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Environmental Assessment

Strawberry River Fish Habitat Phase II

Heber Ranger District, Uinta National Forest
Wasatch County, Utah

Utah Division of Wildlife Resources
Salt Lake City, Utah

Township 3 South Range 12 West: Section 12, and Range 11 West: Section 7

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SUMMARY

The Uinta National Forest proposes to conduct a fisheries habitat and stream channel stabilization project to restore stream bank stability, riparian vegetation, improve fish habitat, control beaver colonization, and maintain and/or extend the boardwalk trail on approximately 1.3 miles of the Strawberry River.

The project area is located along the Strawberry River immediately upstream and downstream of the Forest Service visitor center in Wasatch County on the northwest side of Strawberry Reservoir (Township 3 South, Range 12 West, northeast ¼ of Section 12; Strawberry Reservoir NW Quadrangle) and is within the Heber Ranger District, Uinta National Forest, Utah.

This action is needed to meet the desired condition of a properly functioning stream channel and floodplain, which is beneficial to the ecosystem and wildlife habitat in general. This action is also designed to meet UDWR objectives for habitat and passage of cutthroat trout and Kokanee salmon during spawning.

The proposed action may affect fisheries and aquatic resources, wildlife, vegetation, hydrologic function, and soil resources within the action area. Following review of the proposed project and potential effects of project implementation, it was determined that the greatest risk to resources within the action area would result from displacement and mortality of individual aquatic organisms, physical habitat disruption, soil erosion and compaction, increased turbidity and sedimentation during project implementation, and increase the potential for the establishment of invasive weed species. These effects would however, be temporary and only extend through the end of active project implementation.

The overall long-term effects of implementation of the proposed project would be beneficial to fisheries and aquatic resources, wildlife, vegetation, hydrologic function, and soil resources within the lower Strawberry River. Beneficial effects of the proposed project include: Increased streambank and channel stability, decreased sedimentation in salmonid spawning sites, lower input of phosphorus and fine sediments, increased water quality, increased fish habitat suitability, access to the UDWR fish trap facilities, and enhanced riparian corridor.

In addition to the proposed action, the Forest Service also evaluated the following alternatives:

- Alternative A – No Action. Under the No Action alternative, current management plans will continue to guide management of the project area. No fish habitat and stream channel restoration work would be implemented to accomplish project goals. The Strawberry River will continue to erode unstable banks, fine sediment will continue to restrict salmonid spawning and rearing habitat, and riparian vegetation will be limited to discontinuous patches within favorable habitat areas. Beaver populations and activity in the lower stream reaches between the UDWR fish trap and Strawberry Reservoir will be actively controlled by the UDWR through trapping and/or other lethal means.

- Alternative C – Natural Recovery of Lower Strawberry River. This Alternative was considered in the initial environmental analysis based on issues and concerns expressed during project scoping. Under this Alternative, the lower Strawberry River would be allowed to recover without the use of active land management or habitat restoration and recovery actions. Although this Alternative would have met the desired objectives over time, it did not meet the immediate need for fish access to the UDWR fish trap. Therefore, this Alternative did not fully meet the identified project purpose and need and because of this was not carried through as part of the analysis.

Based upon the effects of the Alternatives, the Heber District Ranger will decide whether and how to improve instream habitat and stabilize stream banks on the Strawberry River between the upper diversion for the UDWR fish trap to a short distance below the Strawberry River confluence with Clyde Creek in accordance with Forest Plan goals, objectives and desired future conditions.

INTRODUCTION

Document Structure

The Forest Service has prepared this Environmental Assessment in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations. This Environmental Assessment discloses the direct, indirect, and cumulative environmental impacts that would result from the proposed action and alternatives. The document is organized into four parts:

- *Introduction:* The section includes information on the history of the project proposal, the purpose of and need for the project, and the agency's proposal for achieving that purpose and need. This section also details how the Forest Service informed the public of the proposal and how the public responded.
- *Comparison of Alternatives, including the Proposed Action:* This section provides a more detailed description of the agency's proposed action as well as alternative methods for achieving the stated purpose. These alternatives were developed based on significant issues raised by the public and other agencies. This discussion also includes possible mitigation measures. Finally, this section provides a summary table of the environmental consequences associated with each alternative.
- *Environmental Consequences:* This section describes the environmental effects of implementing the proposed action and other alternatives. This analysis is organized by resource area. Within each section, the affected environment is described first, followed by the effects of the No Action Alternative that provides a baseline for evaluation and comparison of the other alternatives that follow.
- *Agencies and Persons Consulted:* This section provides a list of preparers and agencies consulted during the development of the environmental assessment.

Additional documentation, including more detailed analyses of project-area resources, may be found in the project planning record located at the Heber Ranger District Office in Heber, Utah.

Background

Strawberry reservoir is Utah's premier cold water sport fishery. The reservoir was chemically treated during 1990 at a cost of $3.5 million to remove aggressive and competing non-game fish populations. Since that time, the sport fishery has quickly recovered to produce unsurpassed fishing quality. The 1987 Strawberry Valley Environmental Assessment established a new management direction for Strawberry Reservoir to include establishment of Bear Lake cutthroat trout and Kokanee salmon, biological suppression of re-emerging rough fish populations, an emphasis on natural reproduction to supplement stocking programs, rehabilitation of the Strawberry watershed and egg production at the Utah Division of Wildlife Resources (UDWR) Strawberry River fish trap. The trap has become an important component of the overall management program at Strawberry Reservoir, and has supplied millions of cutthroat and Kokanee eggs each year to meet the production needs of the enlarge reservoir. Upstream

fish migration from the reservoir to the trap is essential to the success of the current management objectives of Strawberry Reservoir.

The Strawberry River provides important adfluvial spawning habitat, and is one of the most important spawning tributaries in the valley. It is estimated that this stream has the potential to provide up to 48 percent of the total spawning habitat in the valley with the Daniels flows being returned and the appropriate rehabilitation measures being undertaken.

The stream reach proposed for rehabilitation lies between the USFS visitor center, just below the UDWR fish trap where restoration efforts were completed in 2002 (USDA Forest Service 2002) and the reservoir's total maximum water elevation of 7,602.4 feet which is approximately at the confluence with Clyde Creek. At maximum reservoir level a portion of the proposed restoration reach may be inundated. The maximum reservoir level has only been reached once since 1973, during 1998. In 1998, the reservoir elevation reached the maximum level (7,602.47 feet) as part of a test on the dam. If the maximum reservoir elevation is reached it will be for a short period of time (personal communication, Tom Brutin, CUWCD). It is expected that periods of several years will occur between high water elevations so there is still a need to stabilize banks and increase the vegetative cover in the reach.

The section is located on Strawberry Valley Management Lands (which includes both "Project Lands" and "Recreation Lands"), and as such has been protected from grazing impacts since 1990. Although the surrounding riparian area has experienced recovery since protection, there are still many areas of unstable banks and over-wide channels. Although willows are abundant in some areas, there is very little overhanging cover which contributes to high stream temperatures and limited habitat for fish.

This reach is attractive to beaver because of the deep incised channel and the general availability of willows. Beaver presence in this reach has the potential to cause some problems during low flow periods. As beaver begin to build dams and colonize this reach, access to the UDWR fish trap facility is restricted and is most severe for fall spawning Kokanee salmon.

