows. Return flows from agriculture and other human activities make these gaining reaches in the autumn. The

many gravel pit ponds (lined and unlined), further complicate groundwater movement patterns. The connectivity of the River to adjacent groundwater tables is undoubtedly complex and deserves a quantitative evaluation.

In another example of internal contradictions within the DEIS, the following statement from DEIS Section 4.7.5 appears to contradict the findings made in VTR Section 6.1.2 (page 36) and to more closely align with the City's perspective on this issue:

> **DEIS Section: 4.7.5 Ground Water Cache la Poudre River, page 4-40**
> *"During periods of high river flow (spring runoff) for this reach of the Poudre River, the river likely recharges alluvium adjacent to the river. As high flows decrease and irrigation of adjacent fields increases during the summer months, ground water probably flows toward the river. There is insufficient information to determine whether the river is gaining or losing during the winter months. It is probable that certain portions of the river receive ground water due to the delay in ground water flow from irrigated fields some distance from the river, and there may be neither recharge nor discharge to the alluvium in other portions of the river."*

As discussed throughout these Comments, there are potential negative effects from the altered flow regime predicted to result from NISP along the entire course of the River. Although the channel through the City is heavily affected, and the connection with high flows may not be *obvious*, the varying magnitudes of streamflow under current conditions still perform important ecological functions through the entire Reach and, in particular, exercise substantial influence over riparian and riverine vegetation.

VTR Section: 6.1.2 page 37
Statement: *"The assessment of potential effects to riparian resources focused on the potential for changes in channel maintenance flow to affect the channel and in turn the conditions necessary to support riparian vegetation. The magnitude, duration, timing, and frequency of channel maintenance flows can affect riparian vegetation, which in turn affects channel dynamics (Schmidt and Potyondy 2004)… These relationships may vary substantially in highly altered channels. Schmidt and Potyondy (2004); however, noted that although bankfull elevation is related to vegetation along the channel, a range of channel maintenance flows is necessary to keep vegetation from encroaching on the channel."*

Comment: Although the ecological background provided in the cited paragraph is consistent with ecological theory, this statement indicates that the VTR applies these concepts, but it does not. The VTR does not adequately address the "*range of maintenance flows*." The analysis of magnitude, duration, timing and frequency was incomplete and inadequate. Final conclusions ignored the moderately high flow. The role of scouring is not discussed and vegetation encroachment is omitted in the VTR. The analysis in the VTR considered only impacts to overbank flows and omitted any discussion on the important role of the range of flows.

VTR Section: 6.1.2 page 38
Statement: *"Stream stage (the elevation of water in the channel) can affect the elevation of the alluvial ground water, and may in turn affect riparian vegetation."*

Comment: The VTR repeatedly refers to the relationship between stream stage and alluvial groundwater. However, alluvial groundwater levels were not measured. The influence of moderately high flows (and the reduction thereof under project conditions) on recharging the groundwater was omitted from the actual analysis. The recharge to the alluvial groundwater under the current flow regime by moderate flows cannot be ignored in this assessment when the changes anticipated for the proposed action will greatly reduce the frequency of the moderate flows. This issue is another that must be addressed in an SDEIS and Revised Section 404(b)(1) Analysis.

VTR Section: 6.2.5 Riparian Vegetation along the Cache la Poudre and south Platte Rivers, page 40
Statement: *"Although supportive hydrologic conditions are essential for the maintenance of wetlands, simple cause-and-effect relationships are difficult to establish (Mitsch and Gosselink 1993)….. The ground water table adjacent to a stream may be higher or lower than the stream, depending on the discharge/recharge relationship between the stream and adjacent ground water."*

Comment: Difficulty establishing such linkages does not justify ignoring them, especially where assessment of this issue is essential under the Section 404(b)(1) Guidelines. *See* comments on VTR Section 6.1.2 (page 36), above. This statement is fundamentally deficient and should be reanalyzed in a Revised Section 404(b)(1) Analysis.

VTR Section: 6.2.5 page 45
Statement: *"Table 2. High and moderate flows associated with cross sections used for spell analysis and changes with action alternatives..."*

The title for this table refers to "high and moderate flows". This is the first time these terms are used in the VTR. Also, in the body of the table there are references to "high and low" flows. No information is provided to quantitatively or qualitatively describe what is meant by "high," "moderate," and "low" flow.

VTR Section: 6.2.5 page 45
Comment on the data in the body of Table 2

Comment: The final conclusions in the VTR refer to data from this Table 2 as a key piece of evidence. The table was created by transferring data from Table 3.11 in the

River Morphology and Sediment Transfer Technical Report (RMSTTR). Significant mistakes were made during the transfer of the data.

Specifically, there is a column in Table 2 titled "*Number of Spells (days)"*. The corresponding column in Table 3.11 in the River Morphology Technical Report uses the title "*Number of high spells*" which is explained in the body of the text as "*…the number of times in the period for record that the flow threshold is exceeded. A spell must be at least 1 day long and spells must be separated by 3 days*." Table 3.11 also has a column titled "*Total duration of all High Spells (days)"* and this would have been the appropriate data to transfer to Table 2 in the VTR. To clarify, Table 2 is presented below. The correct values (the values presented in the RMSTTR in Table 3.11) have been provided in parenthesis and italicized in the 3rd and 4th columns.

Table 2. High and moderate flows associated with cross sections used for spell analysis and changes with action alternatives.

Cross Section Spell Threshold (cfs)	Number of Spells (days)1	Baseline	Project
234557	2,000 (low)	17 *(93)*	5 *(28)*
	3,600 (high)	4 *(13)*	0 (n/a)
233367	1,600 (low)	19 *(136)*	9 *(53)*
	3,400 (high)	5 *(19)*	0 *(n/a)*
187158	1,400 (low)	20 *(178)*	12 *(76)*
	2,400 (high)	10 *(51)*	5 *(16)*
152250	200 (low)	167 *(1235)*	136 *(921)*
	400 (low)	93 *(697)*	73 *(481)*
	2,300 (high)	9 *(56)*	4 *(19)*
	3,800 (high)	3 *(8)*	0 *(n/a)*
133345	1,900 (low)	28 *(120)*	7 *(30)*
	3,600 (high)	5 *(14)*	1 *(1)*

This error undermines subsequent conclusions in this section. The discussion on pages 55-58 of the VTR uses these incorrect values to draw final and significant conclusions about the influence of overbank flows on riparian vegetation. For each cross section the report refers to the frequency of overbank flows and concludes that *"neither of these flows currently occur at a frequency sufficient to provide hydrologic support for riparian vegetation."* With the correct data set this conclusion would be different. The issue must be addressed in an SDEIS and Revised Section 404(b)(1) Analysis.

VTR Section: 6.2.5 page 46
Statement: *"Reductions in streamflow will result in reductions in stream stage... In areas where the water table decline was less than 3.1 feet, cottonwood mortality was between 7 percent and 13 percent. In another study, Scott et al. (1999) noted that over a 3-year period in medium grained alluvial sands, sustained declines in the water table of greater than 3.1 feet resulted in 88 percent mortality of plains cottonwood. The study further noted that gradual water declines of about 1.5 feet had no measurable effect on mortality, stem growth, or live crown volume (Scott 1999).*
Corresponding statement page 51: *"Lincoln Gage. During the growing season the largest changes in mean monthly stream stage (up to -1.77 ft) would occur during wet years,…In addition, in May, stream stage would be about 0.71 ft below baseline conditions …in average years up to 0.96 feet in June…These changes in vegetation are unlikely to cause a loss of wetland or riparian vegetation…"*

Comment: The Scott et al. (1999) study was improperly applied to the Poudre River study area. Scott et al. (1999) reported cottonwood response to changes in the alluvial ground water table. The conclusion from page 51 of Scott et al. (1999) quoted above refers to *"changes in mean monthly stream stage."* The VTR provides no data on the relationship between stream stage and ground water levels or the distinctions that may apply in this highly modified urban environment, and these relationships cannot be assumed.

Despite this flaw, the VTR uses the value of 3.1 feet as the factor that would cause *88% mortality* and a 1.5 foot decline as a change that would cause *"no measurable effect on mortality, stem growth, or live crown volume…"*and then proceeds to omit additional relevant results from this study. Scott et al. observed a 1.5 foot decline to cause "significant declines in annual branch growth increments." Given the relatively short duration of the observation period (3 years) relative to the life of a cottonwood, Scott et al. distinguish between severe water stress (rapid mortality) and sub-lethal water stress (reduced growth). The authors note that the trees experiencing sub-lethal water stress "may be more vulnerable to subsequent periods of low precipitation and high temperatures". Given the numerous studies documenting physiological and morphological stresses on cottonwoods resulting from dewatering (Reily and Johnson, 1982, Tyree et al., 1994, Obedinski et al., 2001, Rood et al., 2003), and the incorrect application of stream stage instead of ground water, the analysis in the VTR is inadequate and flawed. The issue must be addressed in an SDEIS and Revised Section 404(b)(1) Analysis.

Scott et al. also discuss many site specific ecological and physiological factors which influence the responses of cottonwoods in their study. The article concludes by asserting results are valid within the specific parameters of the study site. As well, the authors acknowledge that "clearly, other combinations of antecedent water table environments, meteorological conditions, drawdown patterns and soil characteristics are possible and beyond the scope of this study…" (Scott et al., 1999). The VTR fails to discuss the characteristics that distinguish the Poudre River environment from the site of the referenced study, or to analyze the significant of those distinguishing characteristics.

Another significant problem with the analysis is the use of the monthly changes in stream stage. Given that daily flows were modeled for the Spells analysis, it is unclear why monthly values were used here. Along with many other river ecologists, the same researchers (Scott et al.) have observed that riparian vegetation is extremely sensitive to changes in minimum and maximum flows (Auble et al., 1994). Without daily flow data, the changes to flow boundaries are unknown, and the analysis is incomplete.

The potential impact of NISP on cottonwoods is extremely important to the City. As stated by Rood et al. (2003a) "Cottonwoods not only have intrinsic environmental and aesthetic value, they also provide the foundation for the riparian forest ecosystem."

Cottonwoods are a keystone species. A keystone species is a species that has a disproportionate effect on its environment relative to its abundance (Power et al. 1996). Such species affect many other organisms in an ecosystem and help to determine the types and numbers of various others species in a community

Such an organism plays a role in its ecosystem that is analogous to the role of a keystone in an arch. While the keystone feels the least pressure of any of the stones in an arch, the arch still collapses without it. Similarly, an ecosystem may experience a dramatic shift if a keystone species is removed, even though that species was a small part of the ecosystem by measures of biomass or productivity.

The City has spent decades and made significant financial investment in protecting the Poudre River floodplain, its habitat, and its aesthetic and recreation resources for the people of Fort Collins and Larimer County. A more detailed, science-driven data analysis is necessary to evaluate the fate of cottonwood forests under the proposed action. The issue must be addressed in an SDEIS and Revised Section 404(b)(1) Analysis.

VTR Section: 6.2.5 pages 47-48
Statement: *"Wetland vegetation, especially herbaceous wetland vegetation, may be more sensitive to changes in ground water levels… Six inches (0.5 feet) is a conservative estimate of the change in stream stage that could affect wetland vegetation…in other reaches where wetland vegetation …it is likely that this (wetland) vegetation is supported by commonly occurring lower flows and may adjust over time to any changes in elevation."*

Comment: This section of the VTR is difficult to understand and evaluate. There seems to be confusion about the fact that areas may contain jurisdictional wetlands, but riparian areas may also include a mosaic of other fluvial influenced areas that may not be "wetlands" in the strict legal sense but are uniquely riparian (i.e. they exist specifically because of the dynamic river flows). In the absence of an inventory of jurisdictional wetlands, modeling of groundwater levels, and alluvial recharge, these conclusions are not supported on a scientific basis.

Furthermore, the claim that the herbaceous vegetation "*may adjust over time to any changes in elevation*" (we assume water table elevation) is not supported by data collection, vegetative modeling, or other research. Rather than existing plant communities adjusting over time, it is more likely that the process of non-native vegetation out-competing native species will be further accelerated, or that vegetation characteristic of wetlands will simply disappear.

VTR Section: 6.2.5 pages 51
Statement: *"In April and September, under Alternatives 2, 3, and 4, mean monthly stream stage during the growing season would change very little (ranging up to -0.01 feet), compared to baseline conditions."*

Comment: This is the first mention of "baseline conditions" in the VTR. Baseline conditions are not defined. It might be that this is a reference to the Baseline conditions modeled in the River Morphology and Sediment Transfer Technical Report (RMSTTR), but this unclear. This is relevant because if baseline conditions are developed from a dry year or based upon average low river flow, plants are more likely to be sensitive to smaller changes in river flow than if the baseline conditions are developed from a higher baseline. In other words, a reduction in stage by 0.5 foot at low flow (low baseline) would have a greater effect than the same reduction in flow at a higher baseline flow. The baseline issue must be addressed in an SDEIS and Revised Section 404(b)(1) Analysis.

