Enclosure 2

US Forest Service Specific Comments

Moffat Collection System Project, Draft Environmental Impact Statement

US Army Corps of Engineers

March 2010

Enclosed are the specific comments of the US Forest Service (USFS) for the proposed Moffat Collection System Project (Project). The US Army Corps of Engineers (ACOE), on behalf of Denver Water (DW), presented their analysis in a Draft Environmental Impact Statement (DEIS), published in October 2009. These comments are presented with citations to specific pages and sections of the DEIS.

Executive Summary

First paragraph, first sentence: "Two federally listed species, bald eagle and slender moonwort, have the potential to occur at Gross Reservoir but would not be impacted under any of the action alternatives." This statement is incorrect because the bald eagle was delisted in 2007, as acknowledged on p. 4-291 of the DEIS, and the slender moonwort has never been federally listed, although it was formerly a candidate for listing. In addition, slender moonwort is not mentioned in Chapter 3 or Chapter 4 of the DEIS; i.e., no baseline information is given and no effects analysis is presented. The Executive Summary should reflect the most recent information based on the biological opinion and be consistent with the DEIS.

Page ES-17 and 18, Stream Flows: Item number 3 indicates that the average annual flows in the Colorado downstream from the Blue River would be reduced by 2300 acre-feet (AF) when comparing the proposed action to the no action alternative. It is not apparent how a total average annual increase in diversion of 2300 AF would meet the purpose and need of providing Denver with an additional 18,000 AF of firm yield. Even if the Blue River contributions to DW's south system are not accounted for, the sum of the differences in flow reductions between the proposed action and no action alternative for the Fraser and Williams Fork is 8000 AF, which still appears to be far less than the stated need for 18,000 AF of firm yield.

It would appear that the sum of the differences in flow between the proposed action and no action alternative for the Fraser, Williams Fork and Blue River (the diverted basins) should be equal to the total differences in flow between the proposed action and no action alternative for the Colorado downstream of the Blue, but this is not the case. The first amount is 2600 AF while the second amount is 2300 AF. Further, it would appear that the sum of the differences between the proposed action and no action alternative for the Fraser and Williams Fork (flows diverted to the Moffat tunnel) should be equal to the differences for South Boulder Creek (the augmented stream), but they are not (8000 AF vs. 8100 AF).

Item 1 indicates that for the proposed action, flows in the Williams Fork below Steelman Creek would decrease by 1910 AF, but that flows downstream in the Williams Fork below Williams Fork Reservoir would decrease by only 1700 AF. How can the decreases in flow downstream be

less than the decreases in flow upstream on the same river? These are only a few examples of inconsistencies in the analysis that should be explained in a supplemental or final DEIS.

Page ES-19, table: It would assist readers if the names and descriptions of the alternatives were provided as a footnote.

Page ES-22: Stream Morphology and Sedimentation

The analysis should include discussion about the tributaries including how sediment is delivered from the tributaries to the main stem streams and how they are affected by larger quantities of water being diverted from the channel during peak flows. The analysis should also show how much peak discharge is reduced compared to bankfull flow conditions.

Page ES-23: Floodplains

The analysis should show how the combination of reduced high flows and sediment supply will alter floodplain sediment dynamics, which in turn will influence vegetation dynamics and processes and terrestrial wildlife.

Page ES-23: Water Quality

The analysis should show how the Project affects stream temperatures in tributaries downstream of the diversions.

Page ES-25: No Action Alternative

The DEIS clearly states that the West Slope streams will be narrower and shallower during runoff months due to the withdrawal of water to meet higher demands, but neglects to clearly state that the proposed alternatives will withdraw even more water from the West Slope streams.

Page ES-28: Wetlands, Waters of the U.S. and Riparian Areas

Reductions in floodplain inundation flows and possibly lower near surface water tables will affect the long-term viability of woody riparian species. Thus, the assertion of minimal effect on woody riparian species is questionable.

Chapter 1

Section 1.1, page 1-1, 1st paragraph: The DEIS states "Denver Water's collection system is composed of two major systems: the North System (also known as the Moffat Collection System) and the South System. These two raw water systems are geographically distinct and are not connected." As described in comments for "Section 1.3.1.6" the North and South collection system are interconnected by Clear Creek so that the "flexibility" argument is the Purpose and Need is moot.

Section 1.1, page 1-1, 2nd paragraph: The statement "forest fires in DW's watersheds" implies a proprietary stake (land ownership) when in fact the majority of the watershed area is owned by the public and managed by the USFS. DW's structures are simply permitted on public lands by the managing agency. The statement should be restated such as "forest fires in publically-owned watersheds that provide the majority of DW's supply."

Section 1.3.1.6, page 1-7: The analysis should include an alternative that considers interconnecting the raw water delivery for the south and north systems to address the imbalance in storage.

Section 1.3.1.6, page 1-7: The statement that "there are no raw water conveyance facilities connecting the two (raw water collection) systems" is incorrect. DW regularly uses natural stream channels as raw water conveyances (e.g., Vasquez and South Boulder Creeks). According to DW employees, water exiting the Gumlick tunnel from the Williams Fork collection system (North system) can alternately be released to Clear Creek (rather than sent thru Vasquez tunnel to the Moffat tunnel). Water in Clear Creek can then be conveyed to the South Platte River in downtown Denver or into the existing South Boulder diversion canal that crosses Clear Creek to the Moffat Water Treatment Plant (WTP). Thus, Clear Creek represents a physical connection between part of the Moffat system and the South system. If needed, DW can exchange water from Clear Creek for South Platte River water higher up in the Platte watershed.

Section 1.3.3, page 1-9: Under the City and County of Denver bullet, the DEIS states: "By charter, DW is required to provide an adequate supply of water to the people of the City and County of Denver for all uses and purposes". The DEIS contains little discussion of the effects of potential water conservation measures that may result in the consideration of other alternatives.

Section 1.4.1, page 1-11: Figure 1-5 should be adjusted to reflect data on actual demand since the year 2000 because actual water use values diverge widely from the expected values. The demand curve has several issues, mainly tied to the fact that demands since 2000 were much lower than anticipated by the modeling. For example, actual demand in 2002 and 2003 was 216,000 AF versus the 312,500 AF predicted (31% error in demand forecast). Given that the demand curve was running in a negative direction since at least 2000, the intersection of the supply and demand curves should be pushed out considerably into the future. The Y-axis needs to be adjusted with the origin at 200,000 instead of 275,000 AF so that actual use values can be plotted on the graph. Demand projections produced by the (Integrated Resources Plan) IRP forecast model are an unacceptable basis for supply planning because the projections have not borne a close semblance to actual use. For instance, the amount of water expected from this Project on an annual basis is less than the error in the annual demand forecast. Using a 31% error value, actual demand in 2030 would be closer to 299,000 AF with supply at 345,000 AF for a surplus of 46,000 AF not including the 30,000 AF safety factor. Another flaw in the demand forecast model is that the proponents used the period 1973-1999 to generate the demand forecast when per capita use dropped substantially starting in 2000.

Section 1.4.1.4, page 1-14: This section mentions an intergovernmental agreement with Arvada. Discuss other intergovernmental agreements DW has for the water contained in the Moffat Collection System (System) and the additional demand these agreements place on the need for securing a reservoir site to provide extra water for a perceived future shortage. The analysis should determine if DW could be creating future shortage situations by extending new contracts.

Chapter 2

Page 2-30, Water Source: "Long-term historic data suggest that approximately 45% of the inflow to Gross Reservoir comes from the South Boulder Creek basin, and about 55% is diverted from the Colorado River basin." It is not clear from this statement whether 45% of the **storage** in Gross Reservoir originates from the South Boulder Creek basin, or whether 45% of the **streamflow** (which may be passed through the reservoir) originates in South Boulder Creek. Our understanding is that the reservoir was primarily designed to store trans-basin diversions.

Section 2.4.2.1. page 2-42: The additional length of South Boulder Creek (and any other streams) to be inundated by the proposed expansion should be displayed as that is certainly a project effect. It would be useful to include that figure in the component description.

Chapter 3

Section 3.0, page 3-5: *Sampling Sites, Fraser River Basin:* The choice of the four sampling sites selected for the Fraser basin do not appear to represent the effects of diversions on all streams for the following reasons:

- Each of the streams either has bypass flows or is downstream of a confluence with streams that have bypass flows. This is not representative of the effects of DW's diversion system. The Fraser diversion system diverts from 31 streams. Only 10 of the streams have bypass flow provisions.
- Each of the streams is large in the context of streams in the Fraser basin. The majority of diverted stream are much smaller.
- None of the sites is located immediately below diversions, where the effects of diversion are most pronounced.

Section 3.1.5.1, Page 3-22, Fraser River, paragraph 1: The DEIS states: "As a result, DW, *at times, diverts all the stream flow from tributaries in the Fraser River basin that do not have minimum bypasses. This results in no stream flow for some distance below the diversions. This is how DW has operated in the past and plans to operate in the future.* The DEIS should discuss how DW plans to minimize their impact to channel morphology and aquatic habitat in these diverted streams.

Section 3.1.5.1, Page 3-24, Water Quality: It would be useful to provide a summary of what the Surface Water Classifications mean. For most readers, Aquatic Life Class 1 and Recreation E do not have inherent meaning.

Section 3.1.5.1, Page 3-25, Temperature section: Discuss whether channels that go dry because of water diversion will be in compliance with water temperature standards.

Section 3.1.5.1, Page 3-25, Temperature: Without some sort of explanation of terms, it is not inherently meaningful to refer to Cold Stream Tier 1 or Tier 2. It would be useful to provide a summary or definition.

Section 3.1.5.2, Page 3-33, Williams Fork River, *Floodplain section:* Just because the Williams Fork River has not been mapped by FEMA, it should not preclude an evaluation and assessment of the potential impact of the proposed action on floodplains in the Williams Fork River drainage

Section 3.1.5.5, Page 3-52, South Boulder Creek: Discuss what type of annual and long-term maintenance occurs on the channel and whether any agencies, including the ACOE and USFS, provide input for this work. The DEIS should show how providing longer duration flows in South Boulder Creek when it is near peak hydraulic capacity will affect channel stability because of increased flow volume from the System.

Show the natural hydraulic capacity of South Boulder Creek between the Moffat Tunnel outflow and Gross Reservoir. Understanding potential channel adjustments to a given perturbation in a stream reach is contingent upon prior conditions.

Is there a minimum flow requirement on South Boulder Creek between the Moffat Tunnel outflow and Gross Reservoir? The DEIS should present information on the low flow habitat conditions along this stream segment.

The water chemistry data collected at the two monitoring sites on the North Fork of the South Platte River should be displayed to provide a better understanding of the interpretations of water quality changes discussed in the DEIS.

Can DW implement Full Use existing now? Are the adequate water rights and facilities in place to accommodate this alternative?

There is not a clear summary of the existing conditions in the North Fork of the South Platte and the South Platte River. Water quality, water quantity, geomorphology, aquatic habitat, riparian habitat and aquatic organisms need to be better described under all scenarios. There needs to be a more thorough comparison of the baseline/existing conditions with the Full Use Existing and Full Use Proposed Action.

The DEIS states: "The North Fork South Platte River would see annual deliveries from Roberts Tunnel increase; this would increase phosphorous loading to both the North Fork South Platte River and Chatfield Reservoir, resulting in a long-term minor impact to water quality." How close are the affected stream segments of the North Fork of the South Platte and South Platte River to exceeding water quality standards, as set by the Colorado Department of Public Health and Environment (CDPHE)?

Sectin 3.1.5.7, South Platte River: The South Platte Protection Plan (SPPP) was signed in 2003 by a diverse group of stakeholders (including DW) with the intent to protect outstandingly remarkable values (ORVs) on the South Platte River. The identified ORVs were: historical resources, cultural resources, fisheries, geologic, recreational, scenic, and wildlife. The SPPP includes the South Platte downstream of Eleven Mile Dam to the confluence with the North Fork and the North Fork upstream to the town of Ismont, sections that are within the boundary of the National Forest and potentially affected by the proposed action. This plan was put forth as an

alternative to the Pike-San Isabel National Forest's recommendation for designation of the South Platte River under the Wild and Scenic Rivers (WSR) Act.

On page 3-58 the DEIS states that the SPPP includes a Streamflow Management Plan, under which DW committed to minimum outflows from Eleven Mile Canyon and Cheesman reservoirs. The DEIS indicates that this commitment may not be achievable under the proposed action: "All operations under the South Platte Protection Plan are subject to the principle of no loss of existing or future water supply. It is possible that conditions could occur under which DW would reduce bypass flows below Eleven Mile Canyon and Cheesman reservoirs." More information is needed to understand the impact to streamflow management guidelines agreed upon in the South Platte Protection Plan.

There is no further mention of the SPPP in the DEIS and specifically no discussion of how the proposed action would affect the agreements set forth in the plan. Was the South Platte Enhancement Board, the governing body for the SPPP, consulted during the alternative development process? How will the proposed action affect the SPPP agreement? Provide a clear review of how the proposed alternatives would meet the requirements of the Plan, including protecting the Outstanding Remarkable Values (ORV) identified along the mainstem and North Fork of the South Platte River.

As stated above, the SPPP was developed as an alternative to WSR Designation. In Chapter 4 – Environmental Consequences there is no analysis of the effects of the proposed action on the values that could impact the ORVs. If ORVs are impacted under this Project, the Forest may need to reconsider Wild and Scenic designation for the mainstem and North Fork of the South Platte.

In 2004, the Pike-San Isabel Forest Plan was amended "…to establish a new management area along the South Platte River between Elevenmile Reservoir and Strontia Springs Reservoir, and along the North Fork of the South Platte River from below Bailey to the confluence with the South Platte River. These portions of the rivers were found to be eligible for consideration as potential Wild and Scenic Rivers." The purpose of this management area designation is to protect the river values that were identified during the eligibility study. Thus, we are concerned about potential impacts to these two river segments.

Section 3.1.6, Page 3-67, Channel Dynamics:

A. Selection of Sampling Sites: The rationale to select sampling sites based on field observations, natural quality of the site, hydraulic modeling potential, and accessibility are subjective criteria. The sampling sites selected do not represent the range of channel types in the Fraser River and Williams Fork River basins. It appears that the sampling sites were only selected if the channel was in good condition and stable within a given channel type (i.e., unstable channels were not sampled). The sampling sites selected are skewed toward Rosgen A and B channel types, which are less likely to be sensitive to morphological changes from existing and proposed flow alterations. Because more sensitive reaches (i.e., pool-riffle channels or Rosgen C type channels) and steep tributary reaches are underrepresented in the list of sampling sites, the analysis and conclusions drawn are incomplete. For example, 48 percent of the St.

Louis Creek drainage consists of a Rosgen C channel type (response reach) and yet the sampling site selected was in a Rosgen B channel type (transport reach).

Reach morphology and sediment dynamics are closely linked to position within the watershed and significant longitudinal variability in the response to an upstream disturbance can occur along a single stream. Additionally, the nature of channel adjustments to a given perturbation in a stream reach is contingent upon prior conditions such that similar changes in inputs can produce different channel adjustments in different reaches. Selecting only one sampling site on a limited number of diversion sites does not reflect the range of channel responses that may occur along a channel. Extrapolating channel responses from a single sampling site to other locations along the channel or other channels is not an acceptable practice. At a minimum, multiple sampling sites should have been selected for each channel type along the focus river segment to better understand the range of existing conditions and potential responses to the proposed action. Sampling site locations should have been determined randomly within a given channel type to minimize operator bias.

The DEIS does not include a sampling site on Vasquez Creek downstream of Gumlick Tunnel even though flows are projected to increase by 20% through the tunnel from water diverted from the Williams Fork drainage. The increase in flows could potentially affect channel stability, channel morphology, and aquatic habitat along Vasquez Creek between the Gumlick Tunnel outflow and the DW Board diversion structure.

B. Hydraulic Capacity and Operation of Diversion Structures: The dimensions, hydraulic capacity, and operational history of each diversion structure need to be provided in order to evaluate the impacts of the existing diversion structures on fluvial processes and channel morphology from the 1) natural flow and sediment regime and 2) proposed changes to the operation of each diversion structure. For example, the annual and maximum annual volume of water diverted by the diversion structure in a given year and the annual and annual maximum peak discharge diverted by the diversion structure should all be shown as well as the maximum discharge capacity of the diversion structure. Discuss how the diversion structure discharge capacity compares to the flow remaining in the channel. Does the diversion structure span the channel? Explain how the diversion structure affects the transport of sediment to the downstream channel.

Section 3.1.6, Table 3.1-18 and Table 3.1-19: See Comment A (Page 3-67) above. Site selection seems biased and not relevant to addressing how potential flow alterations may affect fluvial processes and channel morphology for the range of channel types in the Fraser River and Williams Fork River basins.

Section 3.1.6, Table 3.1-18: It is not clear how this table relates to this analysis. The DEIS claims that "channels classified the same are assumed to have similar hydraulic, sediment transport, sediment supply, lateral migration, and vegetative encroachment characteristics." If channel type is important, perhaps a more process-based approach would have been more appropriate. Rosgen channel-type classifications have no bearing on HEC-RAS modeling nor do they provide any substantial or valuable information to the analysis.

Section 3.1.6, Table 3.1-19: This table provides some values that are not within the accepted range of variability for the stream channel types presented. As an example, sinuosity is extremely low for all sampling sites, but it is especially low for C-type channels. The sinuosity values shown would indicate that there is a problem with the system. In addition, the DEIS should show the entrenchment and flood-prone width values of the sample sites.

Section 3.1.6.1, pages 3-73 and 3-74, Fraser River: *FR4- Ranch Creek:* The DEIS states that this site is located just below the confluence of the "North Fork South Platte River of Ranch Creek", which is incorrect as this is not the Platte River drainage.

Section 3.1.6.5, South Boulder Creek above Gross Reservoir, page 3-78: "Based on visual observations of the reach and predominate bed material, SBC1C is characteristic of a Rosgen B3 to B2 stream type." South Boulder Creek is more likely to be an F2 or F3 channel, with a high width to depth ratio and incised channel where entrenchment has created a loss of access to the floodplain. See Rosgen, D. "Applied River Morphology", 1996, pages 5-6 and 5-150 through 153.

Section 3.2.5, page 3-86 and 3-87: The water budget described for the Fraser River basin is incorrect and needs to be reworked for the following reasons. The estimate of evapotranspiration provided by Apodaca and Bails in 1999 is extremely high compared to actual current ET values in 2010 due to widespread lodgepole pine mortality and was calculated as the budget residual. The consumptive use value provided, which is 15 years old, is an underestimate as Fraser basin development has accelerated greatly in recent times.

There are inconsistencies between the referenced materials and information presented in DEIS: Why would DW personnel tell Apodaca and Bails in 1995 that the value for surface water diverted into the Fraser basin was only 300 AF when the DEIS shows a modeled (PACSM) value of 8700 AF for a similar period? A similar question is relevant for surface water diverted out of the Fraser basin. DW told the USGS in 1995 that the Moffat tunnel diverted 23,500 AF annually but table 3.2-1 shows a modeled value of 60,900 AF for the similar period. For example, page 3-17 mentions that the average annual Moffat tunnel diversions between 1975 and 2005 were 55,800 AF. Which of these three values is correct? This matters because the "groundwater out" value is unknown and calculated as the residual of the budget. It also appears as if the "surface water out" values are highly variable with Apodaca and Bails stating the value is 135,500 AF and the DEIS claiming only 64,500 AF. Explain why the DEIS water budget for the Fraser (table 3.2-1) mixes and matches data from the same report for the same time period with modeled PACSM output. Explain why there was a need to model existing surface-water diversion values to develop a hydro budget. Show how much water DW is actually taking under existing conditions. It is difficult to draw conclusions from the data presented.