Purpose and Need for Action

The purpose of this initiative is to restore stream bank stability, riparian vegetation, improve fish habitat, control beaver colonization, and maintain and/or extend the boardwalk trail on approximately 1.3 miles of the Strawberry River. This action is needed, to meet the desired condition of a properly functioning stream channel and floodplain, which is beneficial to the ecosystem and wildlife habitat in general, but also, helps to meet UDWR objectives for habitat and passage of cutthroat trout and Kokanee salmon during spawning.

Conformance with the Forest Plan

This action responds to the goals and objectives outlined in the 2003 Land and Resource Management Plan (LRMP) for the Uinta National Forest, and helps move the project area towards desired conditions described in that plan (USDA Forest Service 2003a). The

Strawberry River Fish Habitat Phase II project is consistent with Forest-wide and Management Area specific direction and is not inconsistent with management direction for aquatic species or aquatic habitat found in the 2003 LRMP. Specific Forest-wide goals identified in the 2003 LRMP that have applicability to this project include:

FW-Goal-1 Soil, air, and water resources provide for watershed health, public health and safety, long-term soil productivity, and ecosystem sustainability, and meet applicable laws and regulations.

FW-Goal-2 Biologically diverse, sustainable ecosystems maintain or enhance habitats for native flora and fauna, forest and rangeland health, watershed health, and water quality.

FW-Goal-5 Scenic quality and desired landscape character are maintained and/or enhanced.

FW-Goal-6 Diverse and suitable recreational opportunities are provided responsive to public demand while maintaining ecosystem health and contributing to social and economic sustainability.

FW-Goal-8 Forest infrastructure, including facilities and transportation systems, is safe and responsive to public needs and desires; has minimal adverse effects on ecological processes and ecosystem health, diversity, and productivity; and is in balance with needed management actions.

Proposed Action

The proposed action is Alternative B in which the Forest Service and UDWR proposal to perform fish habitat and stream channel restoration work on the Strawberry River from the diversion for the UDWR fish trap to a short distance below the Strawberry River confluence with Clyde Creek. Specific details of the proposed action are addressed in the *Alternatives, Including the Proposed Action* section of this EA.

Decision Framework

Based on the environmental analysis in this EA, the Heber District Ranger will decide whether and how to improve instream habitat and stabilize stream banks on the Strawberry River between the upper diversion for the UDWR fish trap to a short distance below the Strawberry River confluence with Clyde Creek in accordance with Forest Plan goals, objectives and desired future conditions.

Public Involvement

A legal notice initiating the public scoping process was published in the Provo Daily Herald on February 1, 2005 and scoping letters were sent to interested publics on February 3, 2005. The proposal was listed in the April 2005 Schedule of Proposed Actions. In addition, as part of the public involvement process, the agency has coordinated with the Northern Ute Tribe and the Utah Division of Wildlife Resources (UDWR).

Using the comments from the public and other agencies, the interdisciplinary team developed a list of issues to address in considering the possible effects of implementing the proposed action.

Issues

The Forest Service separated the issues into two groups: Significant and non-significant issues. Significant issues were defined as those directly or indirectly caused by implementing the proposed action. Non-significant issues were identified as those: (1) outside the scope of the proposed action; (2) already decided by law, regulation, Forest Plan, or other higher level decision; (3) irrelevant to the decision to be made; or (4) conjectural and not supported by scientific or factual evidence. The Council on Environmental Quality (CEQ) NEPA regulations require this delineation in Sec. 1501.7, "…identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3)…" A list of non-significant issues and reasons regarding their categorization as non-significant may be found in the project record at the Heber Ranger District Office in Heber, Utah.

As for significant issues, the Forest Service identified nine topics raised during scoping. These issues include the following:

Issue #1: Project activities may affect wetland and riparian habitats and their associated species. This issue is addressed in the *Wildlife*, *Vegetation*, and *Hydrology* subsections of the *Environmental Consequences* and *Cumulative Effects* sections of this EA.

Issue #2: Project activities may expose some soil types to erosion. This issue is addressed in the *Soils* and *Hydrology* subsections of the *Environmental Consequences* and *Cumulative Effects* sections of this EA.

Issue #3: Project activities may involve surface disturbance that may result in the increased spread of invasive plant species. This issue is addressed in the *Vegetation* and *Soils* subsections of the *Environmental Consequences* and *Cumulative Effects* sections of this EA.

Issue #4: Project activities may affect wildlife during sensitive time periods and areas (breeding season, calving season, migration corridors). The potential to impact migratory birds during their breeding and nesting seasons was raised as a specific concern. This issue is addressed in the *Wildlife* subsection of the *Environmental Consequences* section of this EA.

Issue #5: Project activities may affect threatened and/or endangered species (TES) and their habitat. This issue is addressed in the *Fisheries and Aquatic Resources*, *Vegetation*, and *Wildlife* subsections of the *Environmental Consequences* and *Cumulative Effects* sections of this EA.

Issue #6: Project activities may affect FS sensitive species (plants and animals and their habitats). This issue is addressed in the *Fisheries and Aquatic Resources*, *Vegetation*, and *Wildlife* subsections of the *Environmental Consequences* and *Cumulative Effects* sections of this EA.

Issue #7: Project activities may affect population trends of Management Indicator Species (MIS). This issue is addressed in the *Fisheries and Aquatic Resources* and *Wildlife* subsections of the *Environmental Consequences* and *Cumulative Effects* sections of this EA.

Issue #8: Project activities may affect the establishment of beaver populations within the action area. This issue is addressed in the *Wildlife* subsection of the *Environmental Consequences* section of this EA.

Issue #9: Project activities have the potential to affect cultural or historic resources within or adjacent to the action area. This issue is addressed in the *Cultural Resources* subsection of the *Environmental Consequences* and *Cumulative Effects* sections of this EA.

ALTERNATIVES, INCLUDING THE PROPOSED ACTION

Alternative A

No Action

Under the No Action alternative, current management plans would continue to guide management of the project area. No fish habitat and stream channel restoration work would be implemented to accomplish project goals. The Strawberry River will continue to erode unstable banks, fine sediment will continue to restrict salmonid spawning and rearing habitat, and riparian vegetation will be limited to discontinuous patches within favorable habitat areas. Beaver populations and activity in the lower stream reaches between the UDWR fish trap and Strawberry Reservoir will be actively controlled by the UDWR through trapping and/or other lethal means.

Alternative B

The Proposed Action

The action proposed by the Forest Service and UDWR to meet the purpose and need is to perform fish habitat and stream channel restoration work on the Strawberry River from the diversion for the UDWR fish trap to a short distance below the Strawberry River confluence with Clyde Creek. Fish habitat and stream channel restoration work specific to the Phase II component of this project will occur primarily between the West-Side Road crossing and the confluence with Clyde Creek. Additional work, to repair and/or modify fish habitat and stream channel stabilization structures built during habitat restoration work completed in 2003, will occur between the UDWR fish trap diversion and the West-Side Road crossing.