VTR Section: 6.2.6 Riparian Vegetation Impacts Summary, page 53
Statement: *"Based on the preliminary analysis using mean monthly flows and stage, it was determined that additional studies were needed …these studies included representative cross sections, generated daily flow data for key locations…"*

Comment: If daily flow data was generated in the additional studies suggested in this VTR section, that data should have been used throughout this analysis and disclosed. Instead, a monthly timestep was used, which is essentially meaningless for assessing impacts to vegetation and ignores the physiological stress experienced by plants under short term drought stress. A discussion based on daily reductions during the peak runoff would have created a useful comparison under which to evaluate the alternatives. This should be done in an SDEIS and Revised Section 404(b)(1) Analysis.

VTR Section: 6.2.6 page 53
Statement: *"Generally, NISP would have less effect on the more frequently occurring moderately high flows, a greater effect on high-flow events, and little effect on the rare large flood events."*

Comment: This statement is unclear and is in direct conflict with other supporting documents. For example, Section 4.1.4 of the River Morphology and Sediment Transfer Technical Report (RMSTTR) (page 4.5) states *"…In summary, the frequency of flooding would be less throughout the study area after the Project. The most consistent effect is on moderate floods where a 4-6 year average recurrence interval would occur on average once in 20 years after the Project."* Because there is no definition of "more frequently occurring moderately high flows" and "high-flows" provided, it is not possible to analyze this statement, particularly given the significant lack of consistency with conclusions in other DEIS documents. These issues must be reconciled in an SDEIS and Revised Section 404(b)(1) Analysis.

VTR Section: 6.2.6 page 53
Statement: *NISP's effects on flow duration for the Poudre River would be the greatest for the upper reaches through Fort Collins. The average annual range in the duration of flows of 800 cfs to 3,000 cfs would be reduced from 45 days per year to 28 days per year, and the mean daily flow would be reduced from 219 cfs to 158 cfs. ….. The average recurrence interval for flows of 2,000 cfs, a relatively high flow, in the Laporte through Timnath reaches would double from about 1 to 2 years; the average recurrence interval for a flow of 3,000 cfs would increase from about 1 in 4 years to 1 in 20 years.*

Comment: The role of peak flows in maintaining recruitment patterns, age-class structure, and sustaining riparian communities through rising alluvial groundwater or overbank inundation is discussed earlier in the VTR but is not considered in the statement quoted here. A 50% decrease in number of days these high flows will occur and the doubling or quadrupling of recurrence intervals for high flow events is very likely to have a major adverse impact on the riparian vegetation because of the critical functions served by these types of flows.

VTR Section: 6.2.6 page 53-54
Statement: *"Based on these projected changes in flows and assessment of representative cross sections, the following conclusions were reached regarding trends and effects to riparian vegetation….."*

The sites typically have sources of supportive hydrology in addition to the river (e.g., gravel pit ponds elevated above the river, tributary drainages, seeps, or irrigation ditches, or these in combination). These supplemental sources of water were evident even in early November during low flows as many of the sites reviewed had areas

that were saturated and water was observed moving toward the river from nearby sources at elevations higher than the river. Wetlands within these sites were saturated in the fall when streamflows were low."

Comment: As stated in comments on VTR Section 6.1.2 (page 37), above, snapshot observations, and zero groundwater data is not sufficient evidence upon which to derive this conclusion. According to Section 404(b)(1) Guidelines Section 230.5 (e), the DEIS must… "*evaluate the various physical and chemical components which characterize the non-living environment of the waters…including its dynamic characteristics*." The Section 404(b)(1) requirements are not satisfied by "*observations of wet ground in November.*" This issue must be addressed in an SDEIS and Revised Section 404(b)(1) Analysis.

VTR Section: 6.2.6 page 54

"Typically, the oldest trees occur along the margins and higher elevations of the floodplain (i.e., farthest from the river), and many of these older trees are decadent."

Comment: It is unclear how the authors identified the age of the cottonwood trees. The forestry literature is replete with data demonstrating that stem diameter is often a poor indicator of tree age. Tree coring (which is reliable) was not mentioned. Given the human history of the area (including plantings, ditches) there is probably a complex mosaic of different age cottonwoods throughout the study area.

VTR Section: 6.2.6 page 55-58

Statement: *"…..The NISP action alternatives would reduce the frequency of flows of 3,400 cfs from 17 to 5 days and flows of 1,600 cfs from 19 to 9 days for the 50 years of hydrologic record (Anderson 2008). Neither of these flows currently occur at a frequency sufficient to provide hydrologic support for riparian vegetation. It is likely that most of the supportive hydrology comes from the lower more frequently occurring streamflows and supplemental sources such as the ditch and nearby ponds."*

Comments: Due to incorrect transfer of data from the River Morphology and Sediment Transfer Technical Report (RMSTTR), the results of this analysis are grossly misrepresented. For example, it should state that flows of 1,600 cfs would be reduced from 136 days to 53 days. These mistakes are fundamental and would fundamentally modify the author's conclusions. The baseline issue must be addressed in an SDEIS and Revised Section 404(b)(1) Analysis.

Furthermore, the argument ignores the important increase in water available to riparian vegetation during moderately high flows (not overbank flows of 1,600 or 3,400 cfs). It is well documented that these moderately high flows cause a corresponding rise in groundwater levels in riparian soils, which the DEIS recognizes elsewhere. *See, for example*, DEIS Section 4.7.5 (page 4-40): … *"During periods of high river flow (spring runoff)… the river likely recharges alluvium adjacent to the river."*

VTR Section: 6.2.6 page 55-58

General comment about interpretation of Spells analysis: It is important to note that the River Morphology and Sediment Transfer Technical Report (RMSTTR) provides a brief "Interpretation of the Results of the Spells Analysis". Its conclusions are inconsistent with those drawn in the VTR in this Section. While the VTR essentially concludes that there will be no impact to the riparian areas along the Poudre River due to hydrologic changes, the RMSTTR excerpt below indicates recognizable, foreseeable changes to flow magnitude and duration and consequential negative impacts to vegetation:

> **RMSTTR Section 4.1.5, page 4.5**
> *"The spells analysis reported in Chapter 3 further elaborates the likely impact of the project by reporting on both occurrence and duration of flow events that correspond to flow thresholds with a particular significance to geomorphology or colonization and survival of riparian vegetation. In general, the analysis reveals a substantial reduction in the occurrence and duration of high flow events throughout the study area under Project conditions. At all of the stations that were analyzed, the number of overbank flows would be reduced by as much as 50% and the average duration of the remaining events would also be decreased.*
>
> *At all the stations that were examined, the number of occurrences of significant overbank flows has decreased markedly. For two stations in the Fort Collins Reach, the number of occurrences of significant overbank flows in the modeled period (1975 to 1999) decreases from 4 or 5 under Baseline conditions to zero with the Project. At another station in the Fort Collins Reach, and also a station downstream in the Timnath Reach, the occurrence of significant overbank flows is now halved (from 19 to 10 occurrences at one station and from 10 to 5 occurrences at the other). The reduction in occurrence is accompanied by a 50 to 70% reduction in the total duration of the overbank flows. There is a similar impact on the lower flow thresholds although the effect is generally less dramatic at the smaller flows.*
>
> *As well as having an important influence on colonization and maintenance of vegetation, the occurrence and duration of flows that inundate channel benches and the floodplain is also important to sediment movement and the morphology of the channel. An elongation of the average time between flow events that are large enough to be capable of scouring the channel gives a longer period for vegetation to establish. A shorter duration of scouring flows means that less net channel change will occur. A trend toward fewer and shorter high flow spells is apparent throughout the study area."*

4. Aquatic Habitat Quality and Aquatic Life

4a. General comments

The City and authors of the DEIS recognize the significance of the Poudre River through Fort Collins as a transition area from a cold water to warm water river. Areas of physical transition from one habitat to another are typically rich in species diversity and sensitive to external environmental perturbations. The City is particularly concerned that lack of field data and limited modeling efforts of the DEIS are not likely to lead to an accurate portrayal of the possible environmental consequences to the aquatic biological resources from the proposed action. Thus, contrary to the conclusions of the DEIS, the City believes that there may be major adverse impacts that could reduce or eliminate certain aquatic life in the Poudre River as a result of the proposed action. Further, the City believes that degraded water quality, large reduction in peak flow, channel narrowing and increased sedimentation will result in reduced ecological function that likely cannot be mitigated. Because the DEIS does a poor job of describing the direct and indirect impacts to aquatic resources resulting from the proposed action, its discussion of mitigation measures is premature at best, and does not suffice to meet the requirements of NEPA and the Section 404(b)(1) Guidelines. *See* Section II.1a of these Comments for more discussion of this issue generally.

4b. Specific Comments on DEIS

DEIS Section: 3.15.5.1 Macroinvertebrate Populations, Cache la Poudre River, pages 3-74 - 3-76
Statement: *"Shieh et al. (1999) collected macroinvertebrate samples from the Cache la Poudre River…"*

Comment: In addition to Shieh, *et al*. (1999) the following relevant literature should have been reviewed to provide a more comprehensive analysis of the macroinvertebrate communities of the Poudre River, Fort Collins, and to support conclusions throughout this section:

- Grotheer et al., 1994.
- Shieh et al., 2002.
- Shieh et al., 2003.

Additionally, Dr. Douglas A. Rice, Laboratory Director, Environmental Health Services, Colorado State University, has thirty years of macroinvertebrate data available for the Poudre River through the study stretch and would be an essential resource for further evaluation.

This entire section of the DEIS is uninformative and the conclusions are not completely accurate based on the available data. The section basically concludes that "based on 2005 data, as well as earlier data, abundant and diverse macroinvertebrate populations inhabit

the Poudre River within the study area." This statement is not accurate upon examination of other published and unpublished data (Grotheer et al., 1994, Rice unpublished data, Shieh et al., 1999, Shieh et al., 2002, Shieh et al., 2003). In fact, macroinvertebrate diversity is significantly reduced and community structure and function significantly altered in the Poudre River through Fort Collins. For example, when using the NAWOA data set (based on USGS 2003, as cited on page 3-76 of the DEIS), in all reaches combined at the mouth of the Canyon at least 122 macroinvertebrate taxa were identified, 87 taxa at a Fort Collins site, and East of Interstate 25 only 45 taxa were found (Kondrateiff 2008).

Furthermore, the statement that *"at all sites, indicating that healthy invertebrate communities inhabit the Cache la Poudre River within the study area [interpreted from Shieh et al.. 1999]"* is misleading because

1. pollution sensitive and strongly rheophilic taxa such as Plecoptera (stoneflies) occurred only upstream of Fort Collins;
2. diversity clearly decreased downstream [Site 1 upstream of Fort Collins, about 30 taxa; Site 2 below Fort Collins, 21 taxa];
3. Smaller and faster growing taxa with multiple generations (e.g. chironomid midges) that are pollution tolerant and are slow water forms dominate sites below Fort Collins. (Interestingly, this is actually indicated in Section 3.15.5.1: "The number of EPT taxa [pollution sensitive and rheophilic aquatic insect orders: Ephemeroptera (mayflies)/Plecoptera (stoneflies)/Trichoptera (caddisflies)] at each site ranged from **five** taxa at I-25 to **15** taxa upstream").

Other than the Physical Habitat Simulation (PHABSIM) modeling (which does not consider water temperature), no other analysis is presented in the evaluation of the proposed action (reduced peak flows and seasonal snowmelt floods) of the structure and function of the macroinvertebrate community and benthic habitat quality of the Poudre River through Fort Collins.

Similarly, PHABSIM results are not useful for judging future impacts. Therefore, more weight should be given in a DEIS to the results of the stream morphology, water quality and hydrology reports. The detrimental effects of degraded water quality, large reduction in peak flow, channel narrowing and increased sedimentation predicted to result from NISP would result in less ecological function than currently exists in this river segment, and the DEIS fails to adequately assess those impacts.

DEIS Section: Section 4.15.1.1 Hydrology, page 4-59-60
Comment: As stated earlier, the use of mean monthly data is not sufficient for a meaningful biological analysis. Mean monthly flow masks the range of values that occur within a month. In months when flows are increasing (ascending hydrograph limb) or decreasing (descending hydrograph limb) during the month, the mean monthly value does not represent the conditions experienced by the aquatic fauna. A daily flow regime should be used to determine impacts to aquatic fauna and habitat. Daily flows for typical

wet, average, and dry years should be simulated and analyzed. The hydrologic regime issue is fundamental to evaluating water project impacts and must be addressed in an SDEIS and Revised Section 404(b)(1) Analysis.