Section 3.5.0, page 3-105, Vegetation Types: The following summary of vegetation surveys is provided: "Vegetation in the Project Area was surveyed and mapped in late August and September of 2005 and June of 2006. In areas of potential permanent disturbance, such as the reservoir sites and other aboveground facilities, the sites were traversed on foot to identify plant community associations and dominant species. Areas of temporary disturbance, such as conveyance facilities, were primarily observed by a vehicle reconnaissance. Areas of special interest identified during the vehicle reconnaissance, such as riparian communities, were also

surveyed by foot." No mention is made of surveys for USFS Sensitive or rare/local concern plants as part of vegetation surveys, and no previous surveys are mentioned, such as the plant surveys done around Gross Reservoir for the DW 2001 FERC relicense. These surveys were done specifically for the Recreation Management Plan and powerline relocation and did not include all areas of anticipated disturbance for the proposed reservoir enlargement, as indicated under FERC License Article 410, heading B. Survey Methodology Used which states "Specific areas around Gross Reservoir were surveyed during June, July, and August 2001.... No attempt to survey the entire reservoir was made." The USFS submitted a Study Request for a Project Area Sensitive and Rare Plant Survey that included specific requirements for determining appropriate species lists (see Appendix G comments), described the need for additional surveys, and included specification guidelines for survey reports. None of this information is included or referenced in the DEIS, and there are no additional available reports or other documentation indicating that the requested surveys occurred.

Section 3.5.0, page 3-106, Noxious Weeds: *Table 3.5-1: Noxious Weeds Observed or Expected to be Present in the Project Area:* this table does not include weeds known to occur in Grand County that are associated with DW's System at tunnel portals, along access roads and pipelines, and at large facilities. Species documented to occur include oxeye daisy and Canada thistle. Orange hawkweed that occurs along the upper Fraser River may be associated with DW's collection system and/or may be conveyed by the system. See related comments under Section 4.5.1.1.

Section 3.5.1.1, beginning on page 3-107, Gross Reservoir: Additional plant communities need to be discussed in this section. Refer to Table 5: Plant Communities of Local Concern for the Arapaho and Roosevelt National Forests and Pawnee National Grassland (ARP) in Appendix G comments for additional plant communities, including ponderosa pine old growth, known to occur in the project area, and additional communities for which surveys should be done and effects analysis conducted depending on survey results.

The discussion of Potential Conservation Areas (PCA) could have occurred in this section or under Wildlife, or both. Since some of the three PCA's are designated primarily to protect plants, it would be helpful to reference the PCA discussions in this section, by page number(s) or section number(s) where they occur under Wildlife.

Although Article 410: Plan to Protect Rare and Sensitive Plants is cited in this section, however information from the Plan regarding occurrence and expected inundation of USFS Sensitive and rare/local concern plant populations is not mentioned in this or other applicable sections.

Section 3.6.0, page 3-117 and 3-120 – 3-121, Overview and/or Wetlands: Given the importance of fens and the documented occurrence of fens at the two Williams Fork sample sites, discussion of fens in either or both of these sections is warranted. Discussion could include a definition of fens and a description of their conservation and legal importance. Discussion should also include any surveys for fens that have occurred in the project area, whether conducted specifically for the proposed project or for other purposes, and results of such surveys. If no project-specific surveys were done, surveys should be conducted for the project area, including

all areas with the potential to be impacted by water depletions. Fens are included Table 5: Plant Communities of Local Concern for the ARP under Appendix G comments.

Section 3.6.0, page 3-117, Overview and/or Wetlands: Table 3.6-1, Summary of Riparian Areas and Wetlands, page 3-120; AND Section 3.6.1.1, beginning on page 3-122: Wetland and riparian habitat mapping for reservoirs, including Gross Reservoir, is described as follows in the fourth paragraph of Section 3.6.0: "These facilities were evaluated using field studies within the proposed or representative affected areas to delineate wetlands and other waters and to map riparian woodland and shrubland communities. Because wetlands are addressed in detail for these facilities, the discussion of riparian areas covers the remaining non-wetland riparian areas." It is not clear from these statements or subsequent discussion in Section 3.6.1.1 whether 100% of wetlands and riparian areas around Gross Reservoir with potential to be inundated by the proposed project were surveyed on the ground. Riparian and wetland acres presented in Table 3.6-1 for the Gross Reservoir area appear small. Clarification is needed regarding whether 100% of wetlands and riparian areas proposed to be inundated around Gross Reservoir have been documented based on thorough field surveys and presented in Table 3.6-1.

Section 3.6.5.1, page 3-147, Fraser River; FR2 – Fraser River Below Tabernash, page 3-147 Third indented paragraph under "Three CNHP Plant associations…": discusses the shrubby cinquefoil/tufted hairgrass plant association that may be associated with fens. This section discusses where this plan association may be found based on Carsey et al 2003, but does not clarify where it is actually found at sample site FR2. This section also does not mention whether a fen is present at sample site FR2.

Section 3.7.0, page 3-169, Overview: This brief section mentions wildlife potentially present in the Project Area, and species distribution information obtained from habitat assessments. No mention is made of any surveys done for wildlife, either for the 2001 Federal Energy Regulatory Commission (FERC) relicensing, or for the Project, and no reference is made to additional reports that might contain this information. Surveys and habitat assessments were requested in the USFS Study Request for Special-Status Terrestrial Wildlife Species and Habitats. There are no additional available reports or other documentation indicating that the requested surveys occurred.

Section 3.7.1.1, page 3-169, Gross Reservoir: *Second paragraph:* The third sentence mentions that insects including western spruce budworm have killed large patches of ponderosa pine on the west side of Gross Reservoir. It should be noted also that large patches of Douglas-fir, the favored host of western spruce budworm in Colorado, have also been killed in the area west of Gross Reservoir.

Section 3.7.1.1, pages 3-169 and 3-170, Big Game:

General comment: The Colorado Division of Wildlife (CDOW) Natural Diversity Information System (NDIS) database is cited multiple times with a 2005 date. Current (2009) NDIS data are available and should be cited instead of the outdated version.

First paragraph on page 3-170: It is mentioned under the discussion for mule deer on the previous page that there are no migration corridors. Under the discussion for elk, migration

corridors are not mentioned; however, according to CDOW NDIS 2009 data, the Gross Reservoir area is within a migration corridor.

Section 3.7.1.1, pages 3-170 and 3-171, Small and Medium-sized Mammals:

Second paragraph page 3-170: Other species known to occur are discussed, without mention of how they are known to occur (observations during field surveys, local knowledge, database, etc) and whether they are known to occur in the Gross Reservoir area, or assumed to occur based on habitats present in the project area.

List of bat species on page 3-171: Fringed myotis and Townsend's big-eared bat are USFS Sensitive species, therefore should be discussed in Section 3.8 Special Status Species .

Table 3.7-1 Raptors Likely or Known to Occur in the Gross Reservoir Study Area, page 3-171: Osprey should be added to this table. The USFS installed two osprey nest platforms in 1993 and ospreys have attempted nesting for more than one season since then, though no successful nesting has been documented. Osprey that nest at other relatively nearby areas forage for fish at Gross Reservoir. Also, since there have been previous nesting attempts, the nest platform area should be added to Figure 3.7-4 as a Potential Raptor Nest. Northern goshawk should also be added, particularly since effects to the species are mentioned under both Wildlife and Special Status Species sections in Chapter 4.

Last paragraph page 3-171: Flammulated owl is a USFS Sensitive species, therefore should be referenced to Section 3.8 Special Status Species. Also, if owls are considered raptors for this analysis, they should be included in Table 3.7-1 for consistency.

Table 3.7-2 Common Songbirds in the Gross Reservoir Study Area by Habitat Type. page 3-172: Several species – pygmy nuthatch, warbling vireo, Wilson's warbler, and mountain bluebird - are USFS Management Indicator Species (MIS) for the ARP, which should be noted in this table and referenced to Table 3.7-3 on the following page, and/or the appropriate discussion in Section 3.8.

Reptiles and Amphibians, page 3-173: Northern leopard frog is a USFS Sensitive species therefore should be referenced as such and to the appropriate discussion in Section 3.8.

USFS Management Indicator Species (MIS), page 3-173: The list in Table 3.7-3 is outdated and needs to be replaced with the May 2005 list. This list is provided in Table 3 of comments to Appendix G. It is unclear why the MIS list is displayed here and the sentence directly above the table refers the reader to further discussion in Section 3.8. Including the list and discussion in the same section would help make the analysis easier to follow.

Potential Conservation Areas (PCA), page 3-173: Current Colorado Natural Heritage Program (CNHP) data for PCA's (available on their web site at http://www.cnhp.colostate.edu/) shows Winiger Gulch and South Boulder Creek above Gross Reservoir as one PCA, named Winiger Gulch with an "alias" of "South Boulder Creek above Gross Reservoir". It is designated to protect two rare plant communities, both mentioned in this section, and one rare plant species occurrence, not mentioned in this section but which should be discussed in Section 3.8.

USFS Managed Areas, page 3-175: Detailed discussion is needed regarding affected environment for important wildlife habitats included in the ARP Forest Plan: existing old growth, old growth development areas, old growth retention, effective habitat, interior forest, and forested and open corridors. GIS data are available from the USFS on request. Discussion should include quantification of available amounts of these habitats in the Project Area as compared to amounts available Forest-wide, based on available GIS data and applicable surveys. Surveys for old growth would include surveys previously conducted, available from the USFS on request, and any site-specific old growth surveys conducted specifically for this project. This information was requested in the USFS Study Request for Special-Status Terrestrial Wildlife Species and Habitats.

Section 3.8, Species lists: All species lists in the DEIS Chapter 3 and Appendix G are outdated and/or incomplete. This includes USFS Sensitive species, Management Indicator species, and rare/local concern plants. These mistakes should be corrected in subsequent versions.

Section 3.8, Special Status Species analysis: The Special Status Species sections in Chapter 3 and 4 are inadequate and missing important information. Chapter 3 contains one short paragraph and Chapter 4 contains less than one page that attempt to describe the affected environment and effects for special status species (SSS) other than three federally and/or state-listed animal species that are discussed individually.

Section 3.8.0, page 3-195, Overview: No information is presented in this section indicating there were surveys for SSS, and no reference is made to additional reports that might contain this information. USFS Study Requests included specifications for wildlife and plant surveys. There are no additional available reports or other documentation indicating that the requested surveys occurred. See also comments under Section 3.5 Vegetation above re: plant surveys.

Second paragraph: The first sentence states that "Information was obtained from… previous studies and reports…." This should include, and should reference here, relevant information in Articles to the 2001 FERC relicense and/or the USFS 4(e) conditions, such as results of wildlife and plant surveys that are relevant to the Project.

Fourth (last) paragraph: The first sentence refers to CNHP 2005 data, which is outdated. A current list of USFS Region 2 Sensitive Species for the Arapaho and Roosevelt National Forests is provided under comments to Appendix G.

Section 3.8.1.1 , page 3-195, Gross Reservoir:

Bald Eagle: The bald eagle is now a USFS Sensitive species and should be referenced as such.

Other Special Status Species, page. 3-197: This section should list, and/or reference in the appropriate table in Appendix G (more specifically than the general reference to Table G-3), all federally and state listed, USFS Sensitive, CNHP-tracked, and other species of local concern that have not been previously addressed under Vegetation in Section 3.5, under Wildlife in Section 3.7, or earlier in Section 3.8 and may occur in the project area or be affected by the project. Refer to comments under Appendix G for current lists of species which should be considered.

There is no reference here to any plant species including USFS Sensitive and rare/local concern plants that were found during surveys for the 2001 FERC relicense, which are documented and mapped in License Article 410. This section and/or supporting documents should discuss plant surveys that have occurred and species found. No reference is made to any additional reports that might contain this information.

For Special Status Species found in the project area or that may be impacted by the project, documentation should be provided in the DEIS and/or supporting documents that includes overall species population status; status of other known populations, especially near the project area; evidence that current literature (including USFS Rocky Mountain Region Species Conservation Assessments available at http://www.fs.fed.us/r2/projects/scp/assessments/index.shtml) was reviewed and incorporated; and consultation with species experts. Two of these assessments (*Botrychium* species and boreal toad) are listed under References, but many more are available and pertinent to this analysis.

As discussed under Section 3.5 Vegetation above, 2005 and 2006 vegetation surveys did not appear to include specific surveys for USFS Sensitive and rare/local concern plants, and no reference is made to any additional reports that might contain this information. The information presented does not address the USFS Study Requests for surveys for wildlife and plants, and there are no additional available reports or other documentation indicating that the requested surveys occurred.

Section 3.8.1.1, Page 3-197: 2nd and 3rd lines of page under greenback cutthroat trout discussion: "This species was petitioned for listing as threatened, but a 12 month finding by the FWS in 2007 determined that listing was not warranted at that time (FWS 2007)." This is inaccurate; greenback cutthroat trout have been listed under ESA since 1973. The 12-month finding pertains to Colorado River cutthroat trout, not greenback cutthroat trout.

Section 3.8.5.1, page 3-202, Fraser River:

River Otter: This species is USFS Sensitive and should be referenced as such. In addition, recent data show that river otters occur in the upper reaches of the Fraser River to the headwaters (CDOW, NDIS 2009; and Doreen Sumerlin, USFS Sulphur Ranger District, personal communication, Feb. 5, 2010). These findings need to be reflected in this section.

Other Special Status Species, page 3-203: This section should include additional species that may occur in wetlands and riparian areas along river corridors – for example, USFS Sensitive plant species Park milkvetch, Selkirk's violet, and other species; plant species of local concern including ferns, three twayblade species *(Listera spp.)* and others; and USFS MIS Wilson's warbler. A discussion of any surveys that have occurred, whether occurrences have been documented, and available habitat should be included for each species. No reference is made to any additional reports that might contain this information.

Other Special Status Species paragraph Page 3-203: The following SSS are excluded from this discussion: mountain sucker, greenback cutthroat trout, lake chub, and sensitive mollusk (Rocky Mountain capshell).

Section 3.8.5.2, pages 3-203 and 3-204, Williams Fork River: Additional species should be included – see comment re: Section 3.8.5 River Otter and other Special Status Species above.

Section 3.8.5.3, page 3-204, Colorado River: *Other Special Status Species:* Additional species should be included – see comment re: Section 3.8.5 River Otter and other Special Status Species above.

Section 3.8.5.6, North Fork South Platte River: The following statement is made about the Preble's Meadow Jumping Mouse: "The portion of the North Fork South Platte River within Jefferson County is considered within the overall range of Preble's, however no occupied range is located on the North Fork South Platte River in this area." We believe that this statement is in error, because a recent study has documented the Preble's mouse on the North Fork in Jefferson County (private land). In addition, it appears that much of the North Fork in Jefferson County contains suitable habitat for the Preble's mouse.

Section 3.9, page 3-211, Affected Environment for Aquatic Biological Resources: *Table 3.9-1* – includes fish species name that are incorrect due to changes and updates in taxonomy. The correct spelling for cutthroat trout species is *Oncorhynchus clarkii* sp.

In addition to Metcalf and others (2007) finding that greenback cutthroat trout "are still at a high risk of extinction", the authors also determined that the greenback lineage has been discovered outside its historic range. The ACOE has a responsibility to analyze the effects on greenback lineage fish outside their native range if they are found to occur elsewhere, as within the DW system.

Habitat page 3-213: The DEIS does not adequately explain or describe the fisheries habitat simulations used in the analysis. The DEIS states that habitat simulations were conducted using IFIM. IFIM and PHABSIM are not the same thing. IFIM is an analysis process, whereas PHABSIM is a model which is often used to identify habitat tradeoffs to be evaluated within the IFIM process. Habitat simulations are not generated through the IFIM process, rather they are generated using PHABSIM.

Nuisance Species page 3-214: Nuisance species are a real problem in Colorado and within the System, with potentially large risks to water infrastructure. DW and the ACOE should recognize the importance of this issue. It should not be treated lightly as it has been in the analysis.

New Zealand mudsnails should be included only in the invasive species discussion.

Section 3.9.1.1, page 3-214, Gross Reservoir: In addition to fish, mollusks need to be addressed in the affected environment discussion of Gross Reservoir as they are a Regional sensitive species (Rocky Mountain Capshell snail) and may be present in Gross Reservoir.

Section 3.9.5.1, Fraser River: Fraser River Mainstem:

Page 3-220: The DEIS states "whirling disease has been identified as occurring within the Fraser River mainstem. The rate of infection is relatively high in the lower Fraser River (Nehring et al. 2003)". Why is the infection in the Frazier River so high and why will flow reductions improve Tubifex habitat?

Page 3-222: Fraser River Tributaries: The DEIS states "A total of 31 tributaries to the Fraser River *may* be potentially affected by the implementation…" "May" should be changed to "will" since these streams are already affected by the project and this effect will continue and get worse with the implementation of these alternatives.

Table 3.9-6: Because of the scope of this analysis, why weren't the data gaps filled in for fish presence upstream of the diversions to get general information on what should be seen downstream of the diversions?

Page 3-225: "In 2005, three sites were dry at the time of sampling….; therefore, no fish were present." These three streams are not intermittent; the reason they were dry is that all of the flow was diverted. The DEIS should explain this; otherwise, the reader may believe they do not flow year-round.

Pages 3-225-231: There is no consistency in the discussion of fish sampling.

As described in the DEIS, the USFS has Right of Way agreements with DW for instream flows in a number of streams within the Moffat Collection system. These instream flows as well as the amount diverted according to DW's water rights are shown in Table 1 below, modified from tables in the DEIS. As can be observed, DW diverts over 95% of the water in just about all of the streams affected by the project on NFS lands. Although the USFS does not dispute DW's right to divert these flows, the agency does dispute the assertion that the effects of the existing and proposed level of diversions on fish are "minimal" (as stated repeatedly in the DEIS) because they primarily occur during spring runoff of normal and wet years.

The proposed diversions not only have an effect on physical habitat for fish in these streams but the volume of water diverted also has significant potential to entrain fish into the diversion structures and ultimately into the System itself. The possibility of entrainment is not only a concern for introduced brook trout but also for cutthroat trout. Page 3-203 of the DEIS identifies a number of diverted streams in the project area with either pure or hybridized populations of Colorado River Cutthroat populations. According to the DEIS pure populations are known to occur in Hamilton, Jim, Ranch (all three forks) and Little Vasquez Creek. In addition, Vasquez, Cabin and the Fraser River contain populations of CR Cutthroat that are known to be hybridized with other cutthroat or rainbow.

Cutthroat are likely to be more impacted by increased diversions during the spring as proposed by DW since they are spring spawners and are likely to be migrating looking for potential spawning sites. The combination of increased activity in streams where almost all of the water is being removed at DW diversion points means Colorado River cutthroat trout (a Region 2 Sensitive Species) are highly susceptible to entrainment during this period. This potential effect is not addressed in either the ACOE DEIS or the DW LA for the project.

Page 3-218 describes the geographic scope of the analysis as focusing on streams where "the annual change in flow is minimal but changes in several months of an average year are greater than 10%." Although an increase in 10% of diversion during wetter months may not seem like much, this increase becomes significant when over 95% of the stream is already diverted.

Table 1. Moffat Collection System Minimum Bypass Requirements as compared to DW water rights for selected streams. Modified from DEIS tables 3.1-8 and 3.1-7.

Reach	DW Water Right (cfs)	Min. Instream Flow (cfs)	Period	% Diverted	Increased Diversion %
Fraser River	275	10 4	5.15 – 9.15 9.16 – 5.14	96	6-38
Vasquez Cr.	275	8 3	5.15 – 9.15 9.16 – 5.14	97	20-43
St. Louis Cr.	700	10 3	5.15 – 9.15 9.16 – 5.14	98	10-17
Ranch Cr.	112	4 2	5.15 – 9.15 9.16 – 5.14	96	14-21
Trail Cr. (N& S)		.25	Year-round		3-8
Hurd Cr.		1	Year-round		3-8
Hamilton Cr.	Hamilton-Cabin Ditch and Extension = 70 + 25	1.5 1	5.15 – 9.15 9.16 – 5.14	93	3-8
Cabin Cr.		2	Year-round		3-8
Little Cabin Cr.		.25	Year-round		3-8
Meadow Cr.	5100 Ac Ft + 294 Ac Ft.	3 1.5	5.15 – 9.15 9.16 – 5.14		3-8

Table 2 (below) contains data on fish distribution and relative abundance in the vicinity of project diversions for streams with minimum bypass requirements as summarized from DEIS Chapter 3 section 3.9.5.1. Several sources of data were reported in the DEIS. Fish/Ha is used here because it is the most consistent data reported for streams of interest. Information on fish assemblages relative to density estimates is uncertain. Sculpin were often sampled and are likely included in any fish densities reported.