Specific objectives of the proposal are to: Restore and maintain the natural dimension, pattern, and profile of the Strawberry River channel; improve upstream fish migration from the reservoir to the State spawning trap facilities; slope/stabilize eroding banks, re-

seed banks and plant willow clumps to help riparian vegetation to re-establish to provide fish cover and reduce summer stream temperatures; and experiment with discouraging beaver access and colonization in this stream segment with fencing and other methods that would not harm any beaver.

In order to achieve the objectives listed above, the proposed action for the restoration effort will focus on a number of techniques that have proven to enhance the natural function of the stream (i.e., establish proper channel dimension, pattern and profile) and will involve the following measures:

- Sloping incised stream banks and covering with coconut fiber to allow for vegetation to establish;
- planting native riparian vegetation such as willows clippings, sedges and riparian grasses;
- properly placing rock and log vanes in stream at critical locations to protect stream banks and allow riparian vegetation to recover;
- harvesting willow clumps from the surrounding flood plain to stabilize banks and create shade for fish habitat; and
- repair/reconstruct or extend existing boardwalk with additional interpretive signing on the river walk for public education opportunities within the river corridor.

A single thread channel with meanders and proper channel sinuosity will be maintained to enhance upstream fish migration. Several rock and log vanes will be placed at critical locations to protect stream banks and allow riparian vegetation to reestablish. Vertical banks will be sloped to allow vegetative cover to establish. Willow clumps will be transplanted from other Strawberry Valley locations to positions along newly sloped streambank. In Addition, willow clippings will be used to accelerate the re-establishment of a riparian community. Root wads and logs will also be used to protect streambanks and provide cover for trout. Coconut fiber will be used on outside bends of meanders to provide additional bank protection until vegetation becomes established. Sloped banks and other disturbed areas will be reseeded with species currently found in the area that are appropriate for the site including water requirements. Equipment access routes and materials staging areas will be restored by surface roughening and reseeding with native vegetation as appropriate. Implementation of the project will involve co-operative participation with the Strawberry Anglers Association, Friends of the Strawberry Valley, Trout Unlimited, and other volunteers.

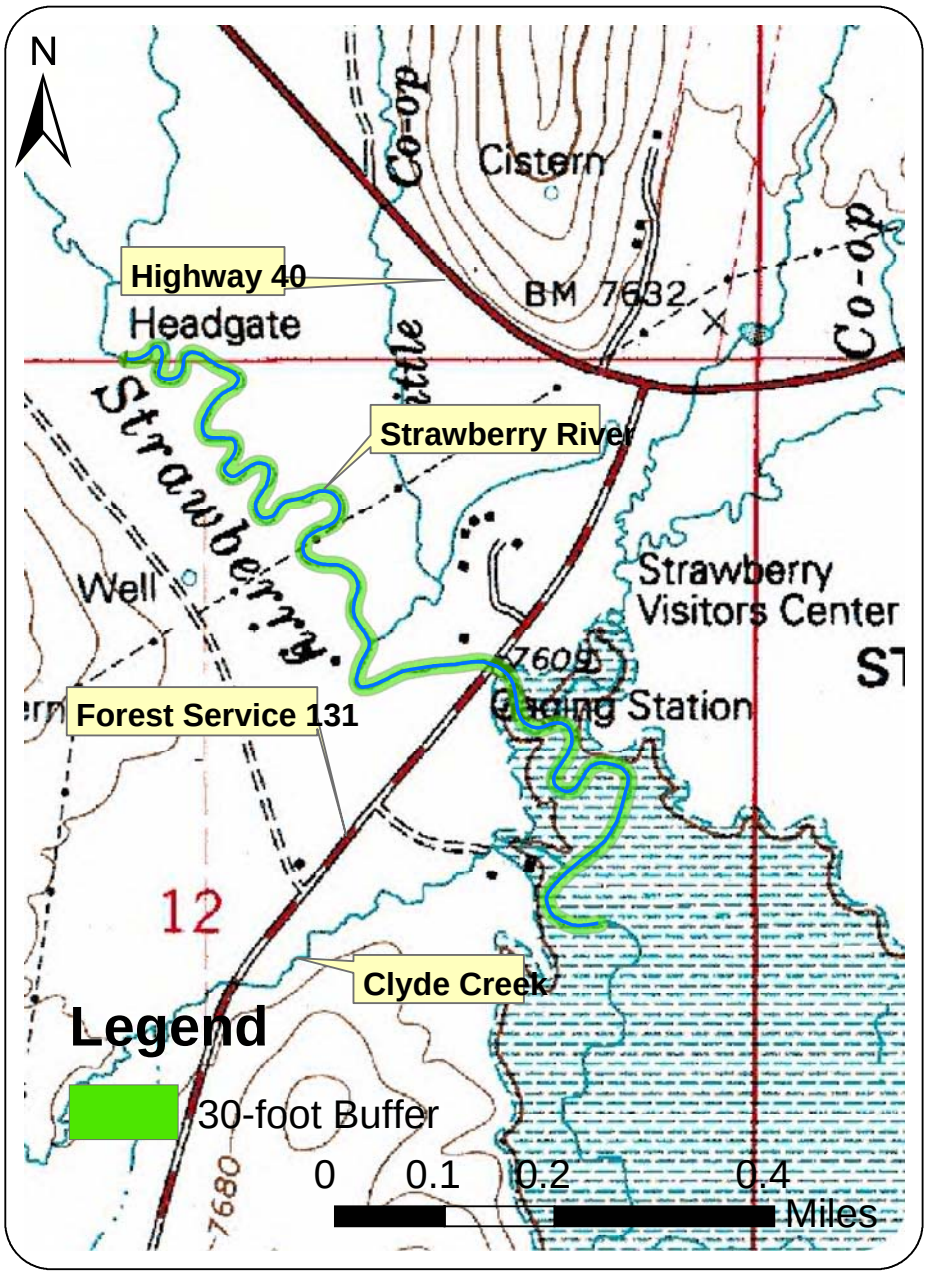

Figure 1. Project Area Strawberry River Fish Habitat Phase II.

ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS

Alternative C

Natural Recovery of Lower Strawberry River

This Alternative was considered in the initial environmental analysis based on issues and concerns expressed during project scoping.

Under this Alternative, the lower Strawberry River would be allowed to recover without the use of active land management or habitat restoration and recovery actions. Natural stream and channel forming process would be allowed to occur, beaver would be permitted to reestablish and over a period of time the lower Strawberry River would attain a natural state of equilibrium and functionality. This process would be relatively slow spanning a number of decades. Over this time issues resulting from existing unstable banks, depleted riparian areas, degraded fish habitat, and access to the UDWR fish trap would continue. Continued operation of the UDWR fish trap, as designed, would not be possible and the facility would need to be relocated or closed until the stream channel had fully recovered and Kokanee salmon could again gain access to the facility.

Although this Alternative will meet the desired objectives over time, it does not meet the immediate need for fish access to the UDWR fish trap and egg taking station. In order to attain their fisheries management objectives for the Strawberry Reservoir recreational fishery, the UDWR will need to actively manage and restrict beaver activity between the reservoir and the fish trap. Therefore, this Alternative cannot be fully implemented and because of this will not be carried through as part of this analysis.