DEIS Section: Section 4.15.2.1.1 Upstream of Fort Collins, page 4-61
Statement: "*Water quality and riparian vegetation are not expected to change from existing conditions for any of the action alternatives in this segment of the river (ERO and HDR 2008; ERO 2008a) and would have no effect on aquatic biological resources.*"

Comment: This blanket statement disagrees with the conclusions presented in the Water Quality Technical Report (WQTR) (page 36): "*Temperatures greater than 20 C have occasionally occurred between mid-July and mid-September; the predicted flow decreases could result in river temperatures that exceed 20 C more frequently and for longer periods. A dissolved oxygen concentration less than the spawning standard of 7 mg/l has occurred in the past; with reduced flows and warmer stream temperatures, the dissolved oxygen standards could be more frequently exceeded.*" This statement from the WQTR indicates a minor to moderate impact to biological resources and not this "no effect" conclusion stated on DEIS page 4-61. *See also* the comments on Vegetation, above in Section IV.3 of these Comments.

DEIS Section: Section 4.15.2.1.1 Upstream of Fort Collins, page 4-61
Statement: "*The reductions in peak flows also would tend to reduce movement and scouring of the substrate, which would tend to benefit benthic invertebrates that live in the substrate and also tend to benefit longnose dace, a common minnow species in the substrate in this segment.*"

Comment: Research has shown that substrate movement is necessary in healthy river ecosystems (Bunn and Arthington, 2002). Annual runoff of snow melt to dependent streams is the process responsible for habitat creation and maintenance. Reductions in peak flows of the magnitude predicted to result from NISP and their scouring effect can result in embedding the channel substrate and subsequent loss of interstitial (soil pore) space utilized by benthic invertebrates.

The City does not agree that longnose dace live in the substrate. This species is generally found close to the bottom substrates but live on the surface of the cobbles and gravels. The only life stage of this species that is small enough to utilize the interstitial spaces would be larval forms. Spawning occurs for an extended period during the summer. This reproductive strategy is geared toward a higher probability of timing the spawn period with snow melt peak flows.

Similarly, benthic invertebrates are adapted to snow melt runoff, and the movement of the stream substrate is beneficial to the habitat. The City does not agree that a non-mobile substrate during peak flows is beneficial. In fact, the reduction in scouring flows to remove fine substrate that NISP is predicted to cause would be detrimental by allowing

fine sediments to either remain in place (go un-scoured) or settle in the water column which in turn continues to embed the channel substrate. Continued channel embedding is likely to result in a loss of aquatic diversity, including invertebrates and fish.

DEIS Section: Section 4.15.2.1.1 Upstream of Fort Collins, page 4-61
Statement: "*Therefore, the information on hydrology and habitat availability for fish and invertebrates indicates that the action alternatives would result in a minor beneficial effect to fish and invertebrate communities in this segment of the Poudre River (Table 4-11). There would be increases in abundance of fish and invertebrates and possibly increased number of species of invertebrates.*"

Comment: In contradiction to the above-quoted statement, the changes that would result from the action alternatives would not be beneficial to fish and invertebrates. Page 4-63 of the DEIS states that "*…the adverse effects of slightly degraded water quality, channel narrowing, and sedimentation*" is likely to cause significant impacts to fish and invertebrate populations, confirming that impacts would not be beneficial. Further, the DEIS incorrectly assumes that the water quality, channel narrowing and sedimentation impacts from NISP would be slight. As discussed at length above, all of these impacts would be much more significant than acknowledged in the DEIS. In addition, the lack of sediment flushing and embedding of the channel substrate with increased water temperatures as a result of the proposed action will also contribute to environmental conditions unsuited to healthy fish and invertebrate life. The cumulative effect of these negative impacts from NISP will be detrimental and will reduce or eliminate important native species and/or eliminate the opportunity for their conservation/reintroduction. The DEIS has not collectively considered these factors as a cumulative impact. The overall result for this section of the River from the action alternatives would be a major adverse impact that must be, but has not been, identified or evaluated in the DEIS. *See* Section 404(b)(1) Guidelines Sections 230.31, 230.51. *See also* Section II.1a of these Comments.

DEIS Section: Section 4.15.2.1.2 Near Fort Collins, page 4-61
Statement: "*Changes to channel morphology, increased sedimentation, degraded water quality, and the greater occurrence of low flows would be detrimental to both fish and invertebrates. The adverse effects would result in lower abundance and fewer species of fish and invertebrates. These minor adverse effects would occur gradually over time, and fish and invertebrate communities would adapt to the new flow regime and channel morphology.*"

Comment: The changes to the River from NISP would be detrimental to both fish and invertebrates, and would constitute more than a "minor adverse effect". According to the methods used for impact analysis, loss of species diversity and abundance would be a "moderate or major adverse effect". The stated conclusion that NISP would result in lower abundance and the loss of species meets the criteria to be a major adverse effect. Fish and invertebrates would not "adapt" but would be forced to conform to the new flow regime, degraded water quality, and channel conditions. The result could be a major

adverse negative effect to existing biological resources up to and including localized extirpations of existing fish and invertebrate assemblages.

Furthermore, it should be noted that the DEIS Statement quoted above concludes that there will be contrasting impacts to these two referenced river reaches. It is very unlikely that the impacts will differ from a minor beneficial effect to a minor adverse effect in adjacent river reaches.

DEIS Section: Section 4.15.2.1.3 Fort Collins to I-25, page 4-63
Statement: *"The action alternatives would have a minor to moderate beneficial effect to fish and invertebrate communities in this segment of the river (Table 4-11). This would result in increased abundance and number of species of fish and invertebrates."*

Comment: This conclusion is based mainly on the result of the PHABSIM analysis. As noted for other sections of the River where channel changes are predicted, PHABSIM results are not useful for judging future impacts. Therefore, more weight should be given to the results of the stream morphology, water quality and hydrology reports. The detrimental effects of degraded water quality, large reduction in peak flow, channel narrowing and increased sedimentation would result in less ecological function than currently exists in this segment of the River. As with the next upstream reach, this is likely to result in the loss of species and abundance and not an increase in species and abundance. There will be major adverse effects to this river segment from NISP. This issue must be addressed in an SDEIS and Revised Section 404(b)(1) Analysis.

DEIS Section 5.8.3 Temperature and Dissolved Oxygen, page 5-16
Statement: *"To control adverse impacts to the temperature of the Poudre River, the District will implement, to the Corps' satisfaction, the means to mitigate any significant adverse effects of Glade Reservoir releases on the temperatures of the Poudre River. Discharge to the Glade forebay and the Poudre River will be fully aerated by the energy dissipation structures."*

Comment: The District's commitment to mitigate for the impacts of temperature variation and dissolved oxygen levels on the cold water fishery requires more detail to meet the requirements of the Section 404(b)(1)Guidelines. More information is required concerning the target minimum stream flows in the reach and the District's operational response when temperatures exceed those identified by cold water fishery experts. Without additional detail or commitments, these vague assertions and assurances do not suffice to address the serious harms to the aquatic ecosystem in the City. *See* Section II.4b of these Comments.

4c. Comments on the Aquatic Biological Resources Technical Report (ABRTR)

ABRTR Section: 2.2, page 31
Statement: *"All three of these other resource areas are conducting additional studies and when these studies are done, the resulting effects on aquatic organism may have to be revised."*

Comment: This statement is in reference to the Water Quality Technical Report (WQTR), Vegetation Technical Report (VTR), and River Morphology and Sediment Transfer Technical Report (RMSTTR). It is not clear when this additional analysis will be completed and whether the comment period would be extended for public review of the revised ABRTR. The ongoing need for this work further confirms the inadequacy of the DEIS and the need for an SDEIS to allow meaningful public review and comment on this issue.

ABRTR Section: 2.2.1. Approach to Analysis, page 32
Statement: *"From approximately the western edge of Fort Collins downstream to approximately Interstate 25, the Cache La Poudre River is a transitional stream from coldwater to warm water habitat."*

Comment: The City agrees with this statement and notes that the River in this transitional reach supports both coldwater and warmwater species. However, the Water Quality Technical Report (WQTR), upon which the ABRTR depends for information regarding changes to water quality to result from NISP, considers the River from approximately Shields Street downstream as warm-water. Therefore, the conclusions in the ABRTR regarding the environmental consequences from NISP do not address impacts to the coldwater species. The data and analysis of environmental consequences must address the impacts to the existing coldwater biological resources downstream to approximately Interstate 25. This would require additional analysis of water quality; in particular, water temperature changes as a result of the proposed action. Effects of the proposed action on water temperature and the potential impact to the aquatic resources were an important factor noted during project scoping. This issue must be addressed in an SDEIS and Revised Section 404(b)(1) Analysis.

ABRTR Section: 2.2.2. Hydrology, page 33
Statement: *"The comparison of hydrologic parameters between alternatives was the primary tool in this report for evaluating the potential effects on aquatic resources in the streams in the study area. In this report, we used summaries of mean monthly flow at nine locations on the Cache La Poudre River and one location on the South Platte River (Figure 5)."*

Comment: Mean monthly data is not an adequate basis for analysis of effects on aquatic resources. The monthly time scale is not sufficient to determine changes on the aquatic resources. The EPA in its scoping letter (EPA letter page 2) recommended the following: "*The hydrologic analysis should be sufficiently detailed to provide the necessary information for the assessment of biological impacts. Monthly average discharge is usually insufficient for such analysis. At a minimum, wet, average, and dry year analysis should also be included*." There are large changes to hydrology for the action alternatives, which should be addressed by using daily hydrology for wet, average, and dry year types. This would allow the comparison on a biologically meaningful time scale. This analysis should be conducted and presented in an SDEIS and Revised Section 404(b)(1) Analysis.

ABRTR Section: 2.2.3 Instream Flow Incremental Methodology, page 40
Comment: The City agrees with the use of the Instream Flow Incremental Methodology (IFIM) and the Physical Habitat Simulation (PHABSIM) portion of that model. The study relied on existing data sets for the habitat simulations. Based on the methods described, only the existing Weighted Usable Area (WUA) data was used in the analysis. It does not appear that any ground-truthing of the existing cross section data was completed to determine applicability to the present day channel. All of the existing data sets were collected over 20 years ago and substantial changes may have occurred to the River within the City. In particular, the cross section data should have been reviewed to insure that the hydraulic simulations conducted in the mid-1980s were still representative of today's environment.

The PHABSIM data included cross sectional information that could be used to address impacts of changes in wetted area on benthic invertebrates. As noted earlier, the use of mean monthly flow data does not allow a biologically meaningful analysis of flow fluctuations on benthic fauna; however, the large changes in flows on a monthly basis seem to indicate that large fluctuations on a more frequent basis are possible.

ABRTR Section: 2.2.3 Instream Flow Incremental Methodology, page 40
Statement: "*We focused our effects analysis on the minimum habitat levels for each species/life stage. Therefore, we determined the minimum habitat level in a given year type (average, wet, and dry*)."

Comment: Minimum habitat level can influence population levels; but impacts on habitat levels cannot be adequately analyzed based on a single minimum habitat value for each year type, especially a single monthly value. Other factors such as frequency of occurrence are also important to aquatic populations. Additional interpretation of time of year should be addressed, as well as minimum habitat value. Time of year is important to determining the impact of changes in river flows on habitat. For most PHABSIM studies, the habitat suitability criteria are derived for moderate to low flows. Habitat use by the species of interest is typically variable on a seasonal basis. Habitat occupied during base flow is likely not the same habitat occupied during peak runoff. The analysis should

include an interpretation of a time series graph of the habitat for wet, average, and dry years and should be fully explained and presented in an SDEIS.

ABRTR Section: 3.2 Fish Populations, page 46
Comment: The fish occurrence data should be segmented by study reach to provide a basis for evaluating environmental consequences. While the list of species for the total study area is informative (Table 2, Page 46), the presence of species by river segment would provide more useful information, especially since the Cache La Poudre River is transitional from coldwater to warm-water within the study area. The historical data should be presented in the same format as the supplemental data collected in 2005.

ABRTR Section: 4.1.1. Upstream of Fort Collins, Effects Summary, page 71
Statement: *"The reductions in maximum flows during runoff in May, June, and July with the action alternatives would tend to increase habitat availability for brown and rainbow trout more than the reductions in winter flows would decrease habitat availability."*

Comment: This statement is confusing. It is illogical to compare impacts to trout from reduced peak flows with the impacts due to reduced winter flows. Furthermore, the assertion in the first half of the statement runs contrary to accepted ecological theory and the ABRTR should therefore provide supporting literature. Second, it is unusual to make a direct comparison between habitat at peak flow and habitat during winter flow, as habitat requirements are distinct for each season. Recent research on ecological flows has shown that the channel maintenance that occurs at peak flow is very important to long term habitat health (Bunn and Arthington, 2002, Fausch et al., et al., 2002, Rathburn et al., in press).