The DEIS (under General Observations on page 3-231) draws very little in the way of conclusions from the fish sampling data presented other than to say that some diversions have succeeded in protecting upstream cutthroat populations from being overwhelmed by brook trout. Looking at this summary of the fish sampling data presented in the DEIS, it is apparent that reliable, replicated data on fish distribution and density is not available and is needed in these streams to be able to adequate evaluate the effect of the project on fish populations. For instance, in the preceding table, for streams with mandatory instream flow requirements, there are no data whatsoever on fish populations upstream of the diversion sites for 4 streams. On another stream, Vasquez Cr., although fish were present, there is no density information. On three other streams, fish populations upstream of the diversion sites are lower than downstream even though flows are higher. When the information gaps are coupled with the inconsistencies in the data presented, the USFS questions how the DEIS can basically conclude that the increases

in diversion proposed by DW with no additional mitigation such as screening at project diversion sites can be expected to have no adverse affects to fish in affected streams

Table 2. Fish distribution and abundance, summarized from DEIS, 3.9.5.1.

Stream Reach	Above Diversion		Below Diversion	
	Fish Species	Fish/Ha	Fish Species	Fish/Ha
Fraser R.	Brook trout (dom.) Cutthroat trout	437	Brook trout (dom) Brown, rainbow	456-2440
St. Louis Cr.	Brook trout (dom.) CR Cutt	797	Brook trout	646-5231
Vasquez Cr.	Brook trout	NA	Brook Trout (dom.) Cutt, Rainbow	1017
Hamilton Cr.	Cutthroat	456-1823	Brook trout	484
Cabin Cr.	Cutthroat	257-2088	Cutthroat	269-2419
Ranch (Main)	No data	No data	Sculpin (dom) Brook, Rainbow, Brown	133-1615
Trail Cr	No data	No data	No water	No water
Hurd Cr.	No data	No data	Brook, Brown Tr.	0-5745
Little Cabin	No fish	No fish	No fish	No fish
Meadow Cr.	No data	No data	Brook Trout Brown Trout	252-74,371
Little Vasquez Cr.*	CR Cutt	Avg.= 27	Brook trout	Avg= 3471

*No minimum bypass flow requirement

Page 3-228, North Fork Ranch Creek: Fish presence determination made from no sampling effort upstream of the diversion. According to Hirsch et al. (2006), a document cited throughout the DEIS, North Fork Ranch Creek is a conservation population of CRCT; therefore, it seems that fish should be present somewhere in the drainage.

Page 3-228, Main Ranch Creek: "No data available upstream of the diversion." This data gap should be addressed in subsequent analysis.

Page 3-229, South Fork Ranch Creek: The ACOE states, "The diversion… apparently hasn't isolated cutthroat trout." While this may be true, a rock diversion dam was built in 2005 upstream of the DW diversion to improve blockage of brook trout. Data is available from CDOW since 2005 to assess the effectiveness of this barrier.

Sampling should occur both downstream and upstream of the diversion structures in streams with water. Meadow Creek supports a robust population of brook trout from the diversion up to the spillway of the reservoir. For Hamilton and Cabin Creek, it should be disclosed that the diversion dam has acted as a barrier to invasion by brook trout like as with the discussions about Little Vasquez and South Fork Ranch Creeks?

Page 3-231, Comments on the ACOE General Observations: The DEIS states, "Fool, North Fork Ranch, and South Fork Ranch creeks were dry downstream of the diversions at the time of sampling in 2005. This indicates these streams are incapable of maintaining viable, reproducing populations of fish." This statement contradicts page 3-223, paragraph 4, lines 1-4 where the DEIS states, "In "severely" diverted streams with flow reductions of more than 90%, there are sections just downstream of the diversion that may be dry…fish are *probably* excluded."

The DEIS states: "Several other streams had water, but no fish present." Explain why fish wouldn't be found, especially brook trout as they are found virtually everywhere.

"The Colorado River cutthroat trout populations in Hamilton, Vasquez, and Little Vasquez creeks are considered genetically pure, while those in Cabin, South Fork Ranch, Jim, and Trail creeks are known to be hybridized with either rainbow trout or other cutthroat trout subspecies (Young et al. 1996)." This statement is incorrect for the following reasons:

- The distinction of genetic purity in cutthroat trout is not critical to this analysis. Cabin and South Fork Ranch are hybridized with greenback cutthroat trout only; therefore, it doesn't make them less important as compared to those hybridized with rainbow trout or Yellowstone cutthroat trout. This discussion continues throughout the DEIS as if to imply that those streams are less important and those fish inferior.
- In the references, Hirsch et al. (2006) was cited. This citation should be used in the discussion of Colorado River cutthroat trout populations found within the DW system. Hirsch et al. (2006) is the most up to date assessment available, while Young et al. (1996) is outdated. Hirsch et al. (2006) should be used in CRCT discussions.
- Trail Creek is not within the DW collection system and therefore should not be referenced when discussing creeks that contain cutthroat trout. The ACOE has direction from the US Fish and Wildlife Service (FWS), like the rest of the other federal agencies, to treat fish that have been designated Lineage GB (Metcalf et al. 2007) as greenback cutthroat trout. There are a number of Lineage GB populations found outside their historic range within DW's operational boundary. Although some have very recently been designated as Lineage GB, a couple of populations have been designated since 2007 and 2008, before both the BA and DEIS were written.

Page 3-231, Benthic Macroinvertebrates under General Observations: The DEIS states: "Fool, North Fork Ranch, and South Fork Ranch creeks were dry downstream of the diversions at the time of sampling in 2005. This indicates these streams are incapable of sustaining robust, perennial benthic invertebrate communities." This statement is in conflict with what is written on page 3-223.

Page 3-232, Habitat: There is no discussion of PHABSIM results for juvenile trout in regard to optimum flows and maximum habitat availability for this lifestage.

Fraser River tributary names are inconsistent between habitat and fish sections and incorrect in some places.

The discussion of benthic macroinvertebrates is misleading. High densities and high numbers of taxa do not necessarily represent a healthy stream, depending on what species are found there.

Certain species are more tolerant of changes in flow and water quality, and it would be important to present that information as to what species are found where and to make comparisons between upstream and downstream of diversions.

Page 3-234, Habitat –Little Vasquez Creek: There is a bypass flow agreement of 0.5 cfs with Grand County Water and Sanitation District. The DEIS doesn't disclose this information.

Page 3-234, Habitat – Meadow Creek: No mention is made of the reservoir upstream nor how the operation of the reservoir affects available fish habitat. The existing condition of fish habitat below the reservoir and below the diversion should be addressed.

Section 3.9.5.2, page 3-235, Williams Fork River: Known Lineage GB populations since 2007 are documented to be present in the Upper Williams Fork. This should be identified in the DEIS.

Page 3-236, Williams Fork Tributaries: "For invertebrates and habitat, potential effects would only occur downstream of the diversions and only the information for these sections of the Fraser River tributaries is described.: This is not accurate as the discussion of the tributaries includes upstream and downstream information.

Page 3-238, General Observations for Williams Fork River Tributaries: The DEIS should include updated records for genetics results in the Williams Fork.

There is no discussion of how DW operations have impacted Bobtail Creek downstream of the diversion. Figure 3-9.2 (p. 3-247) illustrates the habitat-flow relationships for brown trout, the dominant species in the North Fork. As flows exceed 200 cfs, habitat availability for all life stages declines. In a fishery that is self-sustaining and maintained largely by natural reproduction, loss of habitat for early life stages is particularly detrimental. We understand that mitigation has been proposed; however, based upon the data and modeling presented in the DEIS we believe that the effects of increased flows will be more than moderately detrimental to the trout fishery. Accordingly, we are concerned about the impacts to the "quality" of recreational fishing on National Forest System (NFS) land.

Section 3.13.5.6, North Fork South Platte River: The DEIS (p. 3-285) states that on the North Fork of the South Platte "The quality of fishing on segments open to the public is relatively poor and overall use is low." We would like to point out that recreational fishing is important on NFS land and that some areas experience relatively heavy recreational use by anglers (e.g., vicinity of AG Ranch). While the mainstem may have a higher "quality" fishery, the North Fork is also an important recreational fishery.

Chapter 4

General Comment: No analysis was found in this chapter for USFS Sensitive or rare/local concern plant species. Analysis of effects to these species should have been included under Section 4.5 Vegetation, Section 4.8 Special Status Species, or both. This is particularly important because populations of several USFS Sensitive and rare/local concern plants that were found during surveys for the 2001 FERC relicense will be inundated with proposed Gross Reservoir expansion, which is expected to compromise viability for several plant species. There

are no additional available reports or other documentation of analysis of effects to individual plant species other than federally listed plant species.

Section 4.0, Page *4-1,* Introduction, paragraph *2:* Limiting the environmental impact of the proposed Moffat Project to existing conditions is inadequate as it does not address how existing operations have affected stream channels. The impacts of existing operations on channels are needed to provide context to the possible impacts caused by the proposed action(s). The nature of channel adjustments to a given perturbation in a stream reach is contingent upon prior conditions such that similar changes in inputs can produce different channel adjustments in different reaches. Is this a baseline issue?

Page 4-6, item 1: The decrease in flows in the Fraser River and Williams Fork River basins in average and wet years needs to be specified and compared to existing operations and natural flow conditions.

Page 4-6, item 4: The text describes that discharges from the Moffat Tunnel are capped to limit the flow in South Boulder Creek to 1200 cfs. The capacity of the Moffat Tunnel should be described.
The increase in flows (and duration) in South Boulder Creek upstream of the reservoir in average and wet years needs to be specified and compared to existing operations and natural flow conditions.

Page 4-8, Water Quality Section, bullet two: The statement that stream temperature will only be increased in Ranch Creek is false and misleading as other sampling sites not studied may have elevated temperatures during average and wet years because of the reduction in flows from the proposed action(s).

Page 4-9, Floodplain Section, bullet two: The decrease in peak flows in the Fraser River and Williams Fork River basins in average and wet years needs to be specified and compared to existing operations and natural flow conditions.

Page 4-9, Stream Morphology and Sedimentation, bullet one:
C. Transport Capacity, Sediment Supply, and Effective Discharge: The relations between transport capacity and sediment supply are poorly described. The premise that the morphology of a channel will not change because transport capacity is considerably greater than sediment supply from the proposed flow changes is incorrect. Existing channel morphology reflects that it is in balance or in dynamic equilibrium with the current flow and sediment regime. Just because transport capacity remains greater than sediment supply when peak flows are reduced during average and wet years does not necessarily indicate morphological channel changes will be minimal to the proposed action. Reducing the frequency of effective discharge and annual transport capacity will eliminate or reduce Phase 2 sediment transport, which is critical for creating and maintaining channel form.

The elimination of frequent, moderate flood events in the proposed action, which are generally considered to determine channel dimensions and form, can cause pools to become shallower as they fill with sediment and channels to gradually narrow as riparian vegetation becomes established along the channel margins (which will be more apparent and likely in low gradient, unconfined channels). Infrequent, large floods during wet water years may be unable to remove the established vegetation. Frequent, moderate floods are necessary to prevent fine sediments from infilling pools and colonization of riparian vegetation along channel margins. At several of the sampling sites sand deposition was observed and considered an indicator of potential aggradation (see sampling site descriptions in section 3.1.6.1 and 3.1.6.2). The proposed reduction in peak flows during average and wet water years will exacerbate sand/fine gravel deposition and channel aggradation.

The study design to assess the impacts of changes in sediment transport capacity on channel morphology is not well described in the DEIS. Some of the concerns with the analyses and interpretations are:

1) Sediment supply estimates from the Two Forks EIS (Simons and Associates, 1986) are not justified. If the sediment supply equations from the Two Forks EIS are to be used in this DEIS, the relevant assumptions, channel geometry, sediment transport data, and results from that study should be provided in this DEIS. One cannot objectively evaluate how the sediment supply data and results from the Two Forks EIS apply to this study or if the sediment supply equations drawn from the Two Forks EIS were appropriately applied here.
2) What is important from a channel morphology perspective is how the mobilization of D50 and greater size particles are effected by flow alterations (Phase 2 sediment transport). Reducing the frequency of Phase 2 sediment transport could have an adverse effect on channel morphology.
3) Transport capacity needs to be assessed at discrete particle size intervals. No data were provided for the transport capacity of discrete particle size intervals at different flows (total load only presented).
4) The Meyer-Peter Müller equation is inappropriate for estimating bedload transport in steep, mountain channels composed of gravels, cobbles, and boulders. Channel beds are considerably coarser and steeper than the studies used to develop that equation. Other bedload transport equations that use field data to calibrate the bedload transport model to the site would be more appropriate.
5) Field data were not collected to "calibrate" the quantity and size of bedload being transported at different discharges.
6) Prediction of sediment mobility and transport volumes are notoriously difficult, and in most cases inaccuracies can be by orders of magnitude even when an appropriate bedload transport equation is used. As such, results from such studies should be used with caution when predicting potential channel responses.

D. Assumptions Used to Model Flow Hydraulics and Transport Capacity in HEC-RAS: The assumptions used to model flow hydraulics and transport capacity using HEC-RAS were not presented. The general limitations of HEC-RAS to model flows and transport capacity in steep,

forested, mountainous channels were not discussed. The limitations of using flow hydraulics and transport capacity output from HEC-RAS to assess channel impacts and responses to flow alteration were not discussed.

Prediction of sediment mobility and transport volumes are notoriously difficult, and in most cases inaccuracies can be by orders of magnitude even when an appropriate bedload transport equation is used (the Meyer-Peter Müller equation was not an appropriate choice).

Sediment sampling data should be used to calibrate sediment transport equations. Whenever possible, the use of measured sediment loads for testing and calibration of the equations is preferred. Additionally, because pebble counts tend to be biased towards larger particle sizes and underestimate the presence of smaller size fractions in the channel bed, not collecting subsurface data as was done in this study will further reduce the accuracy of sediment transport capacity estimates.

Need to illustrate the flow scenarios to the proposed action on cross sections to illustrate how water-surface elevations relate to existing morphological features. Water surface elevations of the natural flow regime and the existing flow regime should be illustrated on the cross sections as well so that the changes can be visually compared.
Page 4-9, Stream Morphology and Sedimentation, bullet two: "However, for the range of flows expected, sediment transport capacity exceeds available sediment supply and, for all but the smallest flows, sediment transport capacity is orders of magnitude greater than available sediment supply." This statement does not accurately reflect conditions on the ground. It would seem that if sediment transport capacity was orders of magnitude greater than sediment supply, streams should be actively incising. That is, streams should be seeking sediment to transport by eroding their beds and banks. However, on the ground inspection indicates that the only streams that are incising or have incised are those that have been subject to augmented flows, South Boulder Creek and sections of Vasquez Creek.

"All alternatives would result in changes in flow during average and wet conditions and then primarily during the wettest months of the year; therefore, reductions in sediment transport capacity resulting from the alternatives are expected to have negligible impacts on channel morphology." This assertion is counter-intuitive. Frequent high flows, with recurrence intervals of 2-10 years are the flows that transport the most sediment (e.g. effective discharge). These are the flows that occur during the runoff months, particularly on average or wet years. It would appear that reduction of these flows would have the greatest impact on morphology, not negligible impact as is stated in the document.

Page 4-9, Stream Morphology and Sedimentation, bullet three: "Locations along the Fraser River where traction sand currently increases the natural sediment supply are and would remain the most susceptible to local deposition. Any deposition that occurs should be limited in extent and magnitude and should pose only minor changes to channel morphology." Show how the conclusions of the stream morphology assessment were considered in the assessment of fish and aquatic life. Show how "local deposition" affects fish and aquatic habitat in these locations.

Page 4-9, Stream Morphology and Sedimentation, bullet four: This statement is incorrect. Flow would increase in Vasquez Creek downstream of the Gumlick Tunnel outflow. There is no discussion of the potential impacts of increased flow on channel morphology along Vasquez Creek between the Gumlick Tunnel outflow and DW Board diversion on Vasquez Creek.

Page 4-10, Description of the Model: We are not familiar with the DW's Platte and Colorado Simulation Model (PACSM). The assumptions and limitations of the model should be reviewed and evaluated to its application to the proposed project.

Page 4-15, Sampling Sites: The process used to select sampling sites is not explained (See comment A). Because more sensitive reaches (pool-riffle channels or Rosgen C type channels) and steep tributary reaches are underrepresented in the list of sampling sites, the analysis and conclusions drawn are incomplete. Since more sensitive reaches are underrepresented and more likely to undergo morphological change to the proposed flow changes, the selection of sampling sites (pool-riffle channels or Rosgen C type channel) appears to be biased.

If the Two Forks EIS is used to draw conclusions for this project, the relevant assumptions, data, and results used in that study should be provided in this EIS. One cannot objectively evaluate how the data and results from the Two Forks EIS apply to this study or if the conclusions from the Two Forks EIS were appropriately applied here. In other words, the extrapolation and use of the conclusions from the Two Forks EIS to this study is not reasonable based on the information provided.

Page 4-16, Hydraulic Modeling and Sediment Transport Capacity: Relevant hydraulic modeling and sediment transport capacity results from the HEC-RAS modeling performed by ERC (2006) should be included in the EIS so that those data can be evaluated independently. Moreover, the relevant assumptions and input data used for modeling flow hydraulics and transport capacity should be provided so that the use of the model can be objectively evaluated.

The Meyer-Peter Müller equation is inappropriate for estimating bedload transport in steep, forested, mountain channels. Channel beds in the project area are considerably coarser than the particle size limits used to develop the equation. Other bedload transport equations that use field data to calibrate the bedload transport model to the site would be more appropriate.

Page 4-17, Hydraulic Modeling and Sediment Transport Capacity: Fractional transport capacities for all grain sizes should be presented so that the mobilization of coarser particles (those greater than the D50 percentile particle size) can be evaluated for different discharges and flow alteration scenarios. By only reporting the total bedload transport capacity, the movement of the coarser particles, which is important for controlling channel form and processes in steep, coarse-bed channels, cannot be evaluated to assess how its mobilization will be impacted.

The particle size break between phase 1 and phase 2 transport is not necessarily 4 mm. The basis for choosing the 4 mm particle size break needs to be explained and supported based on field data.

The relevance of of using the 4 mm (fine gravel) particle to determine a threshold discharge is unclear. Flow alterations that reduce flow will change flow patterns associated with the complex bed topography in steep mountainous channels, change fine gravel and sand deposition patterns, and cause deposition in pools.

Page 4-18, Sediment Supply: What is the standard error associated with the sediment supply equations listed in Table 4.1-1.

Page 4-19, Effective Discharge: Provide references to studies that support the statement *"However, particularly in sediment-limited systems, changes to effective discharge do not necessarily correspond to changes in channel morphology."*

Page 4-20, Effective Discharge: Because the Meyer-Peter Müller equation was used to calculate bedload transport capacity and its limitations in steep gravel-, cobble-, and boulder- bed channels, effective discharge results and conclusions with regard to channel impacts are of questionable validity.

Page 4-20, Impacts Analysis: The statement, *"In mountain streams, sediment transport capacity typically greatly exceeds sediment supply and as a result sediment entering the system is transported out of the system; deposition does not occur.",* is incorrect. Deposition does occur. Reach descriptions for the Fraser River and Williams Fork River sampling sites discuss sand and fine gravel deposition and it being a potential indicator of aggradation. It is likely that sand and fine gravel deposition will be exacerbated under the proposed action as increased diversions in average and wet water years will further reduce peak flows that are already limited by existing operations.

Page 4-21, Impacts Analysis: The third bullet (increase in transport capacity when transport capacity exceeds sediment supply) applies to Vasquez Creek between the Gumlick Tunnel outflow and DW Board diversion on Vasquez Creek. This impact needs to be assessed.

Section 4.1, Surface Water: *General Comments:* Section 4.1 and 4.13 - There is no disclosure of the impacts to water levels during peak diversion season (summer months) in Dillon and Green Mountain Reservoirs. The White River National Forest has significant investments in recreation facilities and associated infrastructure at these reservoirs. Additionally, planning is underway to construct a boat ramp on Green Mountain Reservoir and there is concern that any design of the boat ramp factor in the direct, indirect, and cumulative effects of the Project. A 45-year average makes it difficult to comment on potential impacts to recreational opportunities and facilities and Dillon and Green Mountain Reservoirs.