Comparison of Alternatives

This section provides a summary of the effects of implementing each alternative. Information in the table is focused on activities and effects where different levels of effects or outputs can be distinguished quantitatively or qualitatively among alternatives.

Table 1. Comparison of project related effects for the No Action and Proposed Action Alternatives.

	No Action	**Proposed Action**
Cultural Resources	No Effect	No Effect

Fisheries and Aquatic Resources	Continued stream bank instability, bank erosion, sedimentation and degradation of aquatic habitat. Continued lower quality salmonid spawning and rearing habitat. Maintain Kokanee fishery in Strawberry Reservoir.	Temporary increase in turbidity, localized increase in sedimentation, and displacement of resident fish. Increase in salmonid spawning and rearing habitat quality. Maintain Kokanee fishery in Strawberry Reservoir.
Hydrology	Unstable, bare streambanks would continue to contribute sediment to stream. Lateral stream migration would negatively affect floodplains & adjacent wetlands. Streambank, riparian conditions, and water quality would slowly improve over time.	Short-term impacts to the stream channel, water quality, and wetland resources would occur during implementation. Streambank stability would be substantially increased through mechanical alteration, structure installation, and establishment of stabilizing riparian vegetation, and use of mitigations/design features. Stream channel would be narrowed to appropriate width, resulting in improved water quality, stream function, and capture/filtration of sediment & pollutants.
Recreation	No Effect	No Effect
Soils	Continued loss of soil through stream bank instability, bank erosion, and sedimentation.	Temporary increase in soil loss through soil erosion, but long term benefits of decreased soil loss through increased bank stability, decreased bank erosion, and decreased sedimentation. Loss of topsoil in areas of excavation and fill. Effects mitigated by topsoil salvage, stockpiling, and redistribution. Increased soil compaction from construction equipment and vehicle traffic on staging areas and temporary roads. Effects mitigated by alleviated soil compaction by ripping and extreme surface roughening.

Vegetation	No Effect	Short-term negative effect on small amount of wildlife habitat. Long-term positive effects on wildlife habitat. Negative effect to individual beaver.
Wildlife	No short-term negative effects on wildlife habitat. Less long-term positive effects on wildlife habitat compared to Alt. B. Negative effect to individual beaver.	Short-term negative effect on small amount of wildlife habitat. Long-term positive effects on wildlife habitat. Negative effect to individual beaver.

ENVIRONMENTAL CONSEQUENCES

This section summarizes the physical, biological, social and economic environments of the affected project area and the potential changes to those environments due to implementation of the alternatives. It also presents the scientific and analytical basis for comparison of alternatives presented in the chart above.

Cultural Resources

Strawberry Valley, including this project area, has been used by people for various activities for at least 8,000 years. Ancient American Indians and their modern Northern Ute descendants fished in the Strawberry River and its tributaries, hunted and gathered plants all through the valley, and gathered in many places for religious, trading, and family events. Evidences of these activities generally take the form of temporary campsites.

During the later 1800's, European American settlers from Heber Valley began to use the valley primarily for livestock grazing. After much of the Uintah-Ouray Indian Reservation was removed from the Ute Tribe in 1905, the upper parts of the watershed were added to the Uinta National Forest. The bottom of the valley (including this project area) was set aside for the Strawberry Valley Reclamation Project, and was managed by the Strawberry Water Users Association until 1988. As a result, people would have used the lower portions of Strawberry Valley (including this project area) for grazing, hunting, and fishing, as it would have been about one mile upstream from the edge of the original reservoir. When the level of the Strawberry Reservoir was raised in the 1980s, this area became considerably wetter, and was probably used only for fishing.

A complete cultural resources inventory of the project area was completed in the summer of 2004 (Thompson 2005). No sites of any kind were found. Consultation was completed with both the Utah State Historic Preservation Office (SHPO) and the Northern Ute Indian Tribe. The Tribe did not express any concerns with the project. The Utah SHPO concurred with the recommendation that there will be no historic properties (important sites) affected by the proposed project on July 30, 2004 (Dykmann 2004).

Since no sites of any kind were found, there will be no direct or indirect effects to cultural resources under the proposed Action Alternative.

Additional information used in determining the effects of the proposed action relative to cultural resources is presented in the *Specialist Report for the Strawberry Fish Habitat Phase II Project* (Thompson 2005).

Fisheries and Aquatic Resources

Analysis Area

The area of analysis includes the Strawberry River above Strawberry Reservoir located within the Strawberry Reservoir Management Area on the Heber Ranger District of the Uinta National Forest, Utah. The action area is defined as the area directly or indirectly affected by the proposed action. For the purposes of this analysis, the action area is defined as the 1.3-mile-long reach of stream channel and a 30-foot-wide buffer along each channel edge (see project area map). The action area is located along the Strawberry River immediately upstream and downstream of the Forest Service visitor center in Wasatch County on the northwest side of Strawberry Reservoir (Township 3 South, Range 12 West, northeast ¼ of Section 12; Strawberry Reservoir NW Quadrangle).

The Strawberry River drainage is located within the Northeastern GU for Colorado River cutthroat trout (*Oncorhynchus clarki pleuriticus*) and streams in the watershed were historically inhabited by Colorado River cutthroat trout. Colorado River cutthroat trout (CRCT) are a USFS Region 4 (USDA Forest Service 2003e) and State of Utah listed sensitive species and conservation agreements between the USFS and UDWR have been developed for this species. The construction of Strawberry Reservoir fragmented and isolated headwater populations of CRCT, and subsequent fisheries enhancement activities and the introduction of non-native fish species in the early 1990s is believed to have eliminated any remnant genetically pure CRCT populations within the Strawberry River drainage. Consequently, no conservation or persistence populations for CRCT have been identified within the Strawberry River drainage and this species will not be addressed in detail as part of this analysis.

Fish Populations

The Bear Lake strain of Bonneville cutthroat trout (*Oncorhynchus clarki utah*) have been introduced into the Strawberry River drainage and populations occur within a number of the stream systems within the watershed. Bonneville cutthroat trout (BCT) are a USFS Region 4 (USDA Forest Service 2003e) and State of Utah listed sensitive species and conservation agreements between the USFS and the UDWR have been developed for this species; however, no conservation or persistence populations for BCT have been identified within the Strawberry River watershed.

Other native fish species believed to be present within the Strawberry River drainage include mottled sculpin (*Cottus bairdi*), mountain sucker (*Catostomus platyrhynchus*), Utah sucker (*Catostomus ardens*), redside shiner (*Richardsonius balteatus*), and speckled dace (*Rinichthys osculus yarrowi*). Although thought to be present in the Strawberry

River drainage prior to the 1990 Rotenone treatment of the Strawberry River watershed, leatherside chub (*Gila copei*) and Utah chub (*Gila atraria*) are no longer found in the drainage (Sigler and Sigler 1996). (Smith 2005a)

In addition to Bonneville cutthroat trout, rainbow trout (*Oncorhynchus mykiss*) are known to be present in the Strawberry River drainage. Other non-native fish species that occur within the watershed include Kokanee salmon (*Oncorhynchus nerka*). Sterile rainbow trout are currently stocked by the UDWR to supplement popular recreational fisheries in some locations within the management area, while hatchery operations by the UDWR on the Strawberry River support popular recreational fisheries for both cutthroat trout and Kokanee salmon in Strawberry Reservoir. (Smith 2005a)

Rare Aquatic Invertebrates

The distribution of aquatic macro-invertebrates considered by the UDWR to be rare or imperiled is not well documented. Observations of these species on the Forest are sporadic and in many cases relatively outdated. However, one species of rare aquatic snail, the glossy valvata (*Valvata humeralis*), has been documented to occur within the Strawberry Reservoir Management Area. However, there are no records of this species being observed within the Strawberry River drainage. (Smith 2005a)

Additional information relative to aquatic invertebrates in the Strawberry River drainage are presented in *Hydrology Report – Strawberry River Restoration II* (Jarnecke 2005a) and *Summary Tables, Biotic Condition Index and Water Quality Data – Strawberry River Restoration II* (Jarnecke 2005b).