Additionally, the use of PHABSIM to evaluate peak flows should be secondary to the stream morphology analysis for peak flows. The habitat time series graphs do show that the minimum habitat occurs during runoff (Figures G-3 & G-6). These same graphs show winter habitat is reduced by NISP by approximately 20% or more for several months. The fact that the full channel is wet during peak flow and only a partial channel is wet at the base flow should be incorporated into the interpretation of impacts. The cross section data used from the previous studies with graphs of water surface versus discharge would depict the amount of wetted area available for fish habitat. The amount of wetted area is also important to the continued productivity for benthic invertebrates. The reduced area of wetted channel would provide less habitat for invertebrates and will negatively impact the biological community.

ABRTR Section: 4.1.2. Near Fort Collins, Effects Summary, page 77
Statement: *"The changes to channel morphology, the increased sedimentation, degraded water quality, and the greater occurrence of low flows would be detrimental to*

both fish and invertebrates. The adverse effects would result in lower abundance and fewer species of fish and invertebrates."

Comment: The City agrees with this statement. An SDEIS should study in detail the effects of lower dissolved oxygen levels and higher temperatures on fish and invertebrates as well as on trout habitat. The City does not agree with the following statement that concludes the paragraph:

ABRTR Section: 4.1.2. Near Fort Collins, Effects Summary, page 77
Statement: "*The minor adverse effects would not be more serious because, over time, these changes will happen gradually, and the fish and invertebrate communities would adapt to the new flow regime and channel morphology."*

Comment: A reduction in fish and invertebrate abundance and diversity can not be considered an "adaptation". There will be a reduction or elimination of biotic diversity due to degradation of stream conditions from NISP. The resulting loss of species should be considered a major adverse impact. The ABRTR presents a good summary of the loss of species over time. However, that gradual loss of species due to human induced changes to the Cache La Poudre should not be considered "natural" and must be put in context of the impact of the proposed action on the baseline (i.e. existing) aquatic fauna in the River. This misleading characterization must be corrected in an SDEIS.

ABRTR Section: 4.1.3 Fort Collins to Interstate 25, Effects Summary, page 83
Statement: "*The information from both the hydrology and PHABSIM simulation indicates that the action alternatives would provide substantially more habitat for fish and invertebrates than the baseline flow conditions …. However, the beneficial effect would be dampened by the adverse effects of slightly degraded water quality, channel narrowing and sedimentation.*"

Comment: This statement appears to argue that decreased peak flows and increased winter base flows would provide more habitat than the current flow regime. The City does not agree, however, that a reduction in spring flows of the magnitude predicted to result from NISP, which would result in additional sedimentation and channel narrowing (among other negative effects), would provide more aquatic habitat. Accumulation of sediment would change the environment for both invertebrates and fish, and possibly modify (negatively) the food chain. Further analysis in an SDEIS is needed to determine if the degree of sediment accumulation, water quality degradation, and channel narrowing would override the benefit of higher winter base flows.

ABRTR Section: 6. Mitigation, page 99
Comment: The ABRTR contains no discussion of avoiding or lessening losses to aquatic resources for the transitional reaches of the Cache La Poudre River. The mitigation, as proposed, does not address the loss of habitat and species complexity in the

River downstream of the Pleasant Valley and Lake Canal. The proposal to stock native fish in isolated, off-channel habitats would not constitute mitigation for losses in the primary channel. Isolated habitat without connection to the River for voluntary ingress and egress does not contribute to the riverine community. Further, these types of habitat were not quantified in the existing environment section to determine if these habitats are available, have permanent water of sufficient water quality to support reproducing population, or would be subject to avian and mammalian predation without adequate escape cover. Finally, the hypothesis that these stocked fish "may escape from these areas and recolonize the Cache La Poudre River" is highly unlikely given the reduction of peak flows. Out of channel peak flows would be required to inundate these isolated off-channel areas and allow fish to move out of the isolated areas.

5. Terrestrial Wildlife

5a. General comments

Riparian habitats in semiarid landscapes support a disproportionately high number of wildlife species. For example, 82% of all breeding birds in northern Colorado occur in riparian habitats while 51% of all species in the southwestern U.S. are obligate to riparian systems (Knopf et al., 1988, Knopf 1985). Furthermore, during migration, riparian habitats attract 10 to 14 times the number of birds compared to upland habitats (Stevens et al.1977, Hehnke and Stone, 1979). A large volume of peer reviewed research indicates the proposed alternative could cause short- and long-term negative changes to critical habitat components to wildlife including loss of mature cottonwood forests, lack of cottonwood recruitment, homogenization of habitats consisting of highly adapted species (weeds), and a subsequent reduced diversity of wildlife guilds. Because the City is heavily invested in over 1,400 acres of habitat along the Poudre River through Fort Collins, the maintenance and/or improvement of riparian habitat and conservation of the dependent wildlife within the riparian system are of paramount concern.

Analysis of wildlife in a riparian ecosystem depends on a "clear understanding of habitat requirements and the physical and biotic processes that create and maintain those habitats" (Askin, 2000, Baron et al., 2002, Skagen et al., 2005). Overall the DEIS does not adequately describe the wildlife resource along the Poudre River through Fort Collins. The DEIS also does not describe the direct and indirect impacts to wildlife resulting from the proposed action.

Due to the sparseness of data in this chapter and oversimplification of ecological theories, the project proponents have not met the minimum requirements outlined in the Section 404(b)(1) Guidelines to understand the terrestrial wildlife resource and predict project impacts. Although some information was gathered from other published sources, this effort was not thorough and was inadequate. Without the required data gathering and analysis, the Corps is not able to address the impacts from NISP in the manner required by NEPA and the Section 404(b)(1) Guidelines. This analysis should be conducted and presented in an SDEIS and Revised Section 404(b)(1) Analysis.

Only once was City of Fort Collins Natural Areas Staff consulted (for a one hour meeting) during the scoping period to discuss wildlife issues along the Poudre River through Fort Collins. At that time, City staff was not given clear information on the impacts of NISP to the flow regime when asked about the potential impact to wildlife (meeting in November 2006 with Stacy Antilla (ERO) with Rick Bachand and Karen Manci (City)). The proponent's consultants did not request any data from the City's Natural Areas Program.

The City has a wildlife species list for Poudre River Natural Areas (routinely available to the public) documenting 267 distinct species. This information was not included or considered in the DEIS. There is no evidence presented in the DEIS that suggests site specific surveys were conducted for species other than for a few select species of concern.

Fundamental conflicts exist within and between the DEIS and the Wildlife Technical Report (WTR) regarding basic elements of the project, severity and magnitude of impacts to wildlife and impacts to the wildlife habitat. Similar disconnects are present between the Biological Assessment (BA) and the WTR.

No information or discussion is provided on: species specific habitats, density and distribution, season of use, breeding vs. migratory habitat requirements, source versus sink populations, patch size, movement corridors, high versus low quality habitat, habitat juxtaposition, larger scale landscape issues, disproportionate loss of species, disproportionate habitat value, cascade of impacts due to reduced water quality and change in impacts to lower food chain species.

The following are specific examples of why the analysis of wildlife is inadequate:

1. The DEIS describes impacts to wildlife along the Poudre River only once, in a subsection entitled "Temporary Impacts." Contrary to the DEIS conclusion, changes to wildlife habitat are likely to be permanent and wide ranging. This is a fundamental issue, because Section 404 requires the Corps to give particular consideration to permanent impacts.
2. In the cursory description of wildlife in the riparian corridor there is a section dedicated to highlighting the importance of this area for waterfowl. The discussion never addresses the existence of neotropical migrant birds in the Poudre River riparian corridor.
   The WTR provides a brief and anecdotal description of the impacts to wildlife habitat, and then concludes: "*Although species diversity and abundance of riparian-dependent wildlife species could be reduced in localized areas, no major changes in species composition or distribution are likely.*" WTR Section 6.2.6 (page 45).
3. If species diversity and abundance are reduced then they should be quantified and characterized as a moderate or major adverse effect.

Without quantifying what wildlife will be impacted by the project, any proposed mitigation measures to address those impacts are speculative and essentially meaningless. Mitigation objectives must be measurable, and based on specific and quantified habitat components (shrub density, plant species composition etc) and wildlife components (species richness, nesting vs. migration habitat etc.) based on pre-construction (baseline) surveys. Without these data, there is no way to understand project impacts or the probability that mitigation measures would be targeted and successful. As a result, the Corps cannot comply with the requirements of NEPA or Section 404 without further analysis in an SDEIS and a Revised Section 404(b)(1) Analysis.

5b. Specific comments on the DEIS

DEIS Section: 3.14.11 Poudre-South Platte River Corridor Study Area, page 3-67
Statement: *"Wildlife species tolerant of human disturbance associated with riverine and riparian habitat likely occur in this study area. White-tailed deer winter range and concentration areas occur throughout the Poudre-South Platte River corridor study area (Figure 3-15). The Poudre-South Platte River corridor study area provides breeding, wintering, and migratory habitat for a variety of waterfowl species. According to Andrews and Righter (1992), 16 species of ducks are described as common to abundant in the Poudre-South Platte drainage (including the study area) during migration, breeding, and winter. Several other duck species are rare to uncommon, but regularly occur in the drainage."*

Comment: This description of the wildlife resource does not adequately capture the value of the riparian corridor to wildlife and the species currently utilizing this habitat. Riparian ecosystems, especially those in semi-arid landscapes, support a disproportionate number of species compared to the surrounding landscape (Brode and Bury, 1984, Finch and Wang, 2000, Skagen et al., 1998, Skagen et al., 2005). In addition to the suite of obligate riparian species, many upland species depend on riparian habitats for forage, cover and for migrating corridors. The statement above seems to indicate the Poudre River currently hosts only "*species tolerant of human disturbance, white-tailed deer and waterfowl*."

In fact, the study area actually hosts a set of species far exceeding this description. The City is deeply concerned by this misrepresentation of Poudre River habitat value. Below is a list of species that have been observed within the City-owned Poudre River Natural Areas (which is limited to only 10 miles of the most urbanized segment of the Poudre River). This list of **267 species** provides a much better portrayal of the exceptional value of the riparian corridor to wildlife and explains why the health of the riparian habitat is of utmost importance to the City.

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Animals Observed on Poudre River Natural Areas, 1974-2008

Species: U = unusual; I = Introduced (to North America for Birds; to Fort Collins area for other species); FT = Federal Threatened; FE = Federal Endangered; ST = Colorado Threatened; SC = Colorado Species of Concern.

Occurrence: X = recorded on site; XN = nests on site; Xn = attempted to nest (unsuccessful); XD = dens on site.

Sources: Compiled from observations by local naturalists, researchers, CSU and Natural Areas Program volunteers, Colorado Division of Wildlife, Colorado Field Ornithologists' reports, and Natural Areas Program staff.