The White River National Forest and the Bureau of Land Management are preparing a Wild and Scenic River (WSR) eligibility analysis of segments of the Colorado River. As part of this effort, a stakeholders group has been formed to offer an alternative to the Wild and Scenic designation whereby streamflow rates associated with ORVs are maintained along with current and future consumptive uses of the Colorado River. DW is an active participant in this stakeholder's process.

The Moffat Project DEIS does not disclose clearly how this project would affect historic (i.e. past), current and future flows in the Colorado River. It also does not clearly disclose direct, indirect and cumulative impacts to the ORVs identified along the Colorado River. This DEIS should clearly disclose daily flow impacts under each of the impact-related time frame definitions used in the DEIS (see page 4-1, first three bullet statements). These impacts must be disclosed for each WSR segment on the Colorado River currently under analysis.

Section 4.1 - The DEIS includes a discussion regarding flow impacts in terms of average annual flows and monthly average flows. It also needs to include impacts to daily flow rates (wet, average and dry years) critical to natural and recreational resources. The flow rate graphs in Appendix H are helpful but average daily flow rates must be clearly disclosed in a table and explained in text of the DEIS.

Section 4.1: "North Fork South Platte River Stream Flow – Changes in North Fork South Platte River flows under Full Use Existing System would be due to DW's additional transbasin diversions through Roberts Tunnel. As shown in Tables H-1.1, H-1.2, and H-1.3, average, dry, and wet year average annual flows in the North Fork South Platte River below Geneva Creek gage would increase by 26,300 AF or 22%, 33,200 AF or 22%, and 19,500 AF or 20%, respectively. Flow increases are commensurate with increases in Roberts Tunnel diversions and would occur year-round but would be greatest from June through October. Table H-1.44 summarizes average monthly flows in the North Fork South Platte River below Geneva Creek gage for average, dry, and wet conditions."

Flow modeling was used to compare the 2006 conditions with the Full Use Existing but no flows or effects on geomorphology were used to describe the 2030 Full Use Proposed flows. PACSM was utilized to evaluate the proposed actions, but it is necessary to characterize the existing conditions as well.

The DEIS needs to account for downstream user diversions, especially in months and streams where flows are going to be reduced. The increased flows described above are for annual flows, not monthly flows. This is misleading and there will be periods of decreased flows. The USGS gages used for comparison are above some of the downstream users and at very limited locations along the system. How will instream flows vary downstream from the gage? For example, how will flows be affected by downstream diversions depending on different priority schemes and how will these variations affect habitat and fish? The analysis needs to characterize effects to these tributaries.

In chapter 4 and Appendix H the following is presented in the DEIS:

> "Three different impact assessment comparisons are made in the EIS:
> • Impacts to water-based resources resulting from anticipated hydrologic changes between
> Current Conditions (2006) and Full Use of the Existing System (2016), with no Moffat System Project, are disclosed.
> • Then, water-based resource impacts are compared between conditions at the time of Full Use of the Existing System (2016) and those at the time of Full Use with Project (2030)."

The FS is interested in impacts to water-based resources and water-based resource impacts for all scenarios. The impacts to water-based resources are not described for the Full Use with project. Also, the water-based resource impacts are not fully identified for the existing conditions, 2006.

Other water users in the system will influence cumulative effects. Need to describe effects on aquatic habitat, organisms and morphology based upon scenarios where other users in the system are in or out of priority for their water rights.

"Flows in the North Fork South Platte River would decrease on average during winter months and increase during summer months. While flows would increase on average during summer months, there would be no change in the maximum flows experienced because DW operates their system in a manner to keep the average daily flow in the North Fork South Platte River below 680 cfs at Grant and below 980 cfs above the confluence with the mainstem (Yevdjerick and Simons 1966 and 1967)."

The FS is concerned about the timing and quantities of water being proposed for conveyance through the North Fork of the South Platte River and the South Platte River. This conveyance can affect the dimension, pattern, profile of the streams and impact aquatic and riparian habitat. Can water be moved to mimic periodic natural peak flows? A hydrograph that mimics spring floods during the wettest months of the year would help maintain channel morphology.

Is degradation to channel morphology currently occurring at the flows described above? The FS would like to see bank erosion measurements and summaries of the existing aquatic habitat for all affected stream reaches on the Forests.

"Floodplains in North Fork South Platte River and South Boulder Creek above Gross Reservoir are unchanged by alternatives because imports through Roberts Tunnel and Moffat Tunnel are managed to stay within the channel. Floods can occur in these basins due to local snowmelt or precipitation, but not due to the changes in the Moffat Collection System."Show at what frequency bankfull flows are released through the system in order to maintain stream channel dimensions and habitat.

"Antero Reservoir to Cheesman Reservoir: In the upper South Platte River, changes in flows under Full Use Existing System would be due to DW's increased demand and changes in the timing of any amount of reservoir releases. Changes in reservoir releases under Full Use Existing Conditions would differ depending on storage conditions in DW's north and south systems and hydrologic conditions."

"Although DW has the ability to reduce bypass flows below Eleven Mile Canyon Reservoir they have not exercised that right to date. Reductions in bypass flows below Eleven Mile Canyon Reservoir were not included in PACSM."

This stretch of the South Platte River was 303(d) listed sediment and temperature. Instream restoration has been completed to work towards the TMDL compliance. Show how the

reduction in bypass flows or the other proposed flow regimes would affect the sediment standards and other water quality standards that the CDPHE enforces.

"To assess the impacts of changes in sediment transport capacity on channel morphology, calculated bedload capacity was compared to anticipate sediment supply at representative sampling sites along the Fraser River, St. Louis Creek, Ranch Creek, Williams Fork River, Colorado River, South Boulder Creek, and North Fork South Platte River. Given the minor flow changes predicted in the Blue River and South Platte River, impacts to channel morphology under the alternatives along these rivers are predicted to be negligible."

There needs to be a summary of existing sediment yield and sediment supply and comparison with Full Use Existing and Full Use Proposed sediment modeling. Show the effects of increased shear stress on lateral migration or bedload transport.

The South Platte between Elevenmile Reservoir and Strontia Springs Reservoir has been impacted by increased sediment from several large wildfires. Display how increased sedimentation has been quantified and modeled under the various flow regimes.

"Under all alternatives, increases in flow would result in an increase in sediment transport capacity along South Boulder Creek and the North Fork South Platte River. It is possible that the increase in sediment transport capacity in these basins could lead to minor localized bed and bank erosion." Without a clear analysis of the existing bed and bank erosion, this is simply a narrative statement not supported by modeling.

Section 4.1, page 4-9: Summary of major conclusion- stream morphology and sedimentation

The statement "All alternatives would result in changes in flow during average and wet conditions and then primarily during the wettest months of the year; therefore, reductions in sediment transport capacity resulting from the alternatives are expected to have negligible impacts on channel morphology." is incorrect. Based on results from Ryan 1997 (cited in the DEIS), it is the continued provision of the infrequent high flows (5-10 year RI) and sustaining the prediversion frequency of > or = bankfull flows over the long-term that maintains channel morphology. The conclusion that diversion had limited impact on channel morphology was derived under the observation that the high flows had continued to bypass diversion structures with sufficient frequency to maintain the channel configuration in most of the settings evaluated. High flows not only maintain coarse bedload transport through the channel, but also prevent riparian vegetation from invading the channel edges and bars. Without these flows, channels begin to aggrade, insets form, and mobile surfaces become stabilized by vegetation. Under current conditions, DWD has only a limited ability to affect flows with a >10 year RI (See figure 5, Ryan 1997). DW proposes to divert high flows from the wettest months of the wettest years and reduce the frequency of bankfull flows to less than 0.5% of current frequency (from 15 days per year to once every 13 years on the mainstem Fraser for effective discharge) but claims this will have a negligible impact on channel morphology. Even under current conditions where infrequent high flows are provided due to a lack of diversion capacity and the frequency of bankfull flows over the long-term is similar to prediversion conditions, Ryan 1997 noted

substantial reductions in channel width (35-50%) on St. Louis Creek in channel units that were unconfined (free to adjust).

Methodology used in sediment capacity evaluation must be explained more clearly, we are uncertain if sediment transport analysis is for phase I transport only for particles < or = 4 mm. Figures from appendices need to be included in text for ease of location.

The analysis should include disclosure of how flow regime changes affects the dissolved (solution) load in affected streams.

Section 4.1, page 4-16: The geomorphic literature is very clear in stating that bedload transport is typically energy-limited. The suspended load transport is supply limited. The best example of supply-limit occurs in heavily developed areas with large areas of impervious surfaces, which is not comparable to a forest setting. If bedload capacity far exceeds sediment supply (by orders of magnitude) at all stream locations studied, then why don't the existing conditions of studied stream channels show extreme channel degradation? Contrary to what the DEIS states, research is finding that the channel width and cross-sectional area are reduced and the channel aggrades following flow diversion. The discussion on Page 4-21 regarding a "sediment balance" concept conspicuously fails to mention that when capacity greatly exceeds supply, degradation is the expected outcome.

In our experience the Meyer Peter-Muller (MPM) equation does not provide an appropriate estimate of sediment transport in coarse bed channels, but performs better in sand and gravel bed streams. In applying the MPM to the streams covered in the DEIS several of the parameter ranges for the study streams are outside of the MPM function range (particle diameter and maximum channel width), which will lead to questionable results.

Recent research has improved our understanding of bedload transport since the 1950's and other more recent bedload transport capacity functions such as the 1990 Parker function must be used to cross-check the MPM for accuracy. For example, the Grand County Stream management plan used the Parker bedload function. The USFS also has a publically available, detailed bedload data record from actual measurements on St. Louis Creek that should be used to validate the MPM sediment bedload equations. While we noticed that the sediment equation results were compared to some published data from St. Louis Creek, we are unsure if the larger data set which includes sediment larger than 4 mm was used or not. This data can be found at the following link:

http://www.fs.fed.us/rm/data_archive/dataaccess/FEF_bedload_transport.shtml

Section 4.1, page 4-18: The DEIS makes questionable assumptions of sediment supply: under undisturbed subalpine forest conditions, erosion generated by overland flow is rare. However, most of the basins in question are disturbed via development, timber harvest, mining, heavy recreation use, water diversions et cetera. Thus, many of the watersheds are supplying sediment at an accelerated rate so that sediment-rating curves from representative sites in the upper Williams Fork are not appropriate for the more heavily disturbed basins. The sediment "supply" equation used is more representative of wilderness basins with streams transporting mostly suspended and bedload derived from channel margins and bed. The result is that for developed

basins, the supply equation under predicts watershed derived loads. Moreover, the supply equations presented are actually sediment discharge equations since they are related to stream discharge. Are the equations based on the assumption that the amount of bedload transported is equal to the sediment load supplied by the watershed? It is uncertain how these equations reflect the supply of sediment to the stream system. For upland sediment supply, try using actual upland erosion models like the USLE or WEPP, data on traction sand application (in the case of the upper Fraser) and sediment delivery ratios for sediment supply estimates instead. In addition, how does DW account for the periodic flushing of accumulated sediment from behind their diversion structures in the sediment analysis?

Flow modeling is based on departure from conditions occurring over past 45 years. However, flows have been largely diverted during this time. Additional diversion amounts appear to be small because they are compared against flows that are already depleted. Suggest analysis address the full amount of flow that would be diverted from these systems.

Section 4.1.1.1, page 4-30: It appears as if the average annual net evaporative losses predicted from an enlarged Gross are underestimated (~ 33%) as compared to evaporative losses at other reservoirs (DW omitted a digit in their evaporation loss reporting for Gross). If one looks at table H-8.1 and normalizes evaporation losses by surface area, the depth of evaporative losses at Gross, although lower in elevation, are only about 66% of that from higher elevation reservoirs such as Dillon, Wolford and the Williams Fork per unit area per year. Typically in Colorado, evaporation values are inversely related to elevation so that the evaporation at Gross should exceed that of the other reservoirs in the following table. The net evaporation at Gross should be closer to 1400 AF/year which is approaching 10% of the predicted annual shortfall of supply in 2030. Table 3 (below) illustrates the error.

Table 3. Reservoir evapotranspiration.

Reservoir and elevation at full pool (ft asl)	Surface area full (acre)	Avg annual net evaporation from DEIS (AF)	Avg annual Net evap per surface acre (AF)	Avg annual Net evap per surface acre (inches)
Dillon 9017	3233	5847	1.81	~22
Wolford 7489	1550	2701	1.74	~21
Will. Fork 7814	1860	3227	1.73	~21
Gross enlarged 7400	818	991	1.21	~14.5

The error is significant in how it affects the water budget for this Project. In other words, the storage Project becomes a less attractive, less efficient use of water as the ratio of water diverted to water available for use increases. Higher than reported evaporation losses will increase this ratio. The error needs to be corrected and the Project reassessed based on new information.

Section 4.1.1.1, Water Quality for Gross Reservoir, page 4-31: "This could change the overall water quality within the reservoir because stream water quality can be significantly different in dry, average, and wet years." The DEIS should show how water quality would be expected to change for each of the scenarios for either better or worse.

Section 4.1.1.2, page 4-35: Prioritizing and sequencing diversion from the major source rivers might help to mitigate project effects. Taking water first from less developed and impacted systems might help maintain habitats and avoid resource conflicts. The DEIS does not contain enough information to determine if this alternative was evaluated.

Page 4-35, Fraser River Stream Flow: The rationale to combine several of the smaller tributaries to model flow is questionable. Small tributaries are underrepresented in the analysis and whether the proposed action impacts or does not impact those channels has not been demonstrated.

Section 4.1.1.2, page 4-36: DW asserts that "the (bypass flow) agreements do not define set amounts for the bypass flow reductions" but the Clinton agreement only waived stipulations for 3 out of 4 streams with required bypass flows (Ranch Creek bypass flow stipulations were not waived). It appears that section 3.(e)2 of the 1970 amendatory decision is still in effect for Ranch Creek; therefore, there is a formula for reducing the bypass flow at Ranch Creek. The stated formula is "if at any time Gross reservoir storage falls below 25,000 AF, the Ranch Creek bypass flow may be reduced by 6% per each 1000 AF of storage water below 25,000 AF in Gross". According to this formula for the Ranch Creek bypass reduction, the PACSM modeling for bypass flow reductions on Ranch Creek is in error as the model assumption of <65% reservoir storage results in approximately 27,000 AF (existing size) or 74,000 AF (enlarged) stored in Gross; Ranch Creek bypass flow would not be allowed to be reduced under these circumstances.

Page 4-36, 1st paragraph. Tables H-7.1 through H-7.3: Average annual Moffat Tunnel diversions would increase by 10,300 AF or 15% and 11,800 AF or 19% in average and wet years, respectively." The average value of 10,300 AF does not agree with the value shown for increased flows in South Boulder Creek [from Moffat tunnel diversions] of 10,400 AF that is found on page ES-18 of the executive summary.

Section 4.1.1.2, page 4-37: Although it is counterintuitive, many west slope streams such as St. Louis Creek do not "grow" in volume in a downstream direction except for certain times of the year. For example, following runoff in the irrigation season, downstream diversions and use result in decreased downstream discharges in St. Louis Creek, further magnifying reductions in flow in these downstream areas, rather than diluting them as suggested in the text.

Starting on page 4-37, the text becomes extremely difficult to read as it includes information that should be represented in tabular format. In the aquatic resources section, creeks were broken up separately. Consider this same format for Fraser River tributary discussions.

The results of an increase in water diversions from the Gumlick Tunnel to the Vasquez Tunnel and how that might affect Vasquez Creek should be addressed in the document. As described previously in these comments, Vasquez Creek below the tunnel (without accounting for Vasquez Tunnel imported flows) is eroding large piles of material left by DW from the boring of the tunnel in the 1960's. This large spoils pile sits immediately adjacent to the creek, and the creek has begun to erode that material, which is subsequently ending up in the creek. DW, according to their permit, should have removed these spoils after tunnel construction.

Below is a brief discussion of DW's stipulations associated with their operation and construction of Vasquez Tunnel. DW has not adhered to these stipulations under current operations; any increases in water diversions from the Gumlick Tunnel to the Vasquez Tunnel raises additional concerns regarding the proposed Project. Stipulations included by the FWS in the federal right of way for the Vasquez Tunnel include the following (from Bureau Sport Fisheries and Wildlife Memo dated November 21, 1969):

a. Control the releases of water into Vasquez Tunnel to avoid unreasonable or unnecessary erosion of the natural channel of Vasquez Creek below the tunnel outlet
b. Protect the stream channel and stream banks through such measures as are necessary and approved by the USFS to avoid unreasonable or unnecessary damage from the increased flow of water incident to diversion of water through the tunnel

Other stipulations included in DW's right of way regarding Vasquez Tunnel:

a. To abide by the follow provisions as to material excavated from the tunnel:
    1. All encroachment on streams will be avoided, and no waste materials will be deposited in, or be permitted to obstruct natural stream channels
    2. The surface of the spoil bank shall be graded off to an even grade and where practicable, top soil placed on top, and seeded to grass or planted to other vegetation
b. To abide by the following provisions as to areas on which the ground cover is destroyed in the course of construction:
    1. To install suitable devices and drainage structures sufficient in number to prevent the accumulation of excessive heads of water and the erosion of the land surface
    2. Top soil shall be stripped from the permitted area and be deposited in storage piles apart from other excavated material. After the desired amount of material has been removed and the excavation trimmed and smoothed, the stored topsoil shall be evenly spread over subsoil exposed, and shall be seeded to grass or planted with other suitable vegetation.

There are also stipulations from the Bureau of Land Management as part of their right-of-way that include weed control on Federal Lands. Spoil piles that were not reseeded or re-vegetated after the boring of Vasquez Tunnel have infestations of oxeye daisy that need to be addressed.

Page 4-37, Fraser River Stream Flow, paragraph 4: There is no mention how flows will be changed along Vasquez Creek between the Gumlick Tunnel outflow and DW Board diversion on Vasquez Creek. Any flow changes need to be quantified.

Section 4.1.1.2, page 4-39: See 2010 CDPHE 303(d) list for possible correction to statement that no sections of the Fraser are listed.

Page 4-40, Fraser River Stream Flow, paragraph 2: Refer to comments made on Section 3.1.6 of the DEIS.

Section 4.1.1.2, page 4-53: Show how the completion of the Fraser River sediment pond would improve channel conditions and partially mitigate effects from the Moffat firming Project. Given that there is an "orders of magnitude" more capacity than sediment supply, Explain how traction sand is even an issue. The document should discuss the current status of the pond project and the road blocks to completion. The DEIS should disclose the other partners (besides CDOT) that have worked on this pond project.

Page 4-53, 2nd and 3rd paragraph.. "These results indicate that the system is sediment-limited and the morphology of the channel is not expected to be impacted by flow reductions." On-the-ground experience indicates that this stream reach is not sediment limited. The substrate is heavily infilled with sand. The source of this sand is likely traction sand from Highway 40. This sand is evident in many locations along the Fraser River, and is particularly evident directly below DW's Fraser diversion.

"Model results suggest that this localized deposition is likely to continue at times of lower flow and the material should be remobilized during higher flow events." The persistence of this sand infill would indicate that sediment transport capacity is not "orders of magnitude" greater than sediment supply, or is not effective in transporting the sand.

We were unable to find particle size distribution for this site if in the voluminous appendix material.

Section 4.1.1.2, page 4-62: Show how DW's water diverted from the Upper Williams Fork is used strictly as drinking water. Once combined with native Vasquez Creek flows, South Boulder Creek water. Unless it can be proven, this statement should be stricken from the EIS.

Page 4-62, Evaluation of Williams Fork River Water Quality: "Table 4.1-12, one parameter, dissolved oxygen, does not meet stream standards downstream of the confluence of the aforementioned four tributaries. The reason for depressed dissolved oxygen is unknown." Show whether this could be attributed to existing streamflow reductions, and resulting higher temperatures.

Page 4-96, South Boulder Creek Stream Morphology and Sedimentation, 1st and 2nd paragraph: "…capacity is orders of magnitude greater than supply." "It is possible that the increase in transport capacity could lead to localized bed and bank erosion." "…the Proposed Action is expected to have only negligible impacts on channel morphology…" There needs to be more explanation to support the conclusion that there would be "negligible impacts" to South Boulder Creek. If capacity is orders of magnitude greater than supply, why would you not expect the stream to be seeking sediment, and why would you expect only localized bed and bank erosion. There are numerous examples of augmented stream channels in Colorado, including South Boulder Creek, where the impacts have not been negligible and localized, but rather significant and extensive.