Threatened, Endangered, and Sensitive (TES) Species

The Bear Lake strain of BCT is the only TES aquatic species believed to inhabit the Strawberry River drainage. This species was introduced into the watershed following the Rotenone treatment of the Strawberry Reservoir system during 1990. Because native populations of aquatic MIS for the Uinta National Forest no longer occur within the Strawberry River drainage, the USFS does not conduct fish population surveys in the drainage as part of the MIS monitoring program (Smith and Lyman 2004). However, the USFS does conduct fish habitat and population monitoring surveys for watersheds on the Forest in which significant land management activities and/or projects have been identified and this information has been collected and is available for the Strawberry River drainage.

Fish populations in Strawberry River drainage are assessed using Habitat Quality Index (HQI) modeling techniques (Binns 1982) and standard electrofishing multiple pass removal depletion protocols (Ricker 1975). These surveys currently span the time period between 1985 through 2004 and are cataloged for reference and review in *Fisheries and Aquatic Resources Data of the Uinta National Forest* (Smith 2004b). Specific sampling protocols for fish populations on the Uinta National Forest are detailed in the *Cutthroat Trout Monitoring Plan and Protocols for the Uinta National Forest* (Smith and Lyman 2004a).

Fish population data for the Strawberry River include information collected during fish population surveys conducted by the UDWR during 1985, 1997, and 2002 and the USFS

during 2003 and 2004. Fisheries surveys conducted by the UDWR during 1985, 1997, and 2002 resulted in combined average standing crop estimates for BCT of 57, 35, and 28 lbs/acre respectively. Bonneville cutthroat trout densities averaged 1.25 fish/m and ranged from 0.57 fish/m in station 2-4 to 1.80 fish/m in station 3-6 during 1997. (Wilson et. al. 2004)

Fisheries surveys conducted by the USFS during 2003 indicate that densities of BCT averaged 0.39 fish/m and ranged from 0.60 fish/m in station 3-6 to 0.18 fish/m in station 4-8. During the 2004 surveys, estimates of BCT averaged 0.60 fish/m and ranged from 0.83 fish/m in station 3-6 to 0.37 fish/m in station 4-8. (Smith 2005a)

Population data, using indices of overall condition (K Factor) for BCT within the Strawberry River drainage, is not sufficient to determine a statistically observable change in the average overall condition of cutthroat trout during the period between 1985 and 2004 because reliable condition data for BCT were not obtained during all of the surveys. However, the existing data appear to indicate that the overall condition of BCT in the Strawberry River has remained consistent during the time period between 2003 and 2004. The overall condition of cutthroat trout in the drainage has historically averaged 0.94 and ranges from an average of 0.93 during 2003 to an average of 0.95 during 2004. (Smith 2005a)

During the period between 1997 and 2004, population data using the abundance of BCT within the Strawberry River at sample station 3-6 show a decline in the overall abundance of cutthroat trout during the period between 1997 and 2004 ($P < 0.010$; $r^2 = 0.90$). It is believed that this decline in abundance may be either an artifact of dissimilar sampling techniques or due to loss of suitable cover habitat and relatively high summer water temperatures resulting from low drought induced flows within this section of the Strawberry River. Estimates of cutthroat trout at sample station 3-6 have historically averaged 1.08 fish/m and range from an average of 0.60 fish/m during 2003 to an average of 1.80 fish/m during 1997. (Smith 2005a)

Aquatic Habitat

Existing habitat data for the Strawberry River drainage consists of Habitat Quality Index (HQI) surveys conducted by UDWR during 1985, 1997, and 2002 (Binns 1982) and R1/R4 habitat surveys (Overton et al. 1997) and Habitat Suitability Index (HSI) surveys (Hickman and Raleigh 1982) conducted by the USFS during 2003 and 2004. Additional surveys, using other habitat survey protocols, used in this analysis are cataloged for reference and review in *Fisheries and Aquatic Resources Data of the Uinta National Forest* (Smith 2004). Specific sampling protocols for fish habitat on the Uinta National Forest are detailed in the *Cutthroat Trout Habitat Monitoring Plan and Protocols for the Uinta National Forest* (Smith and Lyman 2004b).

Results of the 2003 and 2004 R1/R4 and HSI surveys indicate that the habitat suitability for cutthroat trout in Strawberry River is very good with HSI scores of 0.91 during 2003 and 0.94 during 2004. The most limiting factor identified for Strawberry River in the HSI analysis was percent fines < 3 mm in riffle-run habitat with an HSI score of 0.73. After review of the available habitat survey information, it is concluded that aquatic

habitat in the Strawberry River is sufficient to support existing populations of fish and other aquatic species at their present levels. (Smith 2005a)

Environmental Consequences

Alternative A – No Action

Following review of the existing environmental conditions, land use practices, and management objectives, it is determined that not implementing the proposed project would result in continued stream bank instability, bank erosion, sedimentation and degradation of aquatic habitat. The quality of salmonid spawning and rearing habitat would continue to be at a level below the potential for the area and may potentially decrease from present levels.

There would be no displacement and mortality of individual aquatic organisms, physical habitat disruption, increased turbidity and sedimentation resulting from project implementation. Access to the UDWR fish trap would continue to be maintained through active management and control of beaver populations in the area.

It is determined that the overall impact of **not implementing** the proposed project will result in **continued negative long-term impacts** as well as adverse **direct and indirect effects** to fisheries and aquatic resources within the lower Strawberry River drainage.

Alternative B – Proposed Action

Following review of the proposed Strawberry River Restoration Phase II project and potential effects of project implementation, it was determined that the greatest risk to fisheries and aquatic resources within the action area would result from displacement and mortality of individual aquatic organisms, physical habitat disruption, increased turbidity and sedimentation during project implementation. These effects would be temporary and extend through the end of active project implementation.

Following review of the recommended conservation measures and applicable Uinta National Forest LRMP standards and guidelines for aquatic and riparian habitat management, it is anticipated that implementation of the Strawberry River Restoration Phase II project within the identified operational guidelines and mitigation measures will not result in any long-term detrimental effects to existing aquatic resources.

It is determined that the overall impact of this project will be beneficial for fisheries and aquatic resources and that there will be **no negative long-term impacts**, **direct and/or indirect effects** to aquatic species or their habitat resulting from implementation of the Strawberry River Restoration Phase II project.