[REMAINDER OF PAGE INTENTIONALLY LEFT BLANK]

Birds:
Greater white-fronted goose
Snow goose
Canada goose
Tundra swan (U)
Wood duck
Gadwall
Eurasian wigeon (U)
American wigeon
Mallard
Blue-winged teal
Cinnamon teal
Northern shoveler
Northern pintail
Green-winged teal
Canvasback
Redhead
Ring-necked duck
Greater scaup (U)
Lesser scaup
Bufflehead
Common goldeneye
Barrow's goldeneye (U)
Hooded merganser
Common merganser
Red-breasted merganser (U)
Ruddy duck
Ring-necked pheasant (I)
Wild turkey (U)
Northern bobwhite (U)
Pied-billed grebe
Horned grebe
Eared grebe
Western grebe
Clark's grebe
American white pelican
Double-crested cormorant
American bittern (U)
Least bittern (U)
Great blue heron
Great egret (U)
Snowy egret
Cattle egret (U)
Green heron (U)
Black-crowned night-heron
White-faced ibis
Turkey vulture
Osprey
Bald eagle (FT, ST)
Northern harrier
Sharp-shinned hawk
Cooper's hawk
Northern goshawk
Broad-winged hawk (U)
Swainson's hawk
Red-tailed hawk
Ferruginous hawk (SC)
Rough-legged hawk
Golden eagle
American kestrel
Merlin
Peregrine falcon (SC)
Prairie falcon
Black rail (U)
Virginia rail
Sora
American coot
Killdeer
Black-necked stilt (U)
American avocet
Greater yellowlegs
Lesser yellowlegs
Solitary sandpiper
Willet
Spotted sandpiper
Whimbrel (U)
Marbled godwit (U)
Western sandpiper
Least sandpiper
Baird's sandpiper
Long-billed dowitcher
Wilson's snipe
Wilson's phalarope
Franklin's gull
Bonaparte's gull
Ring-billed gull
California gull
Herring gull
Glaucous gull (U)
Caspian tern (U)
Forster's tern
Least tern (U)
Black tern
Rock pigeon (I)
White-winged dove (U)
Mourning dove
Yellow-billed cuckoo
Barn owl
Eastern screech-owl
Great horned owl
Long-eared owl (U)
Short-eared owl (U)
Common nighthawk
Common poorwill
Chimney swift
Broad-tailed hummingbird
Belted kingfisher
Red-headed woodpecker (U)
Red-naped sapsucker (U)
Downy woodpecker
Hairy woodpecker
Northern flicker
Olive-sided flycatcher
Western wood-pewee
Willow flycatcher
Least flycatcher
Cordilleran Flycatcher
Say's phoebe
Western kingbird
Eastern kingbird
Loggerhead shrike
Northern shrike
Plumbeous vireo
Warbling vireo
Red-eyed vireo (U)
Steller's jay
Blue jay
Black-billed magpie
American crow
Common raven
Horned lark
Tree swallow
Violet-green swallow
Northern rough-winged swallow
Bank swallow
Cliff swallow
Barn swallow
Black-capped chickadee
Mountain chickadee
Red-breasted nuthatch
White-breasted nuthatch
Brown creeper
Rock wren
House wren
Marsh wren (U)
American dipper
Golden-crowned kinglet
Ruby-crowned kinglet
Blue-gray gnatcatcher
Western bluebird
Mountain bluebird
Townsend's solitaire
Veery (U)
Swainson's thrush
Hermit thrush
American robin
Gray catbird
Northern mockingbird (U)
Sage thrasher
Brown thrasher (U)
European starling (I)
American pipit
Bohemian waxwing
Cedar waxwing

Blue-winged warbler (U)
Tennessee warbler (U)
Orange-crowned warbler
Virginia's warbler
Yellow warbler
Magnolia warbler (U)
Black-throated blue warbler (U)
Yellow-rumped warbler
Townsend's warbler
Palm warbler (U)
Blackpoll warbler
American redstart
Prothonotary warbler (U)
Swainson's warbler (U)
Northern waterthrush
Kentucky warbler
Mourning warbler (U)
MacGillivray's warbler
Common yellowthroat
Wilson's warbler
Yellow-breasted chat
Western tanager
Green-tailed towhee
Spotted towhee
American tree sparrow
Chipping sparrow
Clay-colored sparrow
Brewer's sparrow
Vesper sparrow
Lark sparrow
Black-throated sparrow (U)
Savannah sparrow
Song sparrow
Lincoln's sparrow
Swamp sparrow (U)
Harris' sparrow (U)
White-throated sparrow
White-crowned sparrow
Golden-crowned sparrow (U)
Dark-eyed junco
Black-headed grosbeak (U)
Blue grosbeak (U)
Lazuli bunting
Indigo bunting (U)
Red-winged blackbird
Western meadowlark
Yellow-headed blackbird
Rusty blackbird (U)
Brewer's blackbird
Common grackle
Great-tailed grackle (U)
Brown-headed cowbird
Orchard oriole (U)
Bullock’s oriole
House finch
Pine siskin
Lesser goldfinch
American goldfinch
Evening grosbeak
House sparrow (I)

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Mammals:

Masked shrew (U)
Fringed myotis (U)
Long-legged myotis (U)
Western small-footed myotis (U)

Little brown bat
Red bat
Hoary bat
Silver-haired bat
Big brown bat
Eastern cottontail
Rock squirrel
Fox squirrel
Plains pocket gopher
Beaver
Western harvest mouse
Deer mouse
Mexican woodrat
Prairie vole
Meadow vole
Muskrat
Norway rat (I)
House mouse (I)
Coyote
Red fox
Black bear (U)
Raccoon
Mink (U)
Striped skunk
River otter (U)

Elk (U)
Mule deer
White-tailed deer

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Amphibians and Reptiles:

Tiger salamander
Woodhouse's toad
Chorus frog
Bullfrog
Northern leopard frog (SC)
Snapping turtle
Painted turtle
Ornate box turtle (U)

Racer
Northern water snake
Bullsnake
Plains garter snake

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In sum, given the valuable role the riparian system serves in supporting regional wildlife diversity, the failure to objectively and methodically describe this wildlife resource is of significant concern to the City. Consequently, the City wishes to emphasize, as stated above, that this issue must be addressed in an SDEIS and Revised Section 404(b)(1) Analysis. *See* Section 404(b)(1) Guidelines Section 230.32. *See also* Section II.4b of these Comments.

DEIS Section: 3.16.11 Species of Concern, Poudre-South Platte River Corridor Study Area, page 3-90
Statement: *3.16.11.1.1 Preble's Meadow Jumping Mouse*
Known occupied Preble's habitat in the study areas is shown on Figure 3-16. Preble's is not known to occur on the Cache la Poudre River downstream of Fort Collins or on the South Platte River downstream of its confluence with the Poudre River.

Comment: A field inventory (trapping effort) should be conducted to verify that Preble's does not occur within the Poudre River drainage.

DEIS Section: 4.2.1.1 Effects Common to All Action Alternatives, Changes to Poudre River Flows, page 4-6
Statement: "*Flow reductions are likely to have significant localized effects on…riparian resources."*

Comment: If this statement is true, then the riparian resources, including utilization by wildlife, must be properly evaluated in an SDEIS and Revised 404(b)(1) Analysis. *See* Section 404(b)(1) Guidelines Section 230.32. Furthermore, if this statement is true then there is a direct conflict between this statement and Table 4-6, which appears in the DEIS a few pages later and summarizes the "Distinguishing Effects of the Alternatives". Table 4-6 compares the proposed action with the no action alternative and states there is "No Distinguishing Effect" for all wildlife categories, except for Threatened and Endangered species. This claim, based on no field data or analysis and the failure to extrapolate habitat impacts to wildlife impacts, is of great concern and also must be subjected to further environmental review to meet the requirements applicable to the DEIS and Section 404(b)(1) Analysis.

DEIS Section: 4.14.3.2.2 Temporary Disturbances, Riparian Habitat along the Cache la Poudre and South Platte Rivers, page 4-55
Statement: "*However, a reduction in the infrequently occurring overbank flows may affect the periodic disturbance of the riparian zone that can aid in creating new habitat for riparian vegetation establishment and rejuvenation of the riparian zone."*

Comment: It is incorrect to treat impacts to the wildlife within the riparian corridor of the Poudre River as temporary by placing them in the Temporary Disturbances section.

In fact, nowhere else in the DEIS or supporting documents are the impacts to the riparian corridor (and wildlife dependent on it) described as temporary. Despite the conflicting conclusions regarding riparian habitat throughout the documents, the one consistent conclusion in these documents is that there will be a long-term effect due to reduced overbank flooding and consequent reduced capacity for cottonwood regeneration. This is not a temporary impact, and the effect it has on wildlife also would not be temporary. As discussed in Part II, this is particularly important, because Section 404 requires the Corps to pay particular attention to impacts that would be permanent.

Furthermore, the Scoping Report for NISP clearly identifies the Poudre River riparian corridor as an affected environment and defines both Wildlife and Riparian resources as "significant general categories" to become the focus of the DEIS. Discussing the impacts to wildlife solely in the Temporary Disturbances section of the DEIS is inconsistent with the Scoping Report.

Another key point about this citation from DEIS page 4-55 is that it understates and incorrectly characterizes impacts to wildlife along the Poudre River. Many studies show that the dewatering of a river could cause steady (linear) degradation of the habitat. These adverse effects include; loss of herbaceous and/or shrubby species and physiologic stress to larger woody species over the short term (see comments to the Vegetation Technical Report). Landscape level changes such as declines of cottonwoods along entire river segments may be expected over the long-term. Because the Poudre River is already in a compromised state (lowered resistance and resilience) the probability that future flow reductions will cause these impacts is increased (City of Fort Collins, 2008). Associated impacts to wildlife may be wide-ranging and deserve analysis on both a local and a regional scale.

Finally, while these changes may be described as linear, the potential for non-linear (and less predictable) change must also be considered. Significant reduction of peak flows could potentially cause the Poudre River to cross a threshold and respond in a non-linear manner that would result in much greater loss of ecological values, ecosystem complexity, and physical and ecological function.

DEIS Section: 4.14.3.2.2 Temporary Disturbances, Riparian Habitat along the Cache la Poudre and South Platte Rivers, page 4-55
Statement: *"As described in the Wildlife Technical Report (ERO 2008c), the flow reductions are not expected to cause losses of riparian and wetland habitat. However, a reduction in the infrequently occurring overbank flows may affect the periodic disturbance of the riparian zone that can aid in creating new habitat for riparian vegetation establishment and rejuvenation of the riparian zone."*

Comment: Within the Wildlife Technical Report (WTR) there are opposing conclusions about impacts to wildlife along the Poudre River. For example:

WTR Section: 6.2.6, page 45
Statement: *"Although species diversity and abundance of riparian-dependent wildlife species could be reduced in localized areas, no major changes in species composition or distribution are likely."*

And;

WTR Section: 7.2.1, page 65
Statement: *"Many species of birds, mammals, reptiles, and amphibians dependent on these (riparian and wetland) habitats would in turn be affected by these changes."*

The public cannot assess the impacts to wildlife when the WTR effectively cancels out its own conclusions. This issue must be addressed in an SDEIS and Revised Section 404(b)(1) Analysis.

DEIS Section: 4.14.5 Mitigation
Statement: *The District and the Corps will coordinate with CDOW regarding mitigation of impacts to wildlife and wildlife habitat.*

Comment: This statement provides no information about an actual mitigation plan, nor does it address impacts sufficiently to meet the requirements of the Section 404(b)(1) Guidelines. Without quantifying what wildlife will be impacted by the project, any proposed mitigation is speculative and essentially meaningless. Mitigation goals must be based on specific and quantified habitat components (shrub density, plant species composition etc) and wildlife components (species richness, nesting vs. migration habitat etc.) based on pre-construction surveys. The Corps cannot defer its analysis of impacts and how they must be addressed until beyond the Section 404 and NEPA process. Without these data, there is no way to understand project impacts or to evaluate the proper responses or requirements to address them. This assessment should be completed and presented in an SDEIS.

DEIS Section: 5.4.1. Wildlife (Mitigation)
Comment: see comments for Section 4.14.5

DEIS Appendix B: Consultation with U.S. Fish and Wildlife Service Biological Assessment and Biological Opinion
Comment: Although the US Fish and Wildlife Service has provided a "final" biological opinion on a proposed action, that opinion appears premature as no decision on a final action has been made. A Biological Opinion is traditionally issued with a Record of Decision, not along with the DEIS. In addition, due to omissions, deficiencies and inadequacies throughout the DEIS, the Biological Assessment (BA) is substantively

premature. The BA must be reevaluated after an SDEIS that includes improved data and analyses regarding all categories of impacts from NISP relevant to wildlife, including trapping of the Preble's Meadow Jumping Mouse along the Poudre River, improved analysis of the effects of the proposed action on riparian vegetation and invasive species. Consultation should be reinitiated once a final decision is made given that it may differ from the original proposed action.

5c. Comments on Wildlife Technical Report (WTR)

WTR Section: 5.1 Big Game, page 21 AND Section 6.3.1, page 46
Statement: *"white-tailed deer are most often seen in riparian areas bordering large streams and river. …white-tailed deer will move seasonally up and downriver corridors in small numbers….white-tailed deer concentration areas are considered critical habitat for white-tailed deer and occur in corridors of riparian habitat that support higher populations of white-tailed deer or serve as travel corridors…Numerous mule and white-tailed deer crossing areas occur near the SPWCP forebay and diversion study area, highlighting the importance of the Poudre and South-Platte river corridors as deer habitat."*

Comment: Despite the direct identification (in this statement from Section 5.1) of the importance of river corridors to deer, Section 6.3.1 of the WTR makes no mention of impacts to deer due to changes to the riparian habitat such as a decline in woody cover.

WTR Section: 5.2. Raptors, page 30 and Section 6.3.2., page 49
Comment: Nests were identified based on size, nest materials, structure, location etc. Little effort was made to document nest use or to identify species using the nest. Also, little thought was given to the use of nests by different species over time. Surveys appeared to have been conducted late in the breeding season (July 8 or later) and only one year of field observations were used for each study location. Based on the data provided, little is known about raptor resources in the area. Surveys were inappropriately limited to Reservoir sites and the Highway 287 realignment and excluded the Poudre River.