Section 4.2, page 4-202: The description of "diversions of water from the west slope" is not clear. The document states flow does not return to all tributaries diverted. Please explain the statement "there were minimum bypass flows at 11 of the 29 diversions structures in July 2006". Verify if these are administratively required minimum bypass flows or "spilling". This statement

implies that the remaining 18 diversions removed all the water, rather than "nearly all the streamflow" that is stated in the DEIS. Please verify. There are no data to show that seepage occurs from diversions structures "at all times when there is water in those structures". It could be possible that the stream is gaining at the diversion point. In fact, in the absence of surface water inputs from tributaries, flow recovery below the diversion would indicate that the reach was gaining and not losing water to seepage. Later, the DEIS states there is flow recovery downstream of diversions, and that diversion impoundment seepage provides for the recovery flows. If the impoundments are seeping and contribute to flow recovery, explain why nine streams are showing completely dry beds below diversions for the remainder of their channel length.

Section 4.2, page 4-203: DW's diversions cause **all** (rather than **some** as stated in the DEIS) diverted streams to have decreased flow, except for two streams that are augmented by diverting other streams. Some of the diverted streams do not go dry at "locations", rather they are dry for their entire length (entire reaches, not points) below the diversion until reaching a confluence. The document should display the current condition of the streams.

Please define the term "small declines" in stream levels. Display the stage decline as a percentage relative to bankfull discharge. Most of these diverted streams are only several feet deep at bankfull. Show the effects of diversion of water on river stage under the existing condition (up to 65% native streamflow) and for the Project, with comparisons to native flows. Display the diversions by times of the year, as opposed to percentage of mean annual flow to show true effects at any point in time.

The conclusion that there is no effect on groundwater levels outside of the limits of the diverted streams is not supported by any data. In fact, changing the hydraulic gradient (steepening it towards the diverted streams) could very easily depress the water table elevation in adjacent uplands. Using a budget approach, it is easy to see that if inputs are static or reduced, and outputs increase, the change in storage is negative. Because DW's diversion system rings the upper Fraser valley, the effects to groundwater are widespread rather than localized as suggested in the DEIS. Alternately, Darcy's Law for groundwater discharge shows that discharge increases as slope increases.

Section 4.2, page 4-204: 1st sentence under Moffat Project Effects: the timing of additional diversions actually maximizes, rather than minimizes the effects to groundwater recharge. In dry years, there is little groundwater recharge because a higher proportion of the available water is used by evapotranspiration relative to wet years. There is less streamflow and overbank flooding, reducing floodplain groundwater recharge. It is in the wet years where substantial diversions are proposed, that most of the groundwater recharge occurs. Therefore, the timing of proposed diversions actually would significantly reduce groundwater recharge.

The DEIS describes groundwater recharge and discharge as "relatively minor components of the (hydrologic) systems" but the hydrologic budget for the Fraser basin shows otherwise. For example, the DEIS Fraser basin water budget claims that groundwater discharge amounts to approx 42,000 AF per year compared to 64,500 AF of surface flow out of the watershed annually. Thus, groundwater discharge is greater than 10% of the total water budget and about

two-thirds of the total surface flow out of the basin. Groundwater discharge alone is more than double the amount of water DW hopes to firm up thru this Project.

It is mentioned that the amount of groundwater recharge through streambeds is controlled by the infiltration properties of the streambed. Regardless of the permeability rate of mineral soils, water must be present in the channel for groundwater recharge to occur. DW proposes to increase the diversion duration, thereby extending both the length of time streambeds are completely dry as well as the physical length. The physical characteristics and therefore the amount of groundwater recharge contributed by streambed percolation would change because reduced high flows will allow vegetation encroachment on the channel bed. The analysis needs to provide data that support the statement that direct groundwater impacts would only occur in local areas around the existing diversions that take up to 85% of the native flow for most of the affected stream miles in the basin. Impacts to groundwater may occur anywhere streamflows are reduced at any time, all the way down to the Colorado River. Recharge of groundwater from unlined portions of the canals will only occur as long as the conveyance system is not encapsulated in pipes. Share what plans DW may have to convert the existing open canals to enclosed pipeline, resulting in elimination of seepage and groundwater recharge. Increasing the collection system efficiency could result in both beneficial effects, by reducing diversion of west-slope surface flows, and adverse effects, by reducing groundwater recharge. The analysis needs to depict these effects clearly.

Page 4-205, conclusion on groundwater effects: This conclusion is incorrect; although the Project may not be affecting upland recharge rates, the Project does accelerate groundwater discharge to gaining streams by increasing the hydraulic gradient from uplands to the riparian by lowering stream stages.

Section 4.2.7, page 4-213 and 214: If DW can mitigate west-slope groundwater impacts by "effectively evaluating the system components", we encourage them to do so then present the results in the FEIS. The impacts to groundwater are long-term permanent, rather than short-term because water is diverted completely out of the basin. The actual groundwater impacts amount to an irretrievable loss of groundwater recharge that ecosystems, and publics rely on. Show what mitigation would be considered for the west-slope water and sanitation departments reliant on groundwater that will experience future supply shortages and impacts to effluent discharge permits (disclosed in this DEIS). Groundwater is not understood as well as surface water; monitoring is needed in subsequent analysis as data presented in the DEIS are inadequate to characterize existing conditions or support the conclusions.

Section 4.5, Vegetation: The third issue bullet lists "Impact of reservoir inundation on rare plants or communities." This section discusses plant communities, but, as mentioned above, there is no discussion of effects to individual plant species in this section or in Section 4.8: Special Status Species and no reference to such an analysis. It appears that no analysis of effects for any individual plant species was done in this section. There are no additional available reports that might contain analysis for USFS Sensitive or rare/local concern plant species. See also General Comment at beginning of Chapter 4 comments, and Section 3.8.1.1 Gross Reservoir: Special Status Species above.

Section 4.5: *Plant species analysis:* Except for federally listed plants potentially affected by water depletions, there is no environmental baseline or analysis for any plant species. The sections on vegetation discuss rare plant communities, but do not mention any individual plant species, although "Impact of reservoir inundation on rare plants or communities" is listed as a primary issue under the vegetation section in Chapter 4.

Section 4.5.1.1, pages 4-230 to 4-232, Gross Reservoir:

Third paragraph on page 4-231: The following statement is made: "The quarry site would not be revegetated because of exposed rock and lack of suitable soil for restoration efforts." The analysis needs to provide further discussion regarding whether this statement is intended to apply to alternative quarry sites that may be considered during the design phase (see Section 2.3.2.1 Gross Reservoir: Borrow/Embankment Materials p. 2-32). The analysis needs to disclose the information considered in arriving at this conclusion, and whether all available options for site rehabilitation were considered before dismissing revegetation. Measures to consider include: saving and storing topsoil and/or vegetation removed from the quarry or other affected areas; importing materials to use for site rehabilitation, with provisions for noxious weed prevention; or using a smaller portion of the proposed quarry area combined with alternative sites, perhaps changing the site rehabilitation potential.

Fourth paragraph on page 4-231: Water is a known dispersal mechanism for weed seeds. Discussion of noxious weed impacts needs to include increased potential for introduction and spread of weed species into newly disturbed areas around Gross Reservoir from DW's Moffat Collection system, including spread from known weed infestations in Grand County associated with the system. See also comments under Section 3.5.0.

Last paragraph on page 4-231: This paragraph discusses impacts on two PCA's; see note above under Section 3.7.1.1; these is now one PCA.

Section 4.5.2.1, Gross Reservoir: Additional analysis is needed for plant communities potentially affected by project activities. Refer to Table 5: Plant Communities of Local Concern for the ARP in Appendix G comments for additional plant communities that need surveys and analysis.

Section 4.5.7, page 4-240 and 4-241, Mitigation and Monitoring:

First bullet re: revegetation plan – A USFS botanist should be consulted to recommend and/or review seed mixes to be used on National Forest lands. Revegetation shall be in compliance with the Arapaho-Roosevelt National Forests revegetation policy for lands administered by the USFS.

Second bullet re: temporary impact areas – Erosion matting, straw, soil amendment, or other measures may be needed to maximize revegetation success, especially in highly disturbed sites exposed to wind. If matting is used, use a product made of biodegradable material – not plastic - and a single layer, to avoid entrapping wildlife – such as coconut-straw erosion blankets described in Section 4.8.7 under Common Garter Snake on p. 4-305. Consult with a USFS botanist prior to using any soil amendments such as fertilizer, which can be favorable to noxious weeds. Also consult with a hydrologist and/or fish biologist if fertilizer use is considered, to

ensure that any concerns regarding runoff of fertilizer into riparian areas or water bodies would be addressed.

Fifth bullet re: weed management plan – coordination should include the USFS.

Sixth bullet re: weed-free equipment – add that all forage products used on National Forest lands will comply with USFS Rocky Mountain Region Order No. 02-2005-01 requiring use of certified weed-free hay, straw, or mulch in all activities on National Forest lands."

Add the following as mitigation: Consult with a USFS botanist regarding seed testing if revegetation will occur. Any seed used on NFS land on the project will be required to be tested for smooth brome, and "all states noxious weed seed exam" according to Association of Official Seed Analysts standards and will be certified by a Registered Seed Technologist or Seed Analyst as meeting the requirements of the Federal Seed Act (7 U.S.C. Chapter 37: Sections 1551-1611) and the Rules and Regulations of the Colorado Seed Act pursuant to 35-27-101 through 125, C.R.S. (1993 Supp. as amended by Senate Bill 93-17). Seed used shall be noxious weed seed free.

Add the following as mitigation: Include the following, or equivalent language as agreed to by the USFS, in contract specifications for revegetation:

Seed mixes will be approved by FERC and USFS. If a species in the seed mix is not available, the Contractor shall provide written evidence from three seed vendors that the species is not available. With written approval, the mix by be adjusted and a new species may be substituted after consultation with FERC and the USFS.

Seed lot tags and seed shall be available to FERC and USFS at least one month prior to seeding, for testing that may be performed by USFS. If noxious weed seeds or smooth brome seeds are found, seed may be rejected and the Contractor shall be responsible for replacement cost of seed.

Add a mitigation to address transport of weeds from DW's collection system components in Grand County to Gross Reservoir. Treatment of weeds should be included with other measures as appropriate.

<u>Section 4.6, Riparian and Wetland Areas:</u>

Fens: There is neither discussion of surveys to determine presence or absence of fens, nor evidence of communication with any experts who might provide further information on fens in the Project area. Furthermore, there is no analysis of impacts to fens, which are a conservation priority for the USFS and for the FWS Mountain-Prairie Region, and are considered a Category 1 wetland by the FWS. This is particularly important in the Williams Fork area, where fens are present (documented in the DEIS Chapter 3) at both river segment sample sites selected by the ACOE to represent effects to other project river segments. Fens are a unique, irreplaceable resource and are sensitive to changes in hydrology.

Page 4-245, Stream Flow Changes, 2nd and 3rd para.: "Although major impacts to riparian systems in the West have been documented as a result of stream flow modifications (Stine et al. 1983), these are usually in situations where diversions resulted in complete dewatering of the

stream, profound changes in flows, or major modifications to stream hydrology resulting from gravel mining or other types of disturbance. This level of flow change or modifications to stream channels is not predicted to result from the Moffat Project. This conclusion is further supported by the fact that the Project would have little or no impact on low flows, which are typically important for maintaining the relatively high water availability on which riparian plants depend for growth and survival (Shafroth and Beauchamp 2006)."

Although the proposed project may not result in complete dewatering of stream channels, it is only because the existing diversion system already completely dewaters, for extensive periods, those streams (all but 10) that are not protected with bypass flow agreements.

First sentence under Table 4.6-3, page 4-251: "Given the conclusion that the Project would have little or no impact on groundwater levels, it can also be concluded that the Project would have little or no impact on riparian vegetation dependent upon groundwater. " This conclusion does not appear to be supported by the analysis provided. Refer to comments under Section 4.2 p. 4-203 through 4-205 for further details**.**

Section 4.6.1.2, River Segments:

Lower Fraser River, pages 4-256 and 4-257: Refer to comment under Section 3.6.5.1: Upper Fraser River: Fraser Canyon Reach: FR2 – Fraser River Below Tabernash regarding habitat actually occupied by the shrubby cinquefoil/tufted hairgrass plant association, and whether a fen is present at sample site FR2. The first paragraph on p. 4-257 mentions the shrubby cinquefoil and that it may expand into sites previously occupied by Geyer's willow, but does not discuss impacts to the shrubby cinquefoil as it currently occurs. Subsequent analysis needs to discuss this impact. In addition, this section should discuss impacts to a fen at sample site FR2 if one is present.

Further, as stated previously, Chapter 3 Section 3.0: Focus River Segments on p. 3-5 states: "Data for the focus reaches were evaluated and extrapolated to the overall study area." It does not appear that this was done relative to fens.

Williams Fork River, page 4-257: As noted above, Chapter 3 Section 3.0: Focus River Segments states "Data for the focus reaches were evaluated and extrapolated to the overall study area." It does not appear that this was done for environmental effects to fens in Chapter 4, as the word "fen" does not occur in the chapter. USFS Wildlife Biologists believe fens may occur in many locations along the Williams Fork, based on field experience. The USFS is not aware of any formal fen surveys in the Williams Fork area. There is no mention in the DEIS of consultation with experts in fens who may be able to provide information regarding existing fens and/or the likelihood of additional fens occurring in the Project Area, particularly in the Williams Fork where fens occur at both sample sites. One such expert is Dr. David Cooper, a wetlands researcher from Colorado State University who has published scientific papers on fens, including research in Rocky Mountain National Park (Cooper et al. 1998). Cooper and others concluded; "Fens in this region do not appear to be sustainable under the drought conditions produced by ditches, water diversions, or ground-water pumping, all of which would lower water tables."

In addition to fens being a high priority for protection for the USFS, the FWS Mountain-Prairie Region has made conservation and protection of fens one of their wetland priorities. Furthermore, the FWS Mountain-Prairie Region has determined that all functioning fens fall within their Resource Category 1, with a goal of no loss of existing habitat value and that every reasonable effort should be made to avoid impacting these habitats.

First Paragraph: Impacts to the fen at sample site WF2, described in the second paragraph on p. 3-152, are not mentioned here and should be analyzed in detail. Fens are a unique, irreplaceable resource and are sensitive to changes in hydrology.

Second Paragraph: The discussion of sample site WF1 does not address potential impacts to the large fen wetland described at the site on p. 3-150 in the partial paragraph above Table 3.6-10, which describes a fen at the site and states that fens are classified by the USFS as resources deserving special protection. Impacts to the fen at sample site WF1 should be analyzed in detail.

Section 4.6.7.1, page 4-269, Compensatory Mitigation: Reference is made to Appendix M for riparian mitigation measures. Mitigation proposed in Appendix M for Riparian Vegetation consists of establishing riparian vegetation around the shoreline of an expanded Gross Reservoir. Although this may compensate for some riparian areas proposed for inundation, it will not compensate for all of the riparian areas or rare plants and plant communities that will be inundated and permanently lost. Shoreline vegetation will establish on its own; however, planting appropriate species may help it establish sooner.

An additional mitigation is recommended for Riparian Vegetation to provide for protection of riparian areas with comparable ecological values to those being destroyed, by means such as purchase and donation to the USFS or funding restoration of comparable areas that have been degraded.

Section 4.6.7.2, pages 4-269 and 4-270, Mitigation During Construction: This section should include mention of, or reference to, limiting vehicle operation to designated construction areas as stated in the first bullet under Section 4.7.7 Mitigation and Monitoring: Wildlife Habitat on p. 4-386

Section 4.7, Wildlife habitats and ARP Forest Plan: There is no discussion of important wildlife habitats relevant to the ARP Forest Plan, including old growth, effective habitat, interior forests, and corridors. There is no discussion about consistency with the Forest Plan regarding these habitats or other Forest Plan goals, objectives, standards, and guidelines that apply to wildlife, botany, and noxious weeds.

Section 4.7.1.1, pages 4-272 to 4-275, Gross Reservoir: There is no discussion of effects to USFS Managed Areas and State Wildlife Areas, although the affected environment for these areas was described in Chapter 3. Discussion of environmental effects to USFS Managed Areas should include important wildlife habitats included in the ARP Forest Plan: existing old growth, old growth development areas, old growth retention, effective habitat, interior forest, and forested and open corridors. These discussions should include quantification of amounts of these habitats expected to be impacted by the project. Discussions should also include an analysis of consistency with the ARP Forest Plan and detailed discussion of inconsistencies, including

Forestwide Goals and Objectives; Operational Goals, Standards and Guidelines; and applicable Standards and Guidelines based on Management Area Direction and Geographic Area Direction.

Raptors, page 4-274: This section contains broad statements about raptors and does not acknowledge the many differences in biology and therefore effects. Differences in biology among raptor species include: different habitats used for nesting and foraging; different nest types and locations, such as cavity nests, stick nests in trees, stick nests on cliffs, and use of cliff ledges with no nest structure; use of alternate nest structures, or not; different prey species; use of the project area during different seasons; and differences in migratory habits. Differences among species, and therefore potential effects, are not acknowledged or analyzed. It is not clear whether the effects discussed in this section are being applied to owls, which are not specifically mentioned, although owls are mentioned in the corresponding section in Chapter 3. Discussion should be included about whether reservoir expansion will inundate osprey platforms installed by the USFS.

First paragraph: The fifth sentence states that impacts *can* be avoided. Please state if they will be. Reference should be made to the mitigations in Section 4.7.7 on p. 4-286 regarding nest surveys, and how implementation of these would affect impacts to nesting raptors. Impacts may not be completely avoided, because surveys do not detect 100% of nesting birds, particularly small songbirds. A more accurate statement would be that "Impacts *would* be avoided *or minimized* by use of pre-construction surveys…."

Second paragraph: The first sentence describes disturbance around an active raptor nest as an indirect impact – this would be considered a direct impact because it occurs at the same time and place as project activities. The last sentence cites CDOW recommendations for buffer zones for red-tailed hawk and golden eagle nests, but does not mention buffer zones for other raptors that may occur in the area. Referring to the CDOW document, "Recommended Buffer Zones and Seasonal Restrictions for Colorado Raptors," revised 2/2008, may be a more efficient way of covering buffer zones here.

Third paragraph: The last sentence in this paragraph singles out northern goshawk regarding long-term loss of habitat for forest birds. Clarification that this means accipiters, if it does, would be helpful. This sentence jumps to the conclusion that reduction of nesting and foraging habitat would likely result in long-term population reduction. No information is provided to support this conclusion, such as quantity and quality of nesting and foraging habitat in the area compared to anticipated loss of habitat, likelihood of occurrence during various seasons, size of home range relative to habitat loss, or whether any occurrences have been documented. In addition, it is not clear whether this statement is intended to apply to any other "forest bird" species such as sharp-shinned hawks or Cooper's hawks.

Other Birds, page 4-275: Second paragraph: The second sentence states the nesting season of migratory birds and waterfowl as generally May through July. This is inconsistent with the first Mitigation and Monitoring bullet under Raptors on p. 4-286 which uses more appropriate nesting season dates of March 1 through July 31.

Section 4.7.1.2, page 4-276 Sensitive Areas: Table 4.7-3, same comment as under Section 3.7.1.1 above re: p. 3-173 – Winiger Gulch and South Boulder Creek above Gross Reservoir are a single PCA according to current CNHP data.

4.7.7, page 4-286, Wildlife Habitat: *First and second bullets* – These measures should reference Section 4.6.7.2 Mitigation during Construction pp. 4-269 and 4-270 for further details.

Third and fourth bullets – These measures should reference Section 4.5.7 Mitigation and Monitoring for guidance and further specifics regarding revegetation and restoration.

The USFS recommends adding a mitigation providing for replacement of the winter concentration areas and severe elk winter range that will be inundated and permanently lost. This could be accomplished by protecting lands with comparable value as elk winter range that may be vulnerable to future development, by means such as purchasing and donating land to the USFS.