Additional information used in determining the effects of the proposed action relative to fisheries and aquatic resources is presented in *Fisheries and Aquatic Resources of the Strawberry River, Utah* (Smith 2005a); *Strawberry River Fish Habitat Phase II – Environmental Effects for Fisheries and Aquatic Resources* (Smith 2005b); and *Biological Assessment and Evaluation, Fisheries and Aquatic Resources – Strawberry River Fish Habitat Phase II* (Smith 2005c).

Additional information relative to the direct and indirect effects of the proposed action relative to fisheries and aquatic resources is included in *Soils Specialist Report for the*

Strawberry Fish Habitat Phase II Project (Davidson 2005) and *Hydrology Report – Strawberry River Restoration II* (Jarnecke 2005a).

Hydrology

Analysis Area

The project area of analysis can generally be defined as the Strawberry River Valley bottom between the UDWR fish trap facilities, West Side Road, and the Reservoir. This area includes ~1.3 miles of Strawberry River. Two tributaries, Co-Op and Clyde Creek, enter Strawberry River in the project area.

Current Conditions

Moderately steep mountain ridges (approximately 9700 feet elevation) surround the Strawberry Valley. Annual precipitation in the valley is estimated as 27 inches/year. The valley floor is principally open, rolling terrain dominated by the grassland-sagebrush type. The Strawberry River in the project area is a low gradient stream (2 percent or less). The stream is relatively unconfined and has a high meander pattern across the valley floor that is restricted by the State Highway that parallels the stream. Past grazing practices and indiscriminate herbicide spaying have eliminated mature willows causing the stream channel to become unstable and increase soil erosion. Livestock grazing was removed from the area in 1989 and bank stabilization projects were implemented in 1987 to the present (USDA Forest Service 2004a).

Stream Morphology and Stream Flows

The *Strawberry Watershed Restoration Report* (USDA Forest Service 2004a) classifies the proposed restoration reach (Segment 1) historically as a Rosgen DA stream type. The DA stream type is a multi-channel system occupying broad valley floors. Currently this stream reach is closer to a Rosgen E stream type (USDA Forest Service 2004a). The Rosgen E stream type exhibits low to moderate sinuosity, gentle-moderately channel gradient and low channel width/depth ratio. Streambanks are composed of finer material than that of the dominant channel bed materials, and are typically stabilized with extensive densely rooted herbaceous and woody riparian/wetland vegetation. This stream type is hydraulically efficient, maintains a high sediment transport capacity, and is very stable unless streambanks are disturbed or the stream experiences significant changes in sediment supply and/or streamflows (Rosgen and Silvey 1998).

Segment 1 lies entirely within the high water line of Strawberry Reservoir and includes approximately 0.5 miles of stream. Loss of streamside and floodplain willow due to aerial herbicide spraying from the 1960s through the 1980s is the largest contributor to changes in stream channel morphology, decreased bank stability, and resultant increases in streambank erosion and sedimentation. Throughout much of the stream reach, herbaceous riparian vegetation and willows have begun to re-establish. However, the vegetation is not of sufficient density or distribution to offer stream cover or stabilize streambanks/channel.

The existing channel is incised an estimated 3-5 feet with long continuous sections of bare banks. Bank erosion rates in this reach are ~550 tons/year per mile of stream – the highest in Strawberry Valley. From 1938 to 1998, the stream channel below Co-Op Creek (lower end of the restoration reach) increased approximately 19 to 33 feet (~77 percent) in average width. Average current channel width is approximately 30 feet throughout the reach where they were historically less than 20 feet (Rosgen and Silvey 1998).

Stream flow records are scarce for Strawberry Valley streams. The U.S. Geological Survey (USGS) operated a stream gage on Indian Creek between 1909 and 1911 and only partial records are available from this period. In the early 1980s the Bureau of Reclamation operated stream gages on Strawberry River and Co-Op Creek, but these records have never been published and they were not available at the time this report was written. The only gage record of any duration is for Hobble Creek Daniel's Summit (USGS gage #09280400). Annual peak flows were recorded at this site for the period 1964-1984. Mean daily stream flows are available for water years 1964-1979. Annual runoff was estimated in the *Strawberry Watershed Restoration Report* (USDA Forest Service 2004a) by correlating reservoir inflow versus outflows, gage data, and drainage area. Estimates for streams in the project analysis area are summarized in Jarnecke (2005a).

Bankfull discharge is defined as the flow at which water just reaches the level of the floodplain and is commonly considered as the channel-forming discharge. The bankfull flow is commonly assumed to have a recurrence interval of 1.5 years, meaning that flows of this magnitude will occur, on average, two out of every three years. The bankfull flow has been shown to be equivalent to the effective discharge, or the flow that transports the most sediment over time. It has also been shown that about 80 percent of the total sediment transport in alluvial streams is accomplished by flows in the range of 80 percent to 160 percent of the bankfull discharge and that sediment transport does not begin until stream flow reaches about 60 percent of the bankfull flow. Finally, it is also important to understand that flows in excess of bankfull typically occur for only a few days each year (USDA Forest Service 2004a). Estimated bankfull flows for streams in the project analysis area are summarized in Jarnecke (2005a).

Wetland and Floodplains

An extensive riparian-wetland encompasses ~ 45 acres on the valley floor adjacent to Strawberry River, Co-Op Creek, and Clyde Creek. This wetland is delineated by the US Fish & Wildlife Service - National Wetlands Inventory and classified as a seasonally inundated, palustrine emergent wetland (Utah AGRC 2001). Palustrine emergent wetlands are generally defined as non-tidal wetlands including bogs, swamps, floodplains and marshes that are substantially covered with emergent vegetation. Specifically, the wetlands in the project area are associated with floodplains of the Strawberry, Co-Op, and Clyde Creek confluence area. This area is dominated by herbaceous *carex* species, *juncus* species, and willow community type. The Project Analysis Area includes approximately 15 acres of Class I, 0.3 acres of Class III, and 8.5 acres of buffered shoreline Riparian Habitat Conservation Areas (RHCA). Numerous valley bottom

overflow channel networks run through the wetlands, generally parallel with the main stem of the Strawberry River.

Water Quality & Macroinvertebrate Data

The Strawberry River and tributaries are considered "High Quality Waters – Category 1" and are subject to the State of Utah's anti-degradation policy. Strawberry River (from Red Creek to headwaters) is listed for Utah Class 2B and 3A Beneficial Uses (UDEQ Division of Water Quality 2005). The Strawberry Reservoir and tributaries are currently partially supporting these beneficial uses. Consequently, Strawberry Reservoir is included on Utah's 2004 303(d) List of Impaired Waterbodies (UDEQ Division of Water Quality 2004) for exceedance in Total Phosphorous (TP) and Dissolved Oxygen (DO). The Utah Department of Environmental Quality (UDEQ) – Division of Water Quality completed a Draft (January 2005) Total Maximum Daily Load (TMDL) study for the Strawberry Reservoir. The TMDL Study estimates the current total phosphorus TMDL to be 3,100 lbs/year for the Strawberry Watershed. The current loads and reductions for the Strawberry River are summarized in Jarnecke (2005a).