WTR Section: 5.2.2 Migratory Birds, and Section 6.3.2, page 49
Statement: *"Based on a study conducted by Hopper (1968), the Poudre-South Platte study area lies within one of the four most important waterfowl regions in Colorado, the South Platte River drainage. Spring (May) surveys established in the 1950s and conducted until the 1990s indicated that more than 20,000 migrant or locally breeding ducks were present in this area during the survey period (Gammonley 2008). Much higher numbers of ducks use the area throughout the spring and fall migration periods (Ibid). According to Andrews and Righter (1992), 16 species of ducks are described as common to abundant in the Poudre-South Platte drainage (including the study area)*

during migration, breeding, and/or winter; and several other duck species are rare to uncommon, but regularly occur in the drainage. Dabbling ducks such as mallards, green-winged teal, blue-winged teal, American widgeon, gadwall, northern pintail, and northern shoveler are most common along the Poudre River drainage from the foothills to the South Platte confluence. These species not only use the river and associated streams, but rely heavily on small wetlands and sloughs. Wood ducks and hooded mergansers, both riparian-dependent species, are increasing in numbers in this area (Ibid.). Resident and migrant populations of Canada geese have increased in the South Platte River drainage. Andrews and Righter (1992) reported that about 1,200 Canada geese breed on the plains near the northeastern foothills, including the Poudre River corridor, and that more than 50,000 geese winter in this area."

Comment: Given this characterization of the importance of the Poudre River to waterfowl, it is reasonable to expect that a data-driven, science-based methodology would be used to assess and quantify impacts to waterfowl that would result from the significant reductions in river flows NISP is predicted to cause. No such effort was made. Such an analysis must be conducted and presented in an SDEIS.

With regard to all other migratory birds it appears little or no site specific data were gathered. Species identified were based on broad habitat categories and listed as species expected to occur. While species based on habitat affinities are a good start, without site specific information describing density, breeding populations etc, it is difficult to determine impacts from the project. Also, species listed are minimal and are far from inclusive. In contrast, the City Natural Areas program maintains a list of species that contains 267 entries. *See* comments on DEIS Section 3.14.11 in Section IV.5b of these Comments. Based on information provided in the DEIS, virtually nothing is known about the site-specific attributes of the avifauna.

The Poudre River is extremely important to migrating songbirds. It is unclear why this section titled "Migratory Birds" did not include the neotropical migrants along the Poudre River riparian corridor. In the table shown below, birds found within City Natural Areas along the Poudre River account for two-thirds of the Fort Collins total bird diversity. This table also shows that the Poudre River through Fort Collins closely compares to major national parks as measured by bird diversity.

Area	# Acres	# Bird Species
Poudre River City-owned Natural Areas	**1,423**	**223**
Fort Collins Growth Management Area	~48,000	353
Yellowstone National Park, WY	2.2 million	311
Everglades National Park, FL	1.5 million	310
Pawnee National Grassland, CO	193,060	301
Rocky Mountain National Park, CO	265,726	280
Acadia National Park, ME	35,000	273
Mesa Verde National Park, CO	52,122	186
Bryce Canyon National Park, UT	35,835	171
Isle Royale National Park, MN	571,790	168
Denali National Park, AK	6 million	165

In sum, this issue must be addressed in an SDEIS and Revised Section 404(b)(1) Analysis.

WTR Section: 5.3. Amphibians and Reptiles and Section 6.3.3, page 53
Statement: *"Many amphibians inhabit areas near wetlands and areas containing a water source throughout the year …wetter habitats tend to support a higher diversity of reptiles"*

Comment: No surveys were conducted to determine species richness, density or distribution. Impacts are discussed relative to habitat (wetland) loss due to reservoir and other construction. No impacts are discussed relative to water loss, wetland loss, or habitat modification from reductions in flows in the Poudre River predicted from NISP.

If, as stated in this report, 75 acres of wetlands will be lost along the Poudre River (above Interstate 25), surveys for reptiles and amphibians should have been conducted to quantify the expected loss of species diversity and abundance. This is a significant omission and must be addressed in an SDEIS and Revised Section 404(b)(1) Analysis.

WTR Section: 6.2.6, Riparian Habitat…, page 41
Statement: *"The effects of changes in stream flows on wildlife were evaluated based on the analysis of impacts to riparian and wetland habitat, described in detail in the Vegetation Resources Technical Report (ERO 2008b), which were assessed based on an analysis of potential changes in stream morphology, ground water, and stream stage as discussed in the Water Resources Technical Report (HDR 2007) and River Morphology and Sediment Transport Technical Report (Anderson 2008). Methods and results of these analyses are summarized below."*

Comment: The quoted conclusion regarding riparian and wetland habitat along the Poudre River is not supported by the scientific literature, nor is it supported by field level data. Furthermore, it appears to be based on a profoundly incorrect river-flow data set.

Within the WTR there are conflicting statements regarding the impacts to riparian habitat. The conflict undermines the analysis of resources dependant on riparian habitat. Terrestrial wildlife relies on the composition and structure of riparian vegetation. Immediately below are just two examples of conflicting statements about impacts to wildlife habitat *within* the WTR:

WTR Section: 6.2.6, page 43
Statement: "*The reductions in streamflows on the Poudre and South Platte rivers associated with the action alternatives are not anticipated to cause a loss of riparian and/or wetland vegetation."*

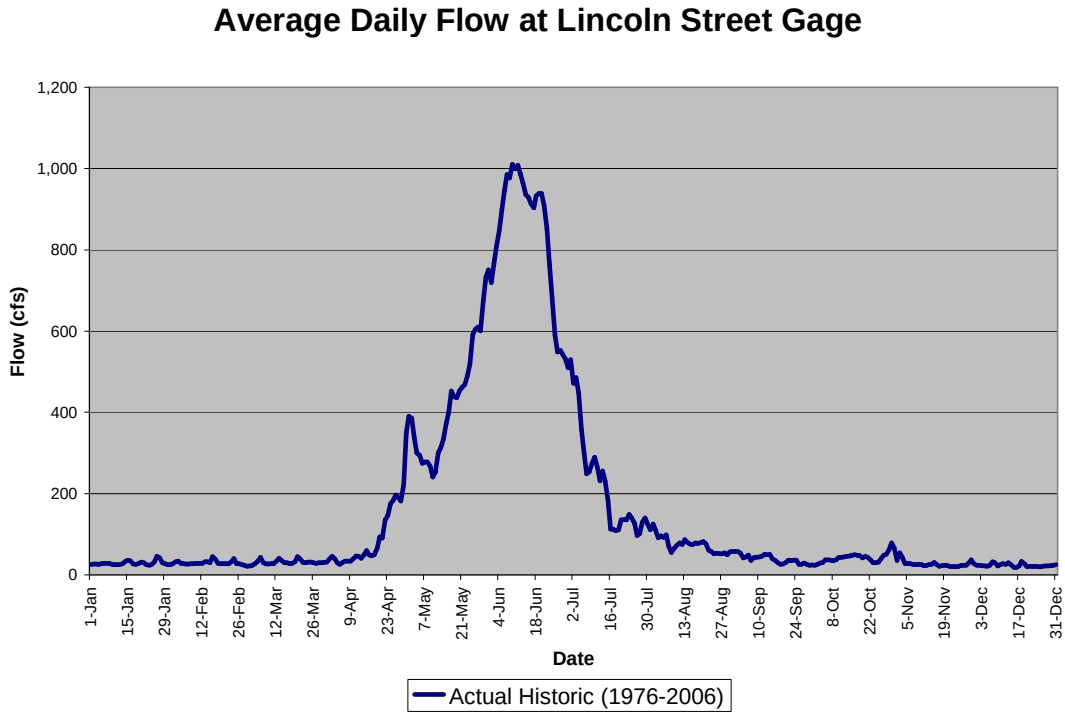
And;

WTR Section: 7.2.1., page 65
Statement: "*The action alternatives would likely result in changes to and losses of riparian and wetland vegetation, especially herbaceous vegetation, in sensitive riparian areas along the Poudre River corridor."*

These fundamental conflicts must be resolved and an improved analysis presented in an SDEIS.

WTR Section: 6.2.6, Riparian Habitat…, page 42
Statement: *"... Because of human alterations… there has been a change in flow regime from one characterized by large spring runoff with low flows the remainder of the year, to a flow regime that is characterized by moderate flows spread throughout the year."*

Comment: This statement is incorrect. While there have been changes to the flow regime of the Poudre River, the current flow regime is still characterized by a spring snow-melt dominated flow regime (see graph of actual historic flows below). This information is readily available to the public from a variety of sources. The rest of the year is characterized by fairly low to very low flows. Understanding the current flow regime is essential to assessing the potential impacts due to predicted reduction (up to 71%) of spring peak flows from NISP. The DEIS must make accurate statements about the existing conditions to adequately identify impacts of the proposed action and to address those impacts as required in the Section 404(b)(1) Guidelines. *See* Section II.3 of these Comments.



Graph assembled from publicly available data on the Internet at: http://waterdata.usgs.gov/CO/nwis/uv?06752260

WTR Section: 6.2.6, Cache la Poudre Upstream of I-25…, page 42
Statement: *"Assuming that the changes discussed above will occur in only portions of these 301 acres, about 89 acres of the sensitive areas may change over time. Of these 89 acres, it is estimated that about 75 acres of wetlands would be affected."*

Comment: The author does not state how the values of 89 and 75 acres values were determined other than references to the terms "assuming" and "estimated". The stated numerical values are not explained in the WTR or the Vegetation Technical Report (VTR). Assumptions and estimations are not adequate methods for analysis of wetlands impacts. An adequate DEIS and Section 404(b)(1) Analysis would indicate whether these were wetlands identified using the Corps' method for identifying jurisdictional wetlands; this is not done. It appears no effort was made to identify jurisdictional wetlands on the Fort Collins Reach of the Poudre River. This issue must be addressed in an SDEIS and Revised Section 404(b)(1) Analysis.

WTR Section: 6.2.6 Cache la Poudre Upstream of I-25…, page 42
Statement: *"Through the City of Fort Collins, it appears that the flow changes that would occur under the action alternatives would likely affect stream morphology,*

because of large reductions in flow during spring runoff in wet and average years. Some potential changes include channel narrowing, greater sediment deposition and less sediment flushing, vegetation encroachment into the channel, increase in the size of inchannel islands, flow obstruction, and bank erosion (ERO 2008d)."

Comment: The referenced study in this passage in the WTR - ERO 2008d - refers to the South Platte River near Kersey in the River Morphology and Sediment Transfer Technical Report (RMSTTR) and, therefore, is not relevant to the Fort Collins segment of the River.

If these changes are expected to occur, however, it is reasonable to expect this study area to be included in the discussion of Alternative 2 in WTR Section 6.3. Throughout Section 6.3, there is no mention of the wildlife habitat or affected species as a result of Alternative 2.

WTR Section: 6.2.6 Cache la Poudre Upstream of I-25…, page 44
Statement: *"Effects to sensitive riparian areas associated with streamflow changes are anticipated to be localized and subtle…habitat changes will likely occur slowly and subtly over many years…."*

Comment: There is little, if any, evidence, to support the concept that the effect to herbaceous wetlands, an important habitat for much wildlife, would be subtle or slow. In fact, with regard to this topic the Biological Assessment (BA) states (page 30): "*changes in groundwater levels...would likely remove the supportive hydrology and the wetlands would no longer be wetlands...*" Specifically for the Lincoln Gage, the BA states (page 32): "*These changes in mean monthly stream stage in sensitive riparian areas …would affect herbaceous wetland vegetation (and therefore scrub-shrub wetlands).*" This issue must be analyzed and addressed in an SDEIS and Revised Section 404(b)(1) Analysis.

WTR Section: 6.2.6 Cache la Poudre Upstream of I-25…, page 44
Statement: *"…it is estimated about 75 acres of wetlands would be affected."*

Comment: It is not stated and not apparent how this numerical value was derived. If this statement is true, these wetlands should have been 1) delineated in the field according to the Corps' method; 2) surveyed methodically for Threatened and Endangered Species or species of concern; and 3) evaluated as habitat for all local wildlife. This issue must be addressed in an SDEIS and Revised Section 404(b)(1) Analysis.

WTR Section: 6.3
General Comment: There is no mention within this entire WTR section of the impacts to wildlife in the riparian corridor. This is a serious procedural flaw because:

1) the Scoping Report states the Poudre River riparian corridor is an "affected environment" and identifies Riparian Resources and Wildlife as "Significant General Categories"; and
2) the Section 404(b) Guidelines require *appropriate factual determinations, evaluations, and tests on the physical*…for the affected resources (Section 230.11 of 404(b) Guidelines). The WTR states that: *"Many species of birds, mammals, reptiles, and amphibians dependent on these habitats would in turn be affected by these changes"* (WTR Section 7.2.1, page 65). Therefore compliance with the Section 404(b)(1) Guidelines requires that the participants evaluate effects to "Other wildlife" and the possible loss of values to other wildlife. *See* Section 404(b)(1) Guidelines Section 230.32 (a) and (b). The anecdotal level analysis provided in WTR Section 6.2.6 does not come close to fulfilling this requirement.