Raptors, First bullet: Second sentence - "… nest surveys would be conducted prior to construction to ensure that no active nests are present in or near the construction footprint." As discussed under Section 4.7.1.1 First Paragraph above, nesting surveys do not detect 100% of nesting birds. A variety of bird species may nest in the project area with differences in nesting seasons, nest types and locations, appropriate survey methods, and likelihood of detection during surveys. Conducting surveys will help to minimize impacts to nesting birds but is unlikely to ensure avoidance of impacts.

Second bullet: May 1 through June 1 is not inclusive enough for the multiple raptor species that may occur in the area, including owls. Expand the survey period to include appropriate survey dates for all raptor species that may occur. Clarify that owls will be included in surveys. Clarify what is meant by "annually during an appropriate season" – does this mean annually while construction and vegetation clearing are occurring? Depending on the timing of construction and vegetation clearing, surveys may be needed prior to the nesting season that construction and vegetation clearing begin.

Third bullet: Buffer zones should be based on CDOW Recommended Buffer Zones and Seasonal Restrictions for Colorado Raptors, revised 2/2008.

Migratory Birds, This paragraph states that land-clearing activities would be timed to avoid the breeding season to avoid impacts to active bird nests, as described for raptors. It is not clear whether this means that surveys would be conducted for all nesting birds if land clearing occurs during nesting season. Mitigation measures for raptors and migratory birds should be consistently stated and implemented – either avoid land clearing during nesting season, or provide for nesting surveys for all birds if land clearing occurs during nesting season. As noted above, nesting surveys would not insure that no nesting birds are impacted because surveys do not detect 100% of nesting birds.

Section 4.8 *Outdated references*: The DEIS appears to be outdated – for example, references to CDOW databases and verbal communication are dated 2005; references to Colorado Natural Heritage Program (CNHP) data are from 2005; and the FWS Species List in Appendix G is from 2005. CDOW and CNHP data were updated in 2009; and the FWS list was most recently

updated in May 2009. Most of this information is available on the internet. CNHP data does not currently include any data for Threatened, Endangered, USFS Sensitive, Proposed (TESP) or rare/local concern plants on the Forest since 2000, including new or revised element occurrences for plants, so is nine years out of date. There are hundreds of plant records not posted to the CNHP database. The USFS is currently entering these data into a new release of the USFS NRIS TESP database, with eventual full data migration to the CNHP database. In the meantime, the ARP Forest botanist can provide data specific to this project, on request.

Section 4.8, *Special Status Plants*: Based on the best available data, in conflict with USFS policy, this project is likely to adversely affect population viability on the Planning Unit (ARP) for three plant species, one USFS Sensitive species and two rare/local concern species. The project may affect viability on the ARP for two additional rare/local concern plant species. All five species were found near Gross Reservoir during surveys for the 2001 DW FERC licensing. Of the five, only the USFS Sensitive species is mentioned in the DEIS, in a species list table. It is not mentioned in the body of the DEIS as occurring and effects are not analyzed, and the remaining four species are not mentioned in the DEIS or appendices. Mitigations and salvage efforts are recommended under Sections 4.6.7.1 and 4.8.7; however, it must be recognized that even with mitigation measures, values and species may not be comparable. Some rare plants that would be inundated probably cannot be found elsewhere and purchased or protected.

Section 4.8, *Species lists:* All species lists in the DEIS Chapter 3 and Appendix G are outdated and/or incomplete. This includes USFS Sensitive species, Management Indicator species, and rare/local concern plants.

Section 4.8, *Special Status Species analysis:* The Special Status Species sections in Chapter 3 and 4 are inadequate and missing important information. Chapter 3 contains one short paragraph and Chapter 4 contains less than one page that attempt to describe the affected environment and effects for SSS other than three federally and/or state-listed animal species that are discussed individually.

Section 4.8.1.1, Gross Reservoir: The Federally threatened Ute ladies'-tresses orchid and Colorado butterfly plant are not analyzed in this section for Gross Reservoir, based on exclusion in Appendix G Table G-1 and in the Biological Assessment submitted by the ACOE of Engineers to the FWS. The USFS requests additional documentation regarding these two species. Refer to comments on Appendix G, Table G-1 for specifics.

Other Special Status Species, pages. 4-291 and 4-292: This section should discuss, and/or reference in the appropriate table in Appendix G (more specifically than the general reference to Table G-3), effects to all federal and state listed, USFS Sensitive, CNHP-tracked, and other species of local concern that have not been previously addressed under Vegetation in Section 4.5, under Wildlife in Section 4.7, or earlier in Section 4.8 and may occur in the project area or be affected by the project. Refer to comments under Appendix G for current lists of species that should be considered. Discussion should include potential impacts from all aspects of the project, including vegetation removal, noise, truck traffic, blasting, road improvements and construction, recreation site relocation, etc.

There is no discussion here of effects to any plant species including USFS Sensitive and rare/local concern plants that were found during surveys for the 2001 FERC relicense, which are documented and mapped in License Article 410. Populations of several of these plant species will be inundated with reservoir expansion, and this is anticipated to compromise population viability for *Aralia nudicaulis, Cylactis (Rubus) arcticus,* and *Sanicula marilandica,* and may compromise population viability for *Carex deweyana* and *Carex sprengelii*. See discussion under Section 3.8.1.1 above regarding baseline information that should be documented and considered for these and other species. This baseline information should be used to analyze effects to local, ARP, and range-wide populations. Analysis needs to clearly and fully disclose impacts to USFS Sensitive and rare/local concern plant species and include rationale leading to conclusions regarding impacts to population viability at the local, ARP, and range-wide levels. No reference is made to any additional reports or analyses that might contain either baseline information or analysis of effects for individual plant species.

Any project that adversely affecting species viability for the above-mentioned plants would be in conflict with the following USFS policy:

USFS MANUAL (FSM), NATIONAL HEADQUARTERS (WO), Washington, DC

FSM 1900 – planning, chapter 1920 - land management planning, Amendment No. 1900-2006-2, Effective Date January 31, 2006

> 1926.15 – Resource Integration Requirements When Using Planning Regulations in Effect before November 9, 2000
>
> 13. Ensure the plan provides for the kinds, amounts, and distribution of habitat needed for recovery of threatened or endangered species and needed to maintain viable, well-distributed populations of all existing native and desired nonnative species.

And

FSM 2600, Wildlife, Fish and Sensitive Plant Habitat Management, Amendment No. 2600-95-7, Effective Date June 23, 1995.

> 2670.22 - Sensitive Species.
>
> 2. Maintain viable populations of all native and desired nonnative wildlife, fish, and plant species in habitats distributed throughout their geographic range on NFS land.

Second paragraph: Noise and construction disturbance are discussed as indirect impacts. These are considered direct impacts because they occur at the same time and place as project activities.

Third paragraph: Northern goshawk is mentioned here and also under Wildlife in Section 4.7.1.1 on p. 4-275. Effects should be analyzed in one section and referenced in additional sections as appropriate.

<u>Section 4.8.1.2, River Segments</u>

There is no discussion in the EIS concerning the impacts to Preble's habitat on the North Fork upstream of the confluence with the South Platte. Occupied habitat has been identified in the North Fork of the South Platte and more occupied habitat is likely to be identified during subsequent surveys. The EIS includes a determination of "may affect, but unlikely to adversely affect" for Preble's (p. 4-294) on the South Platte based upon relatively small changes in flow during average and wet years. However, flow changes appear to be more substantial on the North Fork upstream of the confluence with the South Platte. Show how flow changes in the proposed action will affect the Preble's mouse habitat on the North Fork.

River Otter, page 4-295: The following statement is presented: "Flow changes are expected to have minor or negligible impacts on riparian habitat and fish populations, and impacts to river otter would be negligible." As mentioned in our comments above on riparian and wetland areas (p. 4-251), the analysis presented does not appear to support conclusions of little or no impact to groundwater or groundwater-fed riparian vegetation. This section on river otter does not distinguish groundwater-fed vs. streamflow-dependent riparian vegetation (see also comments to Section 4.6, p. 4.245) Otters use waterways and banks in addition to riparian habitat, and this is not mentioned in the effects analysis. For example, the analysis does not consider other potential impacts including changed access to winter dens that may occur with lower water levels, such as den entrances formerly under water becoming exposed to ambient air; and changes in water depth that could influence freeze-thaw cycles and access to prey. Refer also to Section 4.8.7 comments re: adding mitigation for DW to partner with CDOW for river otter surveys.

Boreal Toad, page 4-295: The following statement is presented: "Flow changes are expected to have minor or negligible impacts on riparian habitats and impacts to boreal toad habitat would be negligible." As mentioned in our comments above on riparian and wetland areas (p. 4-251), the analysis presented does not appear to support conclusions of little or no impacts to groundwater or groundwater-fed riparian vegetation (see also comments to Section 4.6, p. 4.245) This section on boreal toad does not distinguish groundwater-fed vs. streamflow-dependent riparian vegetation. In addition, boreal toad breeding sites occur near the main of the Williams Fork, and the analysis should consider whether flow changes could lower water tables adjacent to the Williams Fork main stem that support breeding populations of boreal toads. Refer also to Section 4.8.7 comments re: adding mitigation for DW to collaborate with CDOW for boreal toad monitoring.

Other Special Status Species, page 4-295: This section should discuss, and/or reference in the appropriate table in Appendix G (more specifically than the general reference to Table G-3), effects to all federal and state listed, USFS Sensitive, CNHP-tracked, and other species of local concern that have not been previously address under Vegetation in Section 4.5, under Wildlife in Section 4.7, or earlier in Section 4.8 and may occur in the project area or be affected by the project. Refer to comments under Appendix G for current lists of species that should be considered.

First paragraph/sentence: "Flow changes in other Project river segments are unlikely to affect other special status species because the flow changes would not noticeably affect habitat for aquatic or riparian species." Based on general hydrology comments and comments specific to Section 4.1, p. 4-9 and 4-245, it appears that further analysis regarding flow changes is needed in

order to either support this statement or include additional analysis for "other special status species" that may be impacted by flow changes.

Paragraph/Sentence under Other Special Status Species bullet, page 4-296: This states "Reductions in bypass flows along tributaries of the Fraser River would not affect special status species, because no special status species are expected to occur in the affected stream reaches." Discussion should be included for special status plant species that occur in riparian and wetland areas and any other special status animal or plant species that may occur. This statement conflicts with brief discussions about river otter and boreal toad on the preceding page, where they are described as occurring or potentially occurring along the Fraser River,

Section 4.8, Environmental Consequences for Special Status Species: The effects discussion for SSS is confusing as in two different places "other special status species" are discussed. The effects discussion for special status fish species is incomplete, and inadequate.

Include discussion on Rocky Mountain Capshell snail, lake chub, mountain suckers, Colorado River cutthroat trout, and update discussion on greenback cutthroat trout with new information presented in this document.

Page 4-296 "Flow changes would have negligible or minor effects on habitat for special status aquatic species. Changes would occur downstream of Colorado River cutthroat trout occupied habitat." Show how the flow changes have minor or negligible effects. Because fish are able to move downstream and they could occupy habitat downstream of diversions (as they do in a number of tributaries). Again, it is not just changes in flow that affect SSS, the possibility of entrainment into the DW system should be discussed.

"Reductions in bypass flows along tributaries of the Fraser would not affect special status species, because no special status species are expected to occur in the affected stream reaches." This statement is misleading to the reader. There is evidence, although anecdotal, indicating that mountain suckers have been found in the Fraser River. Greenback cutthroat trout and Colorado River cutthroat trout are expected to occur in affected stream reaches because they are mobile organisms and could potentially be found downstream of the diversions. In addition to USFS Sensitive and federally protected species, Forest management indicator species are also known to occur in affected stream reaches above and below the diversion points. Entrainment and stranding of fish has been observed at a number of diversion sites. This should be discussed. In addition to the reductions in flows, the mere presence of the diversion itself may affect individual fish. All of the diversions operated by DW are located in occupied habitat, and none of these diversions are screened, which is allowing entrainment of fish into the System. Special status fish could be entrained, and lost to the local population.

Section 4.8.7, Mitigation and Monitoring: *The following measures are recommended for river otter and boreal toad:* DW will partner with the CDOW to support annual river otter surveys and ongoing boreal toad monitoring efforts.

The following measures or a combination of them are recommended to mitigate, as much as possible, anticipated impacts to population viability for the following special status plant species discussed under Section 4.8.1.1 above: *Aralia nudicaulis, Cylactis (Rubus) arcticus, Sanicula*

marilandica, Carex deweyana, and *Carex sprengelii*. The measures are listed in order of USFS priority and effectiveness, and would also apply to any additional populations of these or other special status plant species found prior to or during project implementation.

1. Avoid impacts where possible. For example, if impacts would occur from construction activities, weed treatment, recreation site location, or other project activities that could be adjusted, move or otherwise adjust project activities to avoid impacts to populations.
2. Conduct additional surveys to locate an adequate number of plants of each species that are secure/protected, to remove a viability issue. Surveys would need to include surrounding areas, primarily on the Boulder Ranger District but could include other protected lands.
3. Implement protection measures at other known sites that would help to secure viability.

For populations of *Aralia nudicaulis, Cylactis (Rubus) arcticus, Sanicula marilandica, Carex deweyana,* and *Carex sprengelii* and any additional populations of these or other special status plant species found prior to or during project implementation, *the following measures are recommended as salvage efforts for populations to be permanently destroyed by inundation or other project activities where impacts are unavoidable*. All three are recommended to be implemented concurrently.

1. Collect and curate abundant plant specimens, photographs, and *in situ* data prior to local site extirpation.
2. Transplant plants into suitable habitat, upstream of populations to be inundated. Probability of failure is high, and plants may not survive beyond a few years.
3. Collect seeds, grow them out, and plant resulting plants somewhere else in suitable habitat. Probability of failure is high due to factors such as species (for example *Cylactis arcticus)* that produce seeds infrequently and non-viable seeds being produced and collected.

Also include in mitigations re: salvage efforts: For salvage efforts 2 and 3 above, coordinate with the USFS to develop measures of success in the first two full growing seasons as indicated by monitoring, and provisions for what constitutes reasonable efforts expended.

Add the following mitigation: If any USFS Sensitive plant or animal species or rare/local concern plant species of concern are found in the project area prior to or during implementation, consult with appropriate USFS specialists to determine the appropriate mitigation or avoidance action, which may include timing restrictions, relocation of specific project activities, or other measures.

A measure or measures should be added providing for additional surveys for special status wildlife and plant species in all areas potentially impacted by project activities that have not been adequately surveyed to date. This may include, but would not be limited to all areas potentially affected by inundation, vegetation removal, staging, recreation site relocation, road improvement and construction, helispots, and quarries or other borrow activities.

Section 4.9.1.2, page 4.315: In general, past studies have indicated that available habitat for rainbow and brown trout is maximized between 20 and 250 cfs. On the North Fork of the South

Platte flow changes predicted under the proposed action and "Full Use of the Existing System" will greatly exceed 250 cfs from June through September. The DEIS states on p. 4-315 "in the North Fork South Platte River, there would be 22% higher flows with the Full Use of the Existing System…the increase in flow would be in June through October, the growing season for many aquatic organisms. This would tend to worsen the effects of the already high flows in this stream and have a minor to moderate detrimental effect."

Section 4-13, page 4-378: The White River National Forest manages special use permits for five commercial outfitters that operate trips on the Blue River between Dillon and Green Mountain Reservoirs. The DEIS seems to indicate that long-term impacts of the Proposed Action would be negligible. We disagree that the impacts to recreational boating would be negligible given the nature of the already short "boatable" season.

Table 4.13: The first column in this table compares available recreation days for minimum flows between 300 and 600 cfs. Current information indicates that this section of the Blue River is not floatable at flow rates less than 400 cfs. Please adjust your analysis to reflect this range of flows (400 – 600 cfs).

Economic impacts to commercial outfitters should be disclosed in the DEIS. The Colorado River Outfitters Association report on commercial river use in the state of Colorado, 1988-2008, shows economic benefit of commercial use on the Blue River to be $825,804 in 2008.

Section 4.14.1.1, Existing Land Uses:

First paragraph on page 4-393: This section states the following: "Conflicts with USFS management direction include minor, permanent impacts to wildlife and plant habitats (refer to Section 4.5 Vegetation, and Section 4.7 Wildlife) and temporary impacts to recreational objectives for the duration of Project construction." USFS Management Indicator Species are briefly mentioned on p. 4-275; however Section 4.7 does not contain analysis of any other potential conflicts with USFS management direction, particularly the Forest Plans for the three affected Forests. See comments under Section 4.7.1.1 above.

Section 4.9, Environmental Consequences for Aquatic Biological Resources: The third paragraph on page 4-307 discusses indirect and direct impacts to aquatic resources. The DEIS states that, "Most of the impacts to aquatic resources would be indirect and long-term, through changes in stream flow or the suitability of the stream to support aquatic life. Direct impacts would be very limited and temporary and would be limited to disturbances of reservoirs or short sections of streams during construction." The effects of the action are potentially indirect on fish populations (if not completely dewatered) and direct on habitat. There are two things happening here that need to be discussed individually, the effects on habitat and fish populations. They should not be combined.

Habitat simulation methods

IFIM does not simulate habitat relationships, PHABSIM does. PHABSIM "is a specific model designed to calculate an index to the amount of microhabitat available for different life stages at different flow levels; whereas, IFIM is a general problem–solving approach employing systems analysis techniques" (Stalnaker et al. 1995).

Life stages of Fish and Periodicity and Assumptions of Impact Analysis sections:

This information needs to be referenced. There is no discussion of critical habitat types modeled in either section, which is an integral part of the PHABSIM analysis. The DEIS should show what habitat needs are for various life stages and state how proposed flows affect those habitat types.

The use of non-native trout in the modeling results is not representative of the system. Native cutthroat are not as impacted by high spring runoff as they typically begin spawning on the falling limb of the hydrograph. Rainbow trout are more affected because they a) begin spawning here during the rising limb of the hydrograph, and b) are acclimated to totally different flow regimes, which has limited their ability to thrive in Colorado. The modeling should have included native species, such as cutthroat trout, mountain sucker, or sculpin. PHABSIM is not just a trout model, and should not be treated as one.

Section 4.9.1.2, Invasive Species: Aquatic nuisance species are a significant issue, and should be treated more seriously than they are in the DEIS, especially when it comes to water development infrastructure.

"Therefore, conditions that result in more sedimentation (more worm habitat) may result in an adverse impact." State what conditions would result in more sedimentation. According to the analysis, the system is sediment-limited and the DEIS should state where this additional sedimentation comes from.

"Therefore, conditions that result in elevated temperatures above 20 degrees C may have a beneficial impact on the incidence of whirling disease." Show how often such conditions would occur as temperatures that high could potentially lead to fish mortality depending on the length of time. Also, include a discussion on how brown trout are carriers of whirling disease; how they are responsible for spreading the disease; and how they are much more tolerant of warm stream temperatures.

New Zealand mudsnails have been found in the Boulder Creek drainage. Therefore, it is possible that they could potentially infest the Project Area. This potential effect should be explored in more detail. The conclusions from the paper referenced in the Didymo discussion are not supported as to the whether or not Didymo would thrive in the Fraser River basin:

a) "The analysis shows that a large component of the distribution of *D. geminata* can be attributed to climatic factors alone, ***at least at a continental scale***." – (Kumar et al. 2009 page 418)
b) "The importance of the base-flow index in our results is supported by the observation that *D geminata* is common in **regulated rivers**…" – (Kumar et al. 2009 page 419)

c) "We have established the climatic range for this species in the ***continental US***" and "Although we have examined bioclimatic factors that explain the presence-absence of *D geminata* at a ***continental scale***, we recognize that other factors may be relevant to the range expansion…" It is important to note that this research was not meant to be used at a regional level. Therefore, conclusions made based on the abstract alone of this paper are incorrect and misleading.

It is also important to note that there are approximately 34 other water bodies in which Didymo could occur in the Project Area. There is a real risk associated with Didymo and if it were to spread (because it is present on the west slope as well as in South Boulder Creek), it would be detrimental to the fish species found in those other affected stream reaches. Again, the potential impact of aquatic nuisance species associated with project facilities and operations should be discussed in more detail.

Flushing Flows

This section of the DEIS appears to be making the case that flushing flows are bad and by diverting all the water during runoff, DW is benefitting the aquatic communities. High flows can in fact be a disturbance at times but are also important for forming and maintaining productive stream channels. Native cutthroat trout are not nearly as affected as some other non-native trout species.