The Draft TMDL Study requires a 10 percent reduction in TP for Strawberry River and tributaries within the Strawberry Watershed. The Study also incorporates a margin of safety (750 lbs/yr) and allocation for future sources of phosphorus (260 lbs/yr). In light of the TMDL Draft Study, current NEPA reviews and considerations of any future impacts from management, mitigation measures must be put in place to minimize increases in sediment and phosphorus delivery to Strawberry River.

Water quality and macroinvertebrate data above the project area is available for three baseline monitoring sites; Strawberry River above the UDWR fish trap (STORET# 4936650), Co-Op Creek above confluence with Strawberry River (STORET # 4936530), and Clyde Creek below West Side Road (STORET# 4936620). Water quality data for these sites is available from the mid 1980s through 2004. Additional water quality monitoring sites are located throughout the Strawberry and Watershed, but were not analyzed due to their distances from the project area.

In 2002 and 2003, water quality parameters at the Strawberry sampling location were observed as stable to improving, and generally meeting state water quality standards (USDA Forest Service 2003d). Minor exceedances in TP and DO were reported in the spring of 2003 (USDA Forest Service 2004b). Data from mid 1990s to present shows stable pH levels, slight increases in DO, and decreases in Total Dissolved Solids (TDS) and TP. This data also shows slight upward trend in Total Suspended Solids (TSS) and Dissolved Phosphorous (DP) (USDA Forest Service 2005).

In 2003, water quality parameters for the Clyde Creek sampling location were analyzed, resulting in minor exceedances in temperature and TP (USDA Forest Service 2005). Data from the mid 1990s to 2003 shows that overall TP and TSS are variable with stable to declining levels (USDA Forest Service 2004b).

In 2001, water quality parameters for the Co-Op Creek sampling location were analyzed, resulting in decreased TP from the previous sampling. Exceedances in DO, Chlorine, and Mercury were recorded (USDA Forest Service 2003c). Data from the mid-1990s through

2004 show stable DO levels, and an overall decrease in TSS (USDA Forest Service 2004b).

The three baseline sampling sites mentioned above are located above the restoration reach, but contribute water and can be used as a general indicator of water quality of the area. However, due to the degraded current condition of the restoration reach, waters below reach are expected to exhibit higher TSS & Turbidity, lower DO levels, and elevated/variable temperature. (Jarnecke 2005a)

Macroinvertebrate populations are monitored in conjunction with baseline water quality monitoring. The tool for evaluating conditions of aquatic ecosystems and associated drainages uses a rating called a Biotic Condition Index (BCI). The BCI measures the condition of a stream against its own potential rather than that of other streams and is a composite mean community and individual species tolerance and varies in response to the intensity of perturbations in the ecosystem. The BCI trend for the three sites show an upward trend from 1990 to 2000, with most recent available samplings reporting indices of 80-90. (Jarnecke 2005a)

Environmental Consequences

The following section summarizes the effects of Alternatives A – No Action and Alternative B – Proposed Action.

Alternative A, No Action

Stream Morphology and Stream Flows

Restoration activities would not be completed. Unstable streambanks within the segment would continue to be a chronic sediment source as the present rate of lateral stream migration would continue. The channel width and areas of stream braiding would continue to fluctuate as excess sediment is transported through the system. Willow and herbaceous riparian vegetation will slowly continue to expand at current rates. Accelerated sediment transport and deposition within the stream reach would continue to affect channel/floodplain development and aquatic habitat.

Wetlands and Floodplains

Lateral migration and streambank erosion would continue to negatively impact the palustrine wetlands through the present rate of streambank erosion.

Water Quality

Unstable streambanks would continue to contribute sediment to the Strawberry River at current rates. Reduction or filtration of sediment, phosphorous, and other nutrients would be dependent on natural stabilization of streambanks and development of natural channel and floodplain. A wide, shallow stream channel would continue to warm waters and reduce DO levels.

Alternative B, Proposed Action

Stream Morphology and Stream Flows

In the short term, mechanical disturbance associated with the restoration features will occur to streambanks, floodplain, and streambed. Excavation of streambanks is necessary to lessen slopes and allow herbaceous and woody vegetation to establish. Newly sloped streambanks will be immediately stabilized with coconut fiber, willow clumps, planting of native herbaceous vegetation, and willow cuttings. Restoration of streambank vegetation will also aid in sediment capture, floodplain development, runoff filtration, and create or connect aquatic habitat (Federal Interagency Stream Restoration Working Group 1998).

The streambanks, stream bed, and floodplain will be directly disturbed during installation of the root wads, log vanes, and rock vanes. These features will direct the thalwag away from newly recontoured or erodable streambanks, decrease channel width/depth, and allow channel to develop a functional single thread Rosgen E channel morphology and associated floodplain features. In order to minimize sediment transport during construction, restoration activities will be completed in late summer and during low flows.

Although short-term increases in sedimentation will occur during construction, streambank erosion will be substantially reduced in the long-term. The woody and herbaceous riparian vegetation will continue to stabilize streambanks and the floodplain. The functional Rosgen E type channel will allow increased hydrologic efficiency and restore natural sediment transport regime (Rosgen and Silvey 1998). Higher flows in the narrower channel will allow the river to transport fine sediment and redistribute larger sediments such as gravel and cobble to develop pool and riffle habitat important to stream biota (USDA National Resource Conservation Service 1998).

Wetlands and Floodplains

Short-term impact to the palustrine wetland may occur during transport of materials and equipment to the stream reach. Due to seasonal inundation, impacts to the palustrine wetlands would be minimized by completing the restoration activities in late summer when soil moisture is low. Areas where willow clumps are harvested will be stabilized following removal to minimize erosion or floodplain/wetland function. This activity will not affect the channel system or their hydrological function. Impacts to the soil resource within the wetlands and associated mitigation measures are discussed in *Soils Specialist Report for the Strawberry Fish Habitat Phase II Project* (Davidson 2005).

Water Quality

The Draft TMDL requires reductions of phosphorous input to the reservoir. In order to stabilize the streambanks and develop stable channel/floodplain, short-term impacts to water quality are necessary for long-term improvement. The short-term effect to water quality would mainly consist of introduction of sediment to the stream course during

streambank sloping and installation of root wads, log vanes, rock vanes, and large willow clumps.

Currently the unstable channel and streambank conditions are a large source of sediment and phosphorous. Restoration of riparian vegetation & installation of the channel structures will aid in bank stabilization, channel/floodplain formation, and capture of sediment transported from Strawberry River and tributaries. A narrower, deeper stream channel and increased riparian vegetative cover would decrease water temperature by reducing warming effects of solar radiation. In the long-term, reductions of streambank derived sediment and phosphorous will be substantially reduced following the restoration activities.

Additional information used in determining the direct and indirect effects of the proposed action relative to hydrological issues is presented in *Hydrology Report – Strawberry River Restoration II* (Jarnecke 2005a).

Soils

Analysis Area

The project area of analysis can generally be defined as the Strawberry River Valley bottom between the UDWR fish trap facilities, West Side Road, and the Reservoir. This area includes ~1.3 miles of Strawberry River. Two tributaries, Co-Op and Clyde Creek, enter Strawberry River in the project area.