Specifically Section 230.32 (b) of the Section 404(b)(1) Guidelines states:

"Possible loss of values: The discharge of dredged or fill material can result in the loss or change of breeding and nesting areas, escape cover, travel corridors, and preferred food sources for resident and transient wildlife species associated with the aquatic ecosystem. These adverse impacts upon wildlife habitat may result from changes in water levels, water flow and circulation, salinity, chemical content, and substrate characteristics and elevation. ….Changes in such physical and chemical factors of the environment may favor the introduction of undesirable plant and animal species at the expense of resident species and communities. In some aquatic environments lowering plant and animal species diversity may disrupt the normal functions of the ecosystem and lead to reductions in overall biological productivity."

Most if not all of the habitat components or ecosystem attributes mentioned in this paragraph (above) may be affected within the Poudre River study area by the proposed action. This must be addressed in an SDEIS and Revised Section 404(b)(1) Analysis.

WTR Section: 6.3.4. Other Wildlife Species
Statement: *"Small and large mammals associated with affected vegetation types described in Section 6.3.2 would be directly affected by alternative 2."*

Comment: WTR Section 6.3.2 does not mention the Poudre River study area at all, requiring reassessment in an SDEIS and Revised Section 404(b)(1) Analysis.

WTR Section: 7.2.1. Mitigation, page 65
Statement: *"The action alternatives would likely result in changes to and losses of riparian and wetland vegetation, especially herbaceous vegetation, in sensitive riparian areas along the Poudre River corridor. Many species of birds, mammals, reptiles, and amphibians dependent on these habitats would in turn be affected by these changes. Most*

of the riparian areas potentially sensitive to reduced flows and stream stage are designated as natural areas by the City of Fort Collins. Mitigation measures under consideration at this time are:

• Work with the City of Fort Collins to create and restore habitat by lowering the surface elevation of selected riparian areas to provide a supportive hydrology with the future flow reductions.
• Work with aggregate mines to reclaim these mines as riparian areas.
• Construct check structures in the Poudre River that would raise stream stage to compensate for low stream flows and stages."

Comment: This report fails to discuss the expected impacts to migratory birds, amphibians, raptors, reptiles and mammals. This makes it difficult, in not impossible, to craft adequate measures to address the impacts to wildlife from NISP. Furthermore, the suggested mitigation measures are stated in vague terms, with no binding or enforceable commitments of any kind. Finally, this section asserts conclusions that are directly contrary to other conclusions in the report. Therefore, it is not possible to discuss the proposed mitigation until an SDEIS is prepared that provides consistent conclusions and analysis based on sufficient and correct data. *See* comments on DEIS Section 4.14.5 in Section IV.5b, above.

6. Air Quality and Climate Change

6a. General comments

The scientific literature is now replete with admonitions for water managers regarding the need to include the potential effects of climate in water resource planning (Milly, et. Al, 2008). For example, Stewart el al. (2005) predict that "almost everywhere in western North America, a 10% - 50% decrease in the spring-summer streamflow fractions will accentuate the typical seasonal summer drought with important consequences for warm-season supplies, ecosystems, and wildfire risks." Regonda and others (2005) state that "if the trends in temperature, snowfall, and streamflow demonstrated in this paper persist and even intensify, changes in water management practices will be necessary to adapt to the altered hydrologic regime." As evidenced by many studies published since 2000, the specific concept of rising regional temperatures has been used to explain statistically significant trends and patterns in hydrologic response at basin scales relevant to water management in the Mountain West.

Many of these effects will be further affected by changes in the vegetation and structure of the Poudre River watershed. The near certainty of pine beetle infestation and more catastrophic forest fires in the next decade and beyond suggests that the next fifty years in the Poudre watershed will be significantly different than the 50 years modeled for the DEIS and on which all of the predictions of NISP impacts are based. Pine beetle and fire

effects on the forests will also influence the timing and amounts of runoff from the watershed and, thus, the water available for diversion to Glade, the water remaining in the Poudre and the overall water quality.

Having acknowledged the reasonable foreseeability of climate impacts on stream flow, the DEIS proceeds to ignore it, even though the fundamental basis for the project and its impacts would be profoundly influenced by climate change. The fact that uncertainty regarding the precise degree and effects of climate change exists does not excuse the Corps from analyzing this critical issue. "NEPA prohibits uninformed agency action." *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 351, (1989). ''The procedures included in § 102 of NEPA are not ends in themselves. They are intended to be 'action forcing.' The unequivocal intent of NEPA is to require agencies to consider and give effect to the environmental goals set forth in the Act, not just to file detailed impact studies which will fill governmental archives.'' *Envtl. Def. Fund, Inc. v. Corps of Eng'rs of the U.S. Army*, 470 F.2d 289, 298 (8th Cir.1972) (citation omitted).

"The impact of greenhouse gas emissions on climate change is precisely the kind of cumulative impacts analysis that NEPA requires agencies to conduct." *Center for Biological Diversity v. NHTSA*, 508 F.3d 508 (9th Cir. 2007). Indeed, the United States Supreme Court has noted that the "harms associated with climate change are serious and well recognized." *Massachusetts v. EPA*, 549 U.S. ___, 127 S.Ct. 1438, slip op. at 18 (2007). The Court noted, in particular, the likelihood of a "significant reduction in water storage in winter snowpack in mountainous regions with direct and important economic consequences." *Id.* The Supreme Court also admonished the EPA that it could not "avoid its statutory obligation by noting the uncertainty surrounding various features of climate change…"[12] *Id.* at 31. The same reasoning applies to the Corps' obligations under both the Clean Water Act and NEPA.

The Council on Environmental Quality (CEQ) regulations that govern the conduct of environmental impact review make clear that agencies have an obligation to develop information that is necessary to a reasoned choice among alternatives (including the no-action alternative). 40 C.F.R. § 1502.22(a). Even if it cannot reasonably obtain such critical evidence, it must at least assess the significance of the missing information, provide a summary of the existing scientific evidence, and provide an evaluation of such impacts based upon theoretical approaches or research methods generally accepted in the scientific community. *Id.* at § 1502.22(b). CEQ has stressed the importance of addressing even uncertain effects in its Forty Most Asked Questions that provide guidance on the implementation of its NEPA regulations:

> [I]n the ordinary course of business, people do make judgments based upon reasonably foreseeable occurrences. . . . The agency has the responsibility to make

[12] The Supreme Court also attached "considerable significance to EPA's 'agree[ment] with the President that 'we must address the issue of global climate change,'" 68 Fed.Reg. 52929 (quoting remarks announcing Clear Skies and Global Climate Incentives, 2002 Public Papers of George W. Bush, Vol. 1, Feb. 14, p. 227 (2004). *Id.* at ___.

> an informed judgment, and to estimate future impacts on that basis, especially if trends are ascertainable . . . . The agency cannot ignore these uncertain but probable, effects of its decisions.

46 Fed. Reg. at 18031. Climate issues clearly fall within this category of reasonably foreseeable effects that affect the underlying purpose and impacts of the proposed action. Indeed, the National Academies of Science – in a joint statement with national science academies from other leading countries – has stressed that "[t]he scientific understanding of climate change is now sufficiently clear to justify nations taking prompt action…" *National Academies of Science, Joint Science Academies' Statement: Global Response to Climate Change*, available at http://nationalacademies.org/onpi/06072005.pdf.

The DEIS does not even take first steps towards addressing these climate issues. The purpose and need identified for this project hinges on providing a certain firm yield for NISP participants through 2050. The DEIS then assesses whether the project and certain alternatives would provide this firm yield (along with other project impacts) through 2050 using a purely retrospective data set (from 1949-1999). It is unreasonable to rely solely on a retrospective data set with no consideration of the effects of climate where the scientific evidence makes clear that future conditions will be different. *See* National Research Council, *Air Quality Management in the United States* at 234 (2004) (available at http://www.nap.edu/catalog/10728.html) (the "general consensus within the scientific community is that this warming trend will continue or even accelerate in the coming decades"). *See e.g*., Milly, et. al (2008).

The DEIS further ignores the most recent seven years of data, including serious drought, even though these years may be more representative of future conditions than the data set the DEIS used. In light of this past seven years of data and the overwhelming evidence that climate change will significantly affect water flows, the Corps cannot reasonably assume that the next fifty years will be like the period from 1949-99 and not include periods like 2000-2007. "Projected changes in runoff during the multidecade lifetime of major water infrastructure projects begun now are large enough to push beyond the range of historical behaviors." *Id.*

In other words, the Corps cannot assume that there is stationarity in the climatic and hydrological trends in the face of overwhelming evidence to the contrary (Milly, *et al.*, 2008). It is essential for decision makers to have information regarding the potential effects of climate trends on the firm yield of the project, the cumulative effects of the project on changing river flows, the need for acquisition of additional agricultural water for municipal use, and similar information. The DEIS already shows that the NISP project would be able to divert flows in only a handful of years in every decade based on the older historical regime. Changes in climate can be expected to further reduce this ability to divert, reducing firm yield significantly, requiring more agricultural dry-ups in the action alternatives and massively increasing the cost per acre foot for participants.

Despite uncertainty in the combined effects of future temperature and precipitation changes in the region, there is general consensus that there are substantial risks of altered annual runoff timing, increased interannual variability, and reduced runoff. There are scientifically accepted methods for using the current trajectory of streamflow behavior and a weight of scientific evidence to identify a reasonable probabilistic envelope depicting how regional streamflow could change over the coming decades. *See, e.g.*, Milly (2008) ("Methods for estimating model parameters can be developed to combine historical and paleohydrologic measurements with projections of multiple climate models, driven by multiple climate forcing scenarios."). Such an envelope can be used in selecting appropriate sensitivity factors for modeling purposes. *Id.* ("Projections of runoff changes are bolstered by the recently demonstrated retrodictive skill of climate models.). For example, the City of Boulder has been conducting sensitivity analyses of the effects of a range of climate scenarios on water supply and flows, an approach that could be readily conducted for NISP. *See*, City of Boulder, Lee Rozlaklis, Presentation to SWMP Community Study Group (Nov. 27, 2007) (available at http://www.ci.boulder.co.us/files/csg_nov_27_presentation_wip_revised_on_site.pdf); City of Boulder, Source Water Master Plan Water Availability Executive Summary (Nov. 2007) (available at http://www.ci.boulder.co.us/files/Utilities/Projects/source_water_mp/swmp_csg_mtg2.pdf). Other water suppliers in the region are also evaluating assessing or planning to assess the effects of climate on water supplies and flows. *See e.g., Denver Water*, *Comprehensive Annual Financial Report* at I-20 to I-21 (Dec. 31, 2007) (available at http://www.water.denver.co.gov/financialinfo/annualreport/DW_AR2007.pdf).[14]

Such sensitivity analyses are necessary to avoid uninformed agency action, as required both by NEPA and the Clean Water Act. The information and methodologies are reasonably available and supported by sound science. Indeed, assuming blindly -- and against the scientific record of the last decade -- that the future will be the same as the period starting in 1949 without any additional analysis lacks scientific merit. An SDEIS must include new MODSIM and other analyses with appropriate sensitivity analyses that reflect current trends in climate change and a reasonable range of effects predicted by climate models. The Boulder approach and other ongoing efforts can provide useful guidance and approaches.

Finally, an SDEIS must correct the DEIS's failure to provide any information about the effects of the proposed project on climate. For example, the DEIS should evaluate how many greenhouse gases are produced through the large scale pumping contemplated in the NISP project, as compared to other alternatives including no action.

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[14] Denver Water has conducted sensitivity analyses for its system that used two different climate scenarios. Under one scenario with a two degree increase in temperature, average streamflows and Denver Water supply would drop by seven percent. Under the other scenario with a five degree change, average stream flows would drop 19 percent and Denver Water's supply by 14 percent. *Id.* These types of changes would have a large impact on the firm yield assumptions and streamflow impacts of NISP.