Comparison of Current Conditions and Full Use of Existing System

The use of the comparison between the proposed action and Full Use is comparing two hypothetical situations for an effects analysis. State what these comparisons are based on and make a comparison to current conditions.

State what the frequency will be that INDIVIDUAL tributaries will be dewatered. State how much more time they will be de-watered under DW's proposed action. Lumping streams together to discuss the changes in annual flow makes it impossible to accurately assess the effects of the proposed action on individual streams. Show how often individual streams are de-watered under current conditions. Show how much more they will be de-watered when the Proposed Action "extends the period when water does not pass the diversion" (Page 4-319) compared to current conditions.

There is no consistency in the individual creek discussion sections in how the additional diversions are presented. Some are percentages, some are annual flow amounts, and some are both. This makes it difficult for reviewers to accurately assess effects

Listed below are sentences from the DEIS referring to the availability of R2 Cross simulations. These simulations do not appear to be included in the effects analysis (except for brief Bobtail Creek discussion page 4-324).

- "In addition to IFIM habitat data, CDOW provided R2 Cross habitat data for the Fraser River which will also be considered in the effects analysis of the alternatives" (page 3-222)

- "R2 Cross simulations are available from CDOW for many of the Fraser River tributary streams, including Cabin, Elk, Hamilton, Iron, Jim, Meadow, Middle Fork Ranch, and Main Ranch" (page 3-233)
- "R2 Cross data are available from the CDOW for Bobtail Creek and will be used in the effects analysis of the alternatives" (page 3-239)
- R2 Cross data is presented in the Williams Fork tributaries discussion for Bobtail Creek (page 4-324). This data indicates that flows less than 1 cfs would not be sufficient to "fully maintain fish and invertebrates…" The DEIS indicates that the Proposed Action would reduce the flow passing the diversions and extend the period when these streams would be fully diverted, but there is no discussion of impacts of that. Show how fish will be impacted by the reduced flow and if fish are currently found below the diversions. Display what the impacts are of increased diversions.

Fraser River Tributaries

If fish were identified downstream of the diversions, how will an extension in the period of no flow past the diversion structure with the Proposed Action result in "minor adverse impacts" compared to Full Use? Describe these impacts.

Bypass Flows and City of Englewood ROW Stipulation Discussion

The DEIS mentions streams with bypass flows that would be reduced. The bypass flows associated with Englewood are not mentioned, although it is mentioned that with the Proposed Action those bypasses will be met. The DEIS should show if they be met with Full Use and state why these bypasses are different than the other Fraser River tributary bypasses. Show if the Englewood bypasses can be reduced . If so, explain how much more frequently those streams will have reduced bypass. Currently, there are only flumes at the bypass sites for the City of Englewood. Several of the flumes have non-functioning staff gages. According to the 1974 City of Englewood Revised Stipulations, Englewood should do or provide the following:

- Install flumes or other stream measuring devices suitable for visual and/or recording determination of stream at locations specified by the Forest Supervisor
- Furnish copies of water storage, release, and streamflow summary records maintained in conjunction with this project to District Ranger at established intervals, or cause the same to be done.

Currently, the District has no rating tables on file for any of the flumes, which inhibits the USFS from determining if bypasses are being met. In addition to no rating tables, many of the staff gages are in disrepair or are non-existent. The flumes themselves are in disrepair, making them non-functional.

Overall, the effects analysis needs a clear discussion of the impacts associated with increased water diversions. The DEIS state that they are there but not what they are.

<u>Section 4.13, Recreation:</u>

Recreation-related action alternatives denote a simple (in-kind) relocation of existing facilities with very little applicable analysis. For example, the Gross Reservoir Recreation Relocation

Plan dated 2008, shows that all south shore recreation sites will be relocated and recreation use consolidated. The lack of analysis for this and other similar recreation development around the reservoir suggests avoidance of typical recreation-related concerns such as pedestrian safety, user conflict associated with concentrated use, sustaining a positive recreation experience and dealing with unanticipated operational issues just to name a few. It does not appear that mitigations were considered in the effects analysis.

Inundation and recreation site relocation will result in a change in use dynamics, extend cumulative affects well beyond the FERC boundary (Winiger Ridge and S. Boulder Creek), and prompt a number of changes to law enforcement and operational plans. The DEIS does not disclose affects related to:

- Road relocation, duration of temporary closures, duration of water releases, constantly changing reservoir level, concentrating recreation use, not replacing existing day use and overnight camping opportunities lost to inundation (Winiger Ridge) and a number of other actions not adequately analyzed, will result in a shift in use dynamics.
- Below high water mark (HWM) recreation management needs to consider greater HWM fluctuation and related safety and fishing access.
- The action alternatives do not explore options for recreation site development, nor do they consider mitigation measures necessary to address changing demographics and recreation demand along the Front-Range.
- Water release duration alters kayak and fishing opportunities.
- Multiple year use of temporary roads and closure areas will result in inappropriate access and challenging operations during the implementation period.
- The new location of Osprey Trailhead will be directly in the spillway zone (aesthetics and safety).
- Staging area and stockpile area locations will restrict vegetation re-gen.

Section 4.15, p.4-402-404, Visual Resources: The environmental effects are not analyzed fully. For example, "(t)he "bathtub ring" effect resulting from changes in reservoir elevations(e.g., releases, storage, fill rates) is **not** (emphasis added) illustrated in the photographic simulation. The amount of bare earth exposed by the "bathtub ring" effect would vary depending on reservoir operations. The unattractive visual contrast created by reservoir fluctuations would be similar to the Current Conditions (2006).

Provide support for the assertion that "the dam itself would result in a negligible impact"

The environmental consequences section of the DEIS does indicate that the proposed action will not be consistent with the Forest Plan management guidelines in terms of the scenery resource. The environmental consequences section of the DEIS does indentify the area adjacent to the Gross Reservoir as having a Visual Quality Objective (VQO) of Retention, and does state that "(i)t is not possible to completely mitigate the major short-term direct construction impacts in order to meet these objectives." And"(t)hese areas would not be compliant with management guidelines and would be considered major adverse long-term impacts."

Chapter 5

Mountain pine beetle: Cumulative effects related to mountain pine beetle and sediment supply are discussed in Section 5.6.9, Aquatic Resources on p. 5-47. However, mountain pine beetle is not mentioned prior to this section, such as earlier in the chapter when past, present, and reasonably foreseeable future actions are described, including climate change. Additionally, mountain pine beetle impacts are not discussed under other applicable resource sections including vegetation, wildlife, and special status species.

Section 5.2.2, Past Land-Based Actions: The USFS has done vegetation treatments in some areas west of Gross Reservoir, as part of the Winiger Ridge Ecosystem Management project that should be considered in cumulative effects analysis.

Section 5.3.2, Future Land-Based Actions: The USFS is currently developing a proposal for the Forsythe Fuels Treatment Project, which is expected to include areas in the vicinity of Gross Reservoir and should be considered in cumulative effects analysis.

Section 5.6, Evaluation of Cumulative Effects, page 5-39: There does not appear to be any disclosure of the cumulative effects to stream morphology and sedimentation.

Section 5.6.1, Surface Water page 5-39: There does not appear to be a separate cumulative effects section for water quality.

Decreased water quality, algal growth, and decreased clarity in Shadow Mountain Lake have been an increasing problem over the last decade. One of the sources of water for Shadow Mountain Lake is water imported from the Fraser River through the Windy Gap project. The analysis should consider the cumulative effects, to nutrients and other pollutants, of loss of dilution in the Fraser River due to increased DW diversions combined with the effects of proposed increases in withdrawal for the Windy Gap project.

Section 5.6.4, pages 5-42 and 5-43, Soils: The second full paragraph regarding cumulative impacts to soils in the Gross Reservoir area does not mention soil impacts from increasing recreational use, which will be further concentrated and magnified on National Forest System (NFS) land west of Gross Reservoir due to reservoir expansion, because the area available for recreation will be reduced. In addition, the USFS is currently developing a proposal for the Forsythe Fuels Treatment Project, which is expected to include areas near Gross Reservoir and may contribute to soil impacts.

Section 5.6.5, pages 5-43 and 5-44, Vegetation: As mentioned above, the USFS has implemented past vegetation treatment west of Gross Reservoir as part of the Winiger Ridge project, and is developing a proposal for future fuels treatment for the Forsythe Fuels Treatment Project. Both projects should be considered in cumulative effects analysis. In addition, there is no mention of mountain pine beetle in this section, although it is discussed related to sedimentation in Section 5.6.9, Aquatic Resources.

Section 5.6.6, Riparian and Wetland Areas, Page 5-44: "Past and reasonably foreseeable future actions are not likely to have adverse effects on wetlands and riparian areas at Gross Reservoir…" This statement does not recognize the past effects of Gross Reservoir. When the reservoir was constructed, did it flood wetland and riparian areas?

Section 5.6.7, page 5-45, Wildlife: The second sentence states, "But, reasonably foreseeable future actions are not likely to have adverse cumulative effects, beyond those associated with the Moffat Project alternatives, because no major actions are planned in this area." According to 40 CFR 1508.7 which is cited in Section 5.0 on p. 5-1, "Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time." Cumulative impacts are not limited to "major" actions. Past, present, and reasonably foreseeable actions such as residential development and increase and/or displacement of recreation should be considered.

There is no discussion of specific species or groups of species. Biology, including habitat requirements, varies greatly among wildlife species; therefore, effects including cumulative effects are different. There is no mention of mountain pine beetle in this section, although it is discussed related to sedimentation in Section 5.6.9, Aquatic Resources.

There is no discussion about the cumulative effects of reduction of winter concentration areas and severe winter range on the Clear Creek elk herd.

Section 5.6.8, page 5-46, Special Status Species: *Second Paragraph:* This paragraph begins: "Other special status species have been less affected by past actions, but have limited formal protection from future actions under current conditions. However, if populations were to substantially decline they could be brought under the protection of the Endangered Species Act." Many "other special status species" have formal protection including federal laws such as the Migratory Bird Treaty Act, and state laws. On NFS land, USFS policy protects species and ecosystems. It is against USFS policy to cause a trend toward listing under the Endangered Species Act (ESA).

Cumulative impacts to "other special status species" are discussed in this brief paragraph, presumably intended to include all special status species other than those listed under ESA which are discussed in the first paragraph. As described under Section 5.6.7 Wildlife above, species differ greatly in their biology and effects, including cumulative effects. This applies equally to special status plant and animal species, including USFS sensitive species and rare/local concern plant species. As noted under various sections in Chapters 3 and 4, no analysis of effects to individual plant species is presented, and individual plant species are also absent from cumulative effects analysis.

There is no mention of mountain pine beetle in this section, although it is discussed related to sedimentation in Section 5.6.9, Aquatic Resources.

Section 5.6.9, Aquatic Resources, Page 5-46 and 5-47: "To summarize, Moffat Project alternatives would have none to negligible impacts to fish, benthic invertebrates, and their habitats for most stream segments. Exceptions include minor adverse impacts to fish and invertebrates in South Boulder Creek upstream of Gross Reservoir…" This conclusion seems to completely ignore the impacts to aquatic habitat from the existing stream augmentation. Since this is the most significant impact to the creek, it is hard to understand how the cumulative effects analysis could ignore it.

"Cumulative impacts to aquatic resources would be negligible, except for minor adverse impacts to fish and invertebrates in the North Fork Ranch Creek (tributary of the Fraser River), McQueary, Jones, Bobtail, and Steelman creeks (tributaries of the Williams Fork River)." Discuss if frequent and extended periods of dewatering from the existing diversions, on these and other streams, might have some impact on fish and fish habitat.

Section 5.6.19, page 5-56: The fact that the Fraser River has little boating may be due to the reduced flows due to transbasin diversions. If the flows allowed, boating would occur as it does now in the floatable sections such as the canyon and therefore further flow declines may increase the impact to this recreation use.

Section 5.3.1, page 5-20: Under the Grand County full build out scenario, the cumulative effects in Grand County are predicted to include municipal and domestic water supply shortages and potential failure of waste water treatment plants to meet water quality requirements in effluent discharge permits. Share any proposed mitigation for water supply shortages in Grand County caused by this Project.

APPENDIX G: BIOLOGICAL RESOURCES

Table G-1: Federal and State Listed Endangered or Threatened Species and Occurrence in the Project Area, p. G-2: In this table, Ute ladies'-tresses orchid and Colorado butterfly plant are notated as "not present- habitat is unsuitable or outside current known range" for the Gross Reservoir area. The Biological Assessment (BA) submitted by the ACOE to FWS states on p. 32 that Ute ladies'-tresses orchid is not present at Gross Reservoir. The BA mentions, also on p. 32, that habitat evaluations for Ute ladies'-tresses conducted around Gross Reservoir in 1998 concluded no potential habitat was present. Table 4-1 on p. 20 of the BA assigns a status of "0" also defined as "not present-habitat is unsuitable or outside current known range" to both Ute ladies'-tresses orchid and Colorado butterfly plant and does not analyze them for the Gross Reservoir area, and neither species is analyzed in the DEIS Section 4.8.1.1 for the Gross Reservoir area. The USFS feels both of these species could be present and requests copies of the documents, particularly those areas around Gross Reservoir, to support these conclusions and the exclusion of both of these species from further analysis for the Gross Reservoir. The USFS also requests copies of the document of habitat assessments and/or surveys, conducted during appropriate times in the growing season by qualified personnel, for both of these species for other areas potentially impacted by project activities including water depletions.

Table G-3: Other Special Status Species Occurrence in the Project Area: Table G-3 in the DEIS Appendix G is missing some USFS (USFS) Sensitive wildlife species, many USFS Sensitive plant species, and most USFS Management Indicator Species (MIS) although MIS are listed in Table 3.7-3 of the DEIS. In addition, although some plant species tracked by the Colorado Natural Heritage Program (CNHP) which are not USFS Sensitive are listed in Table G-3, many plant species of local concern to the USFS are not included. Species missing from Table G-3 include: 1) several plant species of local concern and one USFS Sensitive plant species found by DW consultants during surveys for the 2001 relicensing, some populations of which will be presumed to be inundated by the proposed reservoir expansion; 2) a plant species documented to occur by the CNHP in the Winiger Gulch Potential Conservation Area (PCA) that is also presumed to be inundated by the proposed expansion; and 3) other plant species of local concern

for the ARP which may or may not have been included in past or recent surveys. Table G-3 footnotes do not specify the date(s) of USFS Sensitive species lists obtained for this analysis, and do not mention obtaining a list of rare plants and communities from the Forest as specified in Study Request No. 7 (excerpt below).

Following are excerpts from USFS Study Requests where the need for the information described above was stated:

Study Request No. 7 - Project Area Sensitive and Rare Plant Survey: "Rare plants" for this study is defined as comprising 1) plants listed or proposed for listing under the Endangered Species Act, 2) the most current USFS Region 2 list of Sensitive Plants, and 3) all other rare Plants of Local Concern, all three groups of which are as identified by the Forest that could occur in the project area or that could be impacted by proposed project activities, even if occurring outside the project area (e.g., riparian plants potentially impacted by downstream water depletions or changes in reservoir/downstream hydrology flow rates, levels, or timing; rare plants occupying off-site borrow pits; etc.). "Rare plant communities" include those identified by the Forest that could occur in the project area or that could be impacted by proposed project activities, even if occurring outside the project area. Note that these definitions do not necessarily include plants that are otherwise tracked by the Colorado Natural Heritage Program. The most current lists of rare plants and communities to survey must be derived in concert with the Forest.

Study Request No. 8 - Special-Status Terrestrial Wildlife Species and Habitats, Including Amphibians and Invertebrates: Analysis of effects to special-status species should include ESA-listed (endangered, threatened, and candidate) taxa; USFS sensitive species based on the current Region 2 list, and management indicator species (MIS) for the Arapaho and Roosevelt National Forests and Pawnee National Grassland (ARP); all categories currently tracked by the Colorado Natural Heritage Program (CNHP), including plants, birds, mammals, fish, invertebrates, and natural communities (plants, natural communities, and fish are covered in other study requests); species of local concern specific to the project, if any, and migratory birds not included in the above categories.

The tables below contain species lists applicable to the Arapaho and Roosevelt National Forests and Pawnee National Grasslands (ARP), current as of December 2009. Federally Proposed, Threatened, and Endangered species are displayed in Table 1; USFS Sensitive Species in Tables 2A and 2B; Management Indicator Species in Table 3; and Plant Species of Local Concern in Table 4. This document includes terrestrial wildlife and plant species. See Fish comments for fish and other aquatic species. All species listed in these tables should be considered for analysis for projects on the ARP, and reasons for exclusion from analysis should be documented. Tables 2B (USFS Sensitive Plants) and 4 (Plant Species of Local Concern) indicate which plant species should be surveyed for and included in analysis, and probability of occurrence in the Gross Reservoir area. Plant species in Tables 2B and 4, particularly species that occupy riparian areas, wetlands, or fens, should also be considered for analysis for the River Segments.

Table 1: Federally Listed Species that may occur on the ARP or that may be impacted by water depletions or changes in water levels

Based on FWS Colorado Field Office County List Updated June 2009

Common Name	Scientific Name	Status
BIRDS		
▲ Whooping crane	*Grus americana*	Endangered
▲ Least tern (interior population)	*Sterna antillarum*	Endangered
▲ Piping plover	*Charadrius melodus*	Threatened
MAMMALS		
Mexican spotted owl	*Strix occidentalis lucida*	Threatened
Preble's meadow jumping mouse	*Zapus hudsonius preblei*	Threatened
Canada lynx	*Lynx canadensis*	Threatened
PLANTS		
▲ Ψ Colorado butterfly plant	*Gaura neomexicana* ssp. *coloradensis*	Threatened
▲ Western prairie fringed orchid	*Platanthera praeclara*	Threatened
▲ ** Ute ladies'-tresses	*Spiranthes diluvialis*	Threatened
Penland alpine fen mustard	*Eutrema penlandii*	Threatened
Ψ Osterhout milkvetch	*Astragalus osterhoutii*	Endangered
Ψ Penland beardtongue	*Penstemon penlandii*	Endangered
Ψ North Park phacelia	*Phacelia formosula*	Endangered

Note:

▲ water depletions in the South Platte River watershed may affect these species

Ψ these species are suspected to occur but unconfirmed on the Arapaho/Roosevelt National Forest

* The Federal Action Area for this project for all species included in this table is defined as the project area.

** water depletions in the Colorado River watershed may affect this species

Table 2A: Region 2 USFS Sensitive Species for the ARP

TERRESTRIAL WILDLIFE

Based on USFS Manual, Rocky Mountain Region (Region 2), FSM 2600 – Wildlife, Fish, and Sensitive Plant Habitat Management, Chapter 2670-1 – Threatened, Endangered, and Sensitive Plants and Animals, Supplement No. 2600-2009-1, Effective June 9, 2009.