6b. Specific Comments on DEIS

DEIS Section: 3.25 Air Quality, page 3-127
Statement: *"As of November 20, 2007, the areas in the vicinity of the proposed Glade and Galeton reservoirs have been designated as nonattainment areas for ozone. However, air quality is currently not an issue in these areas."*

Comment: The cited conclusion is cavalier, unsupported and completely wrong. The fact that the proposed reservoir sites are in an area designated by the Environmental Protection Agency as nonattainment for the ozone standard is conclusive evidence that air quality is an issue in these areas, because ozone from elsewhere in the nonattainment area can affect these sites and because emissions of ozone precursors at these locations can affect ozone levels elsewhere in the nonattainment area. Thus, air quality is a very important issue that deserves serious treatment instead of the trivial dismissal it receives in the DEIS. Indeed, the EPA included Larimer County within the nonattainment area because of its concerns that emissions from within the county contributed to Denver-area ozone levels. These issues have become yet more challenging with EPA's tightening of the 8-hour ozone standard earlier this year. While ozone levels in Ft. Collins have not exceeded the new ozone standard based on the regulatory three-year average, annual readings have risen above the standard. *E.g.*, Larimer County, Compass of Larimer County (available at https://www.co.larimer.co.us/compass/airquality_env_quality.htm#tables). Further, nearby monitoring in Rocky Mountain National Park shows that ozone levels are above the new standard.

Section 3.25 needs to provide more analysis regarding the effects and nature of ozone as a powerful oxidant that can cause respiratory harm in humans, damage to vegetation, injury to materials and other effects. The section also needs to include both the 1997 and 2008 National Ambient Air Quality Standards for ozone and a description of what the standards mean. The section should also contain discussion about air quality monitoring in the nonattainment area. The section should describe the types of emissions and their sources that contribute to ground-level ozone, including the combustion sources that would be associated with construction of the project and generation of electricity for the project's massive pumping needs. Finally, the Section needs to describe both the transportation and general conformity rules (40 C.F.R. Part 93), including the *de minimis* standards applicable to the project area.

DEIS Section: 4.25.2 Air Quality, page 4-96
Statement: *"All of the alternatives would cause short-term increased exhaust emissions associated with construction vehicles (employee, delivery and heavy-duty equipment). … These emissions are expected to be within conformity levels."*

Comment: The statements and conclusions drawn in this section are completely unsupported and inadequate to comply with NEPA or the Clean Air Act. The section does not identify the conformity standards that apply or the basis for its conclusion that emissions would be below the *de minimis* thresholds of the general conformity rule. As a result, the DEIS is inadequate both under NEPA and the Clean Air Act. The construction activities proposed under any of the action alternatives are massive and would entail significant emissions from construction activities (including on-site earth moving, materials and fill hauling, and concrete hauling and placement equipment). Large new contributions to ozone precursor emissions are of considerable concern because the entire nonattainment area is struggling to meet both the 1997 and 2008 ozone standards, which have been determined by EPA to be requisite for human health.

The Glade Dam itself would involve the placement and construction of earth, rock and concrete almost a mile long and almost 300 feet high, along with forebay and other improvements. In addition, construction would include the Poudre Valley Canal Upgrades, pump stations, the Munroe Canal Bypass, the highway relocation, and the Glade-Horsetooth Pipeline. Galeton Reservoir would involve an almost-two-mile dam 60 feet high and other related facilities. All of these efforts would involve large numbers of emitting vehicles and equipment for considerable periods of time.

Because the DEIS makes no commitments for any use of low-emissions technology, it must be assumed that all of this work would be conducted with generally available diesel-powered equipment that would emit significant quantities of oxides of nitrogen ("NOx"), one of the principal ozone precursors. Projects of comparable size around the country have exceeded *de minimis* thresholds and required a full conformity analysis under the Clean Air Act. *See e.g.*, U.S. EPA, *General Conformity Guidance: Questions and Answers* (1994) (http://epa.gov/ttn/oarpg/conform/gcgqa_71394.pdf) at 6 (conformity applies to emissions from Section 404 permitted construction). An SDEIS and subsequent documents must provide a full emissions inventory from both construction and operational equipment, along with an analysis of whether a full conformity determination is necessary. The analysis should also include an emissions dispersion analysis for particulate matter to assure that the massive earthworks in the dry environments of the proposed reservoir sites would not violate health-based standards.

In addition, an SDEIS needs to better analyze the effects of the project on the emissions of ozone precursors from the operation of the project. Table 4-15 of the DEIS identifies the massive pumping and power demands that would be associated with this project. The increased electricity demand would likely need to be met primarily with coal-based generation, which would entail significant emissions increases of NOx. These emissions need to be quantified, analyzed and compared to relevant conformity thresholds.

DEIS Section: 4.28.2.1 Water-Based Actions, page 4-104
Statement: *"Although climatic change is considered reasonably foreseeable, there is no accepted science for transforming the general concept of variations in global temperature into incremental changes in streamflow at particular locations. Hydrologic*

changes attributable to global climate change are a possibility; however, potential impacts have not been quantitatively estimated in the EIS because of the uncertainties associated with predicting change and the effects."

And;

DEIS Executive Summary, page ES-14
Statement: *"Climate change may affect precipitation, Poudre River streamflows, and the amount of water available for diversion by NISP, which could alter how the action alternatives operate and, in combination with the action alternatives, could further alter flows in the Poudre River."*

Comment: Even though the Corps acknowledges that climate change and impacts on streamflows are reasonably foreseeable,[15] the DEIS unlawfully brushes aside the potential effects of climate change on the project and the cumulative effects of the project and climate change on natural resources, including stream morphology, riparian vegetation, aquatic and terrestrial vegetation and water quality.

Several recent articles in peer-reviewed scientific journals, as well as national and international scientific bodies, also indicate a growing convergence of predictions regarding climate change in the western US. *E.g.*, Intergovernmental Panel on Climate Change, *Technical Paper on Climate Change and Water* at 137-144 (Apr. 2008); National Research Council, *Hydrologic Effects of a Changing Forest Landscape* (2008). Models consistently predict an ongoing warming trend leading to earlier snowmelt. Predictions of net hydrologic effects are more equivocal, but nonetheless point to a substantial risk of diminished runoff. The Intergovernmental Panel on Climate Change, the leading international scientific effort to address climate issues and the recipient of the 2008 Nobel Peace Prize has concluded that:

> Warming and changes in the form, timing, and amount of precipitation will very likely lead to earlier melting and significant reductions in snowpack in the western mountains [of North America] by the middle of the 21st century. In projections for mountain snow melt-dominated watersheds, snowmelt runoff advances, winter and early spring flows increase (raising flooding potential), and summer flows decrease substantially. Hence, heavily-utilized water systems of the western U.S. and Canada that rely on capturing snowmelt runoff could be especially vulnerable… [IPCC (2008) at 138]

This acknowledgement is the only reasonable conclusion in light of the scientific consensus on this issue. According to the Intergovernmental Panel on Climate Change ("IPCC"), "[w]arming of the climate system is unequivocal, as is now evident from observations of increases in global air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level." IPCC, Summary for Policy Makers: Climate Change 2007 at 5 (Feb. 2007). Moreover, "[m]ost of the observed increase in global average temperatures since the mid-20th century is *very likely* due to the observed increase in anthropogenic greenhouse gas concentrations." *Id.* at 10. Thus, the world's leading scientific body on the subject has now concluded, with greater than 90 percent certainty, that emissions of greenhouse gases are responsible for climate change. *Id.*

The federal government has also acknowledged the same likely impacts of climate change to the Mountain West:

> Mountain West — Higher winter temperatures are very likely to reduce late winter snow-pack. This is likely to cause peak runoff to be lower, which is likely to reduce the potential for spring floods associated with snowmelt. As the peak flow shifts to earlier in the spring, summer runoff is likely to be reduced, which is likely to require modifications in water management to provide for flood control, power production, fish runs, cities, and irrigation.

U.S. Department of State, U.S. Climate Action Report 2002, *Third National Communication of the United States of America under the United Nations Framework Convention on Climate Change* (2002) (available at http://www.gcrio.org/CAR2002). [16]

7. Procedural Issues

DEIS Section 2.1.1.1 Independent Review of NISP Alternatives Evaluation, page 2-2
Statement: *"The Phase II report used a multi-tiered screening process through which water supply concepts and elements were screened, and those that passed screening were used to develop a set of alternatives."*

Comment: The basic alternatives were developed prior to initiation of the NEPA process, but there is no indication that they were ever evaluated or measured against the issues raised by the public during scoping, other than in the analysis of effects. In fact, it appears that the comments raised during scoping were generally ignored. No alternatives were developed specifically to address issues raised in scoping and there is no tracking system in place that allows the reviewer to track comments through the analysis process.

DEIS Section 2.1.2.1 Purpose and Need Screening Criteria, page 2-5
Statement: "*The Project concepts and elements were screened using three purposes and need criteria: firm yield, timeliness, and regional project, as described below."*

Comment: The alternatives were basically developed prior to public scoping and identification of the 24 main issues raised in that process. Although the alternatives developed may have been evaluated against the issues raised, no alternatives were developed in response to the issues raised. Consequently, public involvement resulting from scoping appears to have been ignored in the early stages of the NEPA process.

[16] The United States EPA also identified these projected impacts to water resources in the West from climate change: www.epa.gov/climatechange/effects/water/northamerica.

DEIS Section 2.1.2.2 Environmental Screening Criteria, page 2-5
Statement: *"Wetland areas were estimated using National Wetland Inventory maps, the Phase II report (MWH 2004), and/or geographic information system (GIS) tools, as discussed in the Alternatives Evaluation Report (HDR 2007a)."*

Comment: Although adequate for concept development, the National Wetlands Inventory (NWI) is not sufficiently accurate for project level planning. Many small wetlands will be overlooked and many of the units identified in the inventory will be wrong. This approach does not allow for identification of project specific impacts or evaluate the impacts that might result from required mitigation. There is no assessment as to whether the mitigation can even be accomplished "in-kind" and "in-place." Under section 404 of the Clean Water Act and NEPA, this is an inappropriate use of "adaptive management." *See* Section II.5 of these Comments.

DEIS Section 2.1.2.2 Environmental Screening Criteria, page 2-6
Statement: *"Therefore, any new proposed reservoir element located on a perennial stream was eliminated from further evaluation."*

Comment: The assumption that perennial streams should be dropped from consideration seems based on false assumptions. The decision appears to be based on the inability of the proponents to collect an adequate level of information during their planning process. This decision may have eliminated viable alternatives.

DEIS Section 2.4.1 Operational Flexibility, page 2-30
Statement: *"The District has the following needs for operational flexibility for the Proposed Project."*

Comment: The City cannot seriously evaluate the effects of the project with so little information provided regarding implementation and operation of the project. The specific impacts of these options cannot be evaluated in the context of the entire project's operation. An SDEIS is necessary to provide the requisite data and take the legally required "hard look" at the alternatives considered and the Proposed Project.

DEIS Table 3-17 Wetlands and Other Waters, Glade Reservoir Study Area, page 3-49
Statement: *"A determination has not been made regarding the jurisdictional status of these wetlands and other waters under Section 404 of the Clean Water Act."*

Comment: A jurisdictional determination must be made and circulated in an SDEIS prior to making a decision or issuing a permit. Presently, it is impossible to know the amount of wetlands mitigation that will be required, where it will be developed, and the

impacts that might develop as a result of wetlands mitigation-related activities. Since this is a project specific proposal, the Corps must base its evaluation on project specific information before a decision can be made. *See* discussion in Sections II.6 and II.7 of these Comments.

DEIS Section 3.14.1 Regulatory Framework, page 3-61
Statement: *"The Fish and Wildlife Coordination Act requires the federal action agency to consult with the U.S. Fish and Wildlife Service (Service) and the CDOW on issues related to conservation of wildlife resources for federal projects resulting in modifications to waters or channels of a body of water (16 U.S.C. §§ 661–667c)."*

Comment: The DEIS makes no mention of the Bald and Golden Eagle Protection Act. *See* 16 U.S.C. 668-668d. The Corps must comply with that Act in addition to others noted, including identifying, analyzing and considering incidental take issues as they relate to eagles.

DEIS Section 4.12.4 Summary of Effects to Wetlands and Other Waters, page 4-50
Statement: *"Table 4-9 summarizes the direct effects to wetlands and other waters that would occur under all of the alternatives."*

Comment: This "summary" of the effects on wetlands and other waters fails to address the effect of building or providing the necessary mitigation to alleviate these impacts. It must be redone in an SDEIS that addresses such questions as: Where will the new mitigation occur and in what quantities? What impacts will result from creation of the mitigation? Will the mitigation offset the impacts to the sites identified in Table 4-9?

DEIS Section 4.15.2.1.1 Upstream of Fort Collins, page 4-61
Statement: *"Therefore, the information on hydrology and habitat availability for fish and invertebrates indicates that the action alternatives would result in a minor beneficial effect to fish and invertebrate communities in this segment of the Poudre River (Table 4-11)."*

Comment: These conclusions differ considerably from those on other rivers in Colorado. For example, reduced winter and spring flows on the Yampa have had a major negative effect on critical downstream spawning habitat for endangered fishes. This evaluation fails to address the effects of reduced flows on the creation or elimination of specific spawning habitats for individual species.

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