Common Name	Scientific Name	MIS/Indicator Community
MAMMALS		
American marten	*Martes americana*	No
Black-tailed prairie dog	*Cynomys ludovicianus*	Yes / Prairie dog towns
☼ ▼ Fringed myotis	*Myotis thysanodes*	No
Pygmy shrew	*Sorex hoyi montanus*	No
River Otter	*Lontra canadensis*	No
Rocky Mountain bighorn sheep	*Ovis Canadensis canadensis*	Yes/openings
Swift fox	*Vulpes velox*	No
Townsend's Big-eared bat	*Corynorhinus townsendii*	No
Ψ White-tailed prairie dog	*Cynomys leucurus*	No
North American Wolverine	*Gulo gulo*	No
BIRDS		
☼ American bittern	*Botaurus lentiginosus*	No
American peregrine falcon	*Falco peregrinus*	No
American three-toed woodpecker	*Picoides dorsalis*	No
Bald eagle	*Haliaeetus leucocephalus*	No

Common Name	Scientific Name	MIS/Indicator Community
Black swift	*Cypseloides niger*	No
Black tern	*Chlidonias niger*	No
Boreal owl	*Aegolius funereus*	No
Brewer's sparrow	*Spizella breweri*	No
Burrowing owl	*Athene cunicularia*	Yes / Prairie dog towns
Cassin's sparrow	*Aimophila cassini*	No
Chestnut-collared longspur	*Calcarius ornatus*	No
Ferruginous hawk	*Buteo regalis*	Yes / Shortgrass & midgrass prairie
Flammulated owl	*Otus flammeolus*	No
Grasshopper sparrow	*Ammodramus savannarum*	No
▼ Greater sage-grouse	*Centrocercus urophasianus*	No
☼ Lewis' woodpecker	*Melanerpes lewis*	No
Loggerhead shrike	*Lanius ludovicianus*	No
Long-billed curlew	*Numenius americanus*	No
McCown's longspur	*Calcarius mccownii*	No
Mountain plover	*Charadrius montanus*	Yes / Shortgrass Prairie
Northern goshawk	*Accipiter gentilis*	No
Northern harrier	*Circus cyaneus*	No
Olive-sided flycatcher	*Contopus borealis*	No
Purple martin	*Progne subis*	No
White-tailed ptarmigan	*Lagopus leucurus*	No
▼ Yellow-billed cuckoo	*Coccyzus americanus occidentalis*	No

Common Name	Scientific Name	MIS/Indicator Community
AMPHIBIANS		
Boreal toad	*Bufo boreas boreas*	Yes / Montane riparian & wetlands
Northern leopard frog	*Rana pipiens*	No
Wood frog	*Rana sylvatica*	No
INSECTS		
Hudsonian emerald	*Somatochlora hudsonica*	No
Ψ Regal fritillary butterfly	*Speyenia idalia*	No

Note: Ψ These species are suspected to occur but unconfirmed on the Arapaho/Roosevelt National Forest.

☼ These species are suspected to occur but unconfirmed on the Pawnee National Grassland.

▼These species not known or suspected to occur on NFS land, however they may occur in the planning area vicinity.

Table 2B: Region 2 USFS Sensitive Species for the ARP

PLANTS

Based on USFS Manual, Rocky Mountain Region (Region 2), FSM 2600 – Wildlife, Fish, and Sensitive Plant Habitat Management, Chapter 2670-1 – Threatened, Endangered, and Sensitive Plants and Animals, Supplement No. 2600-2009-1, Effective June 9, 2009.

Common Name	Scientific Name	Survey and Analyze for Gross Reservoir Expansion	Probability of Occurrence in Gross Reservoir Area
Ψ Sea pink	*Armeria maritima* var. *siberica*	No	N/A
☼ Dwarf milkweed	*Asclepias uncialis*	No	N/A
Ψ Park milkvetch	*Astragalus leptaleus*	**Yes**	**Low**

Upswept moonwort	*Botrychium ascendens*	**Yes**	**Low**
☼ Prairie moonwort	*Botrychium campestre*	No	N/A
Fork-leaved moonwort	*Botrychium "furcatum"*	**Yes**	**Low**
Ψ Slender moonwort	*Botrychium lineare*	**Yes**	**Medium**
Paradox moonwort	*Botrychium paradoxum*	**Yes**	**Low**
Lesser panicled sedge	*Carex diandra*	**Yes**	**Low**
Livid sedge	*Carex livida*	**Yes**	**Low**
☼ Sandhill goosefoot	*Chenopodium cycloides*	No	N/A
Yellow lady's-slipper	*Cypripedium calceolus* spp. *parviflorum*	**Yes**	**Medium to high**
Clawless draba	*Draba exunguiculata*	No	N/A
Gray's peak whitlow-grass	*Draba grayana*	No	N/A
Roundleaf sundew	*Drosera rotundifolia*	No	N/A
Stream orchid	*Epipactis gigantea*	**Yes**	**Low to Medium**
Dropleaf buckwheat	*Eriogonum exilifolium*	No	N/A
Slender cottongrass	*Eriophorum gracile*	No	N/A
Hall's fescue	*Festuca hallii*	No	N/A
Ψ Weber's scarlet-gilia	*Ipomopsis aggregata* ssp. *weberi*	No	N/A
Simple kobresia	*Kobresia simpliciuscula*	No	N/A
Colorado Tansy-aster	*Machaeranthera coloradoensis*	**Yes**	**Low**
Ψ Adder's-mouth	*Malaxis brachypoda*	**Yes**	**Medium**
Budding monkeyflower	*Mimulus gemmiparus*	**Yes**	**Low**
Kotzebue's grass of Parnassus	*Parnassia kotzebuei*	No	N/A

Ψ Harrington beardtongue	*Penstemon harringtonii*	No	N/A
Rocky Mountain cinquefoil	*Potentilla rupincola*	**Yes**	**Low to Medium**
Greenland primrose	*Primula egaliksensis*	**Yes**	**Low**
Tundra buttercup	*Ranunculus karelinii*	No	N/A
Dwarf raspberry	*Rubus arcticus* ssp. *acaulis (Cylactis arctica* ssp. *acaulis)*	**Yes**	**KNOWN IN PROJECT AREA**
Silver willow	*Salix candida*	**Yes**	**Low**
Ψ Autumn willow	*Salix serissima*	**Yes**	**Low**
Sphagnum (peat moss)	*Sphagnum angustifolium*	**Yes**	**Low**
Baltic sphagnum	*Sphagnum balticum*	**Yes**	**Low**
Lesser bladderwort	*Utricularia minor*	**Yes**	**Low**
Ψ Selkirk's violet	*Viola selkirkii*	**Yes**	**Medium**

Table 3: Management Indicator Species (MIS)[1]

For Arapaho and Roosevelt National Forests

Does Not Include MIS for Pawnee National Grassland

Common Name	Scientific Name	Management Indicator Community
MAMMALS		
Rocky Mountain bighorn sheep	*Ovis Canadensis canadensis*	Openings
Elk	*Cervus elaphus*	Young to Mature Forest & Openings
Mule deer	*Odocoileus hemionus*	Young to Mature Forest & Openings

Common Name	Scientific Name	Management Indicator Community
BIRDS		
Golden-crowned kinglet	*Regulus satrapa*	Interior Forests
Hairy woodpecker	*Picoides villosus*	Yung to Mature Forest
Mountain bluebird	*Sialia currucoides*	Openings
Pygmy nuthatch	*Sitta pygmaea*	Old Growth
Warbling vireo	*Vireo gilvus*	Aspen Forest
Wilson's warbler	*Wilsonia pusilla*	Montane Riparian and Wetlands
AMPHIBIANS		
Boreal toad	*Bufo boreas boreas*	Montane riparian & wetlands

[1]Species is addressed under multiple categories; MIS, Sensitive and/or Federally Listed

Table 4: Plant Species of Local Concern for the ARP

All Species Listed in This Table Should Be Surveyed for and Analyzed

For the Gross Reservoir Expansion

Common Name	Scientific Name	Probability of Occurrence in Gross Reservoir Area
FERNS, all except *Cystopteris fragilis*	*Various*	High
Larimer aletes	*Aletes humilis*	Low
Wild sarsaparilla	*Aralia nudicaulis*	**KNOWN IN PROJECT AREA**
Paper birch	*Betula papyrifera*	Low
Triangle-leaved moonwort, green-stemmed phase	*Botrychium lanceolatum* ssp. *"viride"*	Low
Leather leaf grapefern	*Botrychium multifidum*	Low to Medium

Northwestern moonwort	*Botrychium pinnatum*	Low
"Redbank" moonwort	*Botrychium "redbank"*	Low
Lease moonwort	*Botrychium simplex*	Low to Medium
Rattlesnake fern	*Botrypus virginianus*	Low to Medium
Dewey sedge	*Carex deweyana*	**KNOWN IN PROJECT AREA**
Woolyfruit sedge	*Carex lasiocarpa*	Low
Mud sedge	*Carex limosa*	Low
Peck's sedge	*Carex peckii*	Low
Sprengel's sedge	*Carex sprengelii*	**KNOWN IN PROJECT AREA**
Enchantress's nightshade	*Circaea alpina*	**KNOWN IN PROJECT AREA**
Purple cinquefoil	*Comarum palustre*	Medium to High
Yellow coralroot	*Corallorhiza trifida*	Medium
Spring coralroot	*Corallorhiza wisteriana*	Medium
Bunchberry	*Cornus canadensis*	Low
Hazelnut	*Corylus cornuta*	Medium
Rattlesnake-plantain	*Goodyear repens*	Medium
Tall blue lettuce	*Lactuca biennis*	**KNOWN IN PROJECT AREA**
Rocky Mountain blazing star	*Liatris ligulistylis*	Low
Wood lily	*Lilium philadelphicum*	Low to Medium
Northern twayblade	*Listera borealis*	Low
Broadlipped twayblade	*Listera convallarioides*	Low
Heartleaved twayblade	*Listera cordata*	High
Utah lupine	*Lupinus lepidus* var.	Low

	utahensis	
Stiff club-moss	*Lycopodium annotinum*	Low
Fringed loosestrife	*Lysimachia ciliata*	Medium to High
Leechleaf blazingstar	*Mentzelia sinuata*	Low
Buckbean	*Menyanthes trifoliata*	Low
Sweet coltsfoot	*Petasites sagittatus*	Low
Slivery primrose	*Primula incana*	Low
Pictureleaf wintergreen	*Pyrola picta*	Low to Medium
Maryland sanicle	*Sanicula marilandica*	**KNOWN IN PROJECT AREA**
False melic	*Schizachne purpurascens*	**KNOWN IN PROJECT AREA**
All other Sphagnum species not included as Sensitive	*Sphagnum* spp.	Low

Table 5: Plant Communities of Local Concern for the ARP

All Communities Listed in This Table Should Be Surveyed for and Analyzed

For the Gross Reservoir Expansion

Common Name	Scientific Name	Probability of Occurrence in Gross Reservoir Area
Colorado blue spruce	*Picea pungens*	**KNOWN IN PROJECT AREA**
Ponderosa pine/spike fescue	*Pinus ponderosa/leucopoa kingii*	Medium to high
Ponderosa pine/antelope bitterbrush	*Pinus ponderosa/Purshia tridentata*	Medium to high
Relictual prairie grass riverine community	*Spartina pectinata-Sorghastrum avenaceum-Andropogon gerardii-*	

	Dichanthelium oligosanthes-Hypericum majus	Medium
Ponderosa pine old growth	*Pinus ponderosa*	**KNOWN IN PROJECT AREA**
Upwelling/dome springs/seeps		Low
Thinleaf alder/mesic forb riparian shrubland	*Alnus incana/*mesic forbs shrubland	**KNOWN IN PROJECT AREA**
Foothills riparian shrubland	*Betula occidentalis/Maianthemum stellatum* or other forbs	**KNOWN IN PROJECT AREA**
Fens	Habitat for a number of USFS Sensitive and local concern plant species	**KNOWN IN PROJECT AREA** (Williams Fork)

Table G-5: Other Special Status Species Occurrence in the River Segments

This table is missing Special Status Species that may occur in or adjacent to the river segments. Missing species include boreal toad, a USFS Sensitive and MIS amphibian species. Missing species also include a number of Special Status plants that inhabit riparian areas, wetlands, and/or fens, all of which occur adjacent to river segments. Missing plant species include USFS Sensitive plant species park milkvetch, lesser-panicled sedge, livid sedge, silver willow, and others; and plant species of local concern including fern species, several sedge species *(Carex spp.)*, several twayblade species *(Listera spp.)*, and others.

Lesser bladderwort, a USFS Sensitive plant species that inhabits montane fens, seeps, and freshwater marshes, is designated in this table as unlikely to occur in all river segments; however suitable habitat may be present in wetlands that occur along various river segments, and fens were documented at two sample sites along the Williams Fork River.

Appendix H – PACSM results for Surface Water

The difference between the proposed action, current conditions, full use, and the no action should be more clearly displayed on the Graphs provided in Appendix H. The current graphs are not useful for assessing the effects.

Use symbols rather than colors throughout the document to make those graphs easier to interpret.

Appendix H-6 provides daily flow changes in the mainstem and North Fork of the South Platte River. It also presents information indicating that there could be substantial maximum daily

flow reductions and increases. The effects of these significant daily flow reductions and increases need to be addressed, particularly the effects on channel and bank stability, fisheries, wetlands, riparian and wildlife habitats.

Appendix K (Preliminary Section 404(b) (1) Guidelines Compliance.

After reviewing the DEIS, the USFS feels that the proposed mitigation measures are not sufficient to adequately protect public resources. As described in the Introduction (Section 1), this 404 analysis should document the potential environmental consequences associated with the project. However, this "effects" section appears to assume that the only effect the project is having on aquatic populations in streams covered by the DEIS is a reduction or change in habitat due to increased water withdrawal. Although increased diversion volumes are a concern to the USFS, this limited description of effects is inaccurate. USFS personnel have identified many other impacts of the Project on fish in Westside streams. Some of these effects have already been documented in earlier letters to DW and FERC. Additional direct effects to fish were identified in a field review of Westside project diversions on July 21-23, 2009 and are described below. Impacts to fish in the Englewood-Ranch Collection System which should be disclosed in the DEIS and addressed via proposed mitigation measures include:

- The spillway at Meadow Creek Reservoir traps and isolates fish from both the reservoir and Meadow Creek itself. Fish transported out of the reservoir during spill events were observed trapped in the pool at the end of the spillway where they are subject to poor water quality as water temperatures warm and oxygen is depleted. Ultimately most if not all of the fish trapped in the spillway pool will likely die.
- The outlet from the reservoir is not designed to protect fish from injury or mortality if they are entrained out of the reservoir. It is hard to imagine how any fish thus entrained could survive to reach Meadow Creek after they are run through the outlet.
- The DW Meadow Creek diversion is unscreened allowing entrainment of fish into the Moffat Canal system.
- The DW Hamilton Creek diversion is unscreened allowing entrainment of fish into the Moffat Canal system. Cutthroat trout have been documented upstream of this diversion.
- The Cabin Creek diversion is unscreened allowing entrainment of fish into the Moffat Canal system. Cabin Creek has been identified by the USFS as a High Priority recovery stream for Colorado River Cutthroat.

Project effects for other streams on National Forest System (NFS) lands in the Frazier River system are not adequately analyzed, including Vasquez Creek, St. Louis Creek and the Frazier River itself.

- At the main Frazier River Diversion, a considerable number of brook trout were observed entrapped in an isolated off-channel pool below the instream flow release facility. At least 4 mortalities were observed at the time with more expected to occur with reductions in water quantity and quality at the site.
- The Vasquez Creek diversion is unscreened allowing entrainment of fish into the Moffat Canal system. Cutthroat trout are present in the upper watershed and thus subject to entrainment in the canal.
- The outlet of the Vasquez tunnel contains significant spoil piles made from tunnel debris. The unsurfaced road to the site is in poor condition and is eroding. The spoil pile under

the road is rock with no topsoil and has not been revegetated. The sideslopes down to the stream were over-steepened and eroding. The spoil pile constrains Vasquez Creek and the stream flows into the toe of the waste dump causing active erosion of the sideslope above into the stream.

- The St. Louis Creek diversion is unscreened allowing entrainment of fish into the Moffat Canal system. St. Louis Creek upstream of the diversion site is a high priority watershed for cutthroat reintroduction due to the large amount of high quality habitat upstream.

Appendix M – DW's Proposed Mitigation Plan for the Moffat Collection System Project

This Appendix begins, "This Mitigation Plan is DW's proposal to provide compensatory mitigation for unavoidable adverse effects associated with the Proposed Action for the Moffat Project." The mitigation proposed for riparian vegetation would help to compensate for only a portion of riparian areas proposed for inundation, and would not address riparian habitat to be lost in the various drainages. For wildlife and SSS, the mitigations proposed appear to apply primarily to complying with the Endangered Species Act and the Migratory Bird Treaty Act. There is no mitigation proposed for special status plant populations that would be inundated, or for loss of critical elk winter range.

The USFS recommends additional mitigation measures in several resource areas. Refer to comments under the various Mitigation and Monitoring sections of Chapter 4 for specifics.

DW's proposed mitigations are inadequate to address the Project's impacts to fish populations and fish habitat. As described earlier in this submittal, USFS personnel have documented numerous instances where project facilities and operations have directly impacted fishery resources (including operations that result in direct mortality to fish) on NFS lands. DW has proposed no mitigation measures whatsoever to resolve these impacts.

The DEIS identifies several westslope streams affected by DW's diversion of water to the Moffat Collection system as containing pure or hybridized populations of Colorado River cutthroat. However, rather than address the impact of the project through screening or other actions that would protect individuals within these existing populations, DW's proposed mitigation measure is to cooperate with CDOW to establish several new populations of Colorado River Cutthroat in Wilderness Areas unaffected by the project. While the USFS supports these type of efforts to reintroduce native cutthroat trout into protected habitat, the agency feels that the first priority actions should be to protect existing populations and mitigating project effects in an "on-site, in-kind" manner consistent with CEQ Mitigation Priorities:, found at 40 CFR Party 1500-1508.

The DEIS indicates that there will be impacts to aquatic habitat and aquatic biota in the North Fork of the South Platte. In Appendix M there is some discussion of mitigation for these impacts. The Pike National Forest would like to be involved in development of a mitigation plan that addresses these impacts. Any mitigation plan should address concerns identified by the CDOW that could potentially impact recreational fishing on the North Fork and also the South Platte. Although mitigation is mentioned only for the North Fork, we feel that any changes in release patterns from Eleven Mile and Cheesman reservoirs may also require mitigation and protection of fisheries habitat investments made in Eleven Mile Canyon. In the PSICC Forest Plan, we have an anti-degradation policy that prevents projects that lead to resource degradation.

The mitigation section, Appendix M, does not adequately demonstrate that natural stream restoration will occur.

"To compensate for reduced flows and subsequent potential decrease in aquatic habitat in the North Fork, DW will create aquatic habitat improvements on the North Fork. These improvements will be developed in coordination with the ACOE, CDOW, USFS, and landowners. For example, pool habitat could be created by a combination of boulder placement and grade controls. DW will submit a detailed aquatic habitat improvement plan as part of the final Mitigation Plan."

The USFS needs to see a mitigation design that incorporates natural restoration techniques.

Comments to Supporting Documentation and References

Existing Channel conditions report

Figure 6, Page 12: The 1986 general equation contradicts the sediment supply curves in some of the graphs in appendix H. The 1986 general equation expresses a sediment discharge/rating curve rather than a supply equation because it is related to flow. Sediment is supplied from uplands, especially in disturbed watersheds as well as from in-channel sources. The 1986 general equation is representative of phase I bedload transport only and while it clearly over-predicts sediment transport at flows less than approximately 160 cfs (because it includes suspended load as well as bedload supposedly), it misses the second part of the bedload function (phase II) and substantially underestimates the sediment transport at higher flows (>160 cfs). In the most extreme case of under-prediction, the general equation compared to measurements at site 4 under-predicts daily sediment discharge by a factor of 2.5 (predicts 20 tons/day, actual is 50 tons per day). What is wrong with the general "supply" equation? Does this "supply" equation account for sediment stored in channel backwaters, on the floodplain and point bars or from episodic mass wasting or basin development causing accelerated upland erosion? If "gravel to cobble sized sediments typically act as an immobile layer that moderates the supply of bed load sediments until higher flows break up the armor layer and make sediments available for transport as bed load", yet the supply equation discounts this portion of the bedload function, how could bedload transport be supply limited? Why is there no discussion of in-channel sediment supply at higher flows where the streambed is mobilized?

Provide data to support the assumption that sediment discharge from a stream is an appropriate surrogate for sediment supply to a stream from the watershed.

Bedload is energy limited, especially for phase II transport and the sediment supply is greater than the transport capacity. Further diversions lead to aggradations and a reduction in cross-sectional area and when extreme high flows escape diversion and enter a shrunken channel, the channel is blown out and the function is lost. Flood stage is increased by jamming high flows into a channel with decreased water conveyance capacity.

Cooper, D. J., L. H. MacDonald, S. K. Wenger, S. Woods. 1998. Hydrologic restoration of a fen in Rocky Mt. National Park, Colorado. Wetlands 18: 335-345). These surveys were done specifically for the Recreation Management Plan and powerline relocation and did not include all

areas of anticipated disturbance for the proposed reservoir enlargement, as indicated under FERC License Article 410, heading B. Survey Methodology Used which states "Specific areas around Gross Reservoir were surveyed during June, July, and August 2001.... No attempt to survey the entire reservoir was made."