Current Conditions

Segment 1 lies almost entirely within the high water line of Strawberry Reservoir. Loss of willows from aerial herbicide spraying from the 1960's through the 80's is the largest contributor to changes in stream channel morphology. The absence of established stream bank vegetation has decreased bank stability resulting in high rates of stream bank erosion.

According to the *Strawberry Watershed Restoration Report* (USDA Forest Service 2004a), bank erosion is highest in Strawberry Valley (in decreasing order) on Strawberry River, Co-Op Creek, Trail Hollow and Chipman Creeks. Based on present estimates, these four streams account for 88 percent of the bank erosion on valley streams (USDA Forest Service 2004a). Bank erosion rates in this reach (Segment 1) are approximately 550 tons/year per mile of stream – the highest in Strawberry Valley. High bank erosion rates in Strawberry Valley are the result of the combined effects of grazing, herbicide use, flow diversions, channelization, road construction, and (likely) removal of beaver. Fine sediments produced by high rates of bank erosion contribute to current stream conditions that inhibit fish migration, degrade spawning habitat, limit juvenile salmonid concealment cover and degrade pool and riffle habitat function and complexity.

The main soil issues center on short-term, temporary soil disturbances that remove native ground cover/vegetation and long-term, permanent disturbance that compact the soil with repeated use. These ground disturbance impacts need to be mitigated to help protect soil and water resources by decreasing soil erosion, eliminating sedimentation and increased phosphorus inputs to streams, and alleviating soil compaction and loss of soil structure

Even small losses of topsoil can result in poor revegetation after disturbance. Loss of vegetation or litter cover opens the soil to both wind and water erosion. Either soil structure damage through compaction or loss of topsoil through erosion will make these areas extremely erosive and difficult to revegetate. Increased soil erosion within riparian areas will increase the likelihood of sediment delivery to the Strawberry River. Since phosphorus is tied closely to soil particles, increased sediment into the stream will eventually result in increased phosphorus input to Strawberry Reservoir as sediments work their way down to the reservoir.

Ground disturbance changes the physical properties of soils through compaction, damage to the soil aggregate structure, and soil displacement, all of which lead to increased water runoff resulting in increased surface soil erosion, stream sedimentation, and phosphorus input to the stream. Region 4 Soil Guidelines and Standards state that no more than 15 percent of an activity area should have "Detrimentally Disturbed Soil" after the completion of all management activities. Without proper mitigation measures to protect the soils from detrimental disturbance, adherence to Region 4 guidelines may not occur.

Environmental Consequences

Alternative A – No Action

Disturbance associated with project construction would not occur. However, loss of soil through stream bank instability, bank erosion, and sedimentation would continue in the lower reaches of the Strawberry River drainage.

Alternative B – Proposed Action

Soil disturbance associated with sloping stream banks, moving soils, using construction staging areas, and developing temporary access routes have the potential to negatively impact soil aggregate structure which is the key factor for maintaining soil stability, structure, productivity, and permeability. Soil aggregate structure is impacted by several factors associated with soil disturbance including soil handling, soil compaction, and soil moisture content.

Primary soil concerns and mitigation measures for the proposed project include the following:

<u>Soil Disturbance</u> through stream bank alteration during the construction phase will be minimized through topsoil salvage. Prior to disturbing or moving soil at each of the stream bank locations, topsoil will be salvaged and stockpiled. Stockpiled topsoil will be protected from disturbance, compaction, and erosion during storage. Topsoil will be replaced on final graded surfaces after the final contour is established either by movement or placement of subsoil.

<u>Soil Erosion</u> resulting from equipment access routes and surface facility staging areas after the construction phase. Lowering soil erosion is critical to meeting Forest standards for preserving soil productivity and water quality, and to adhering to the TMDL requirements for reducing phosphorus inputs to Strawberry Reservoir. The key to reducing soil erosion is to minimize surface runoff. Although an initial increase in soil disturbance and stream sedimentation is likely during construction, the long-term reduction of increased bank stability will far outweigh the short-term disturbance

increase. At the conclusion of the project, equipment access routes need to be obliterated, alleviating subsurface compaction and leaving a roughened surface to reduce water and wind erosion until vegetation is reestablished. Because staging areas incur concentrated vehicle traffic from heavy equipment, these areas are very vulnerable to detrimental soil disturbance and compaction.

Soil Compaction resulting from vehicle traffic and repeated use of equipment access routes and surface facility staging areas during construction by equipment during wet conditions. Soil compaction interrupts water infiltration and storage, reduces plant growth thus lowering soil productivity, and interrupts nutrient cycles. Soil compaction will be minimized by avoiding repeated use of equipment access routes and equipment movement in staging areas during wet periods.

Surface roughening techniques to reduce soil compaction and erosion include track-hoe deep surface roughening which involves using a track-hoe excavator to roughen the soil surface throughout the depth of subsoil compaction by creating small (< 1 foot deep), overlapping depressions. The roughened soil surface will help catch water, prevent runoff, lower erosion, and catch sediment.

Overall benefits associated with implementation of the proposed project include decreased soil loss through increased bank stability, decreased bank erosion, and decreased sedimentation.

Additional information used in determining the effects of the proposed action relative to soils is presented in the *Soils Specialist Report for the Strawberry Fish Habitat Phase II Project* (Davidson 2005) and *Strawberry Soil Survey Interim Report* (USDA Natural Resources Conservation Service 2004).

Vegetation

Analysis Area

The action area is defined as the area directly or indirectly affected by the proposed action. For the purposes of this analysis, the action area is defined as the 1.3-mile-long reach of stream channel and a 30-foot-wide buffer along each channel edge (see project area map). The action area is located along the Strawberry River immediately upstream and downstream of the Forest Service visitor center in Wasatch County on the northwest side of Strawberry Reservoir (Township 3 South, Range 12 West, northeast ¼ of Section 12; Strawberry Reservoir NW Quadrangle).

The project involves reshaping the banks and planting additional riparian vegetation along a reach of the Strawberry River, from the Strawberry Reservoir to Forest Road 131, about one quarter mile in extent. The stream runs through a willow-dominated riparian community, at about 7600 feet elevation. The proposed project area was surveyed by Biological Technician Joshua Freiburger on August 10, 2004. No rare plant species were found (Freiburger, 2004), though possible suitable habitat for moonworts is present.

Existing vegetation in the project area is typical of the area's riparian vegetation. Common through the area are several species of willows, silver sage, Kentucky bluegrass, smooth brome (introduced), wiregrass, intermediate wheatgrass (introduced),

slender wheatgrass, beaked sedge, the weeds Canada thistle, musk thistle, and yellow sweetclover, and native forbs buttercup, strawberry, cinquefoil, and checkerflower. Another wide range of native and weed species are also found in lesser quantities.

Threatened, Endangered and Sensitive Plant Species

Brief descriptions of known habitats of Endangered, Threatened and Forest Service Sensitive plants that occur in Wasatch County are included in Table 2.

Table 2. Habitats and status of Endangered, Threatened and Sensitive plants occurring in Wasatch County, Utah.

SPECIES Common Name (Status) (Scientific Name)	Habitat in Project Area	Distribution / Habitat Association
Ute Ladies'-tresses orchid (Threatened) *Spiranthes diluvialis*	No	Wet meadow communities with continually saturated soils, below 6800 feet elevation (Atwood et al. 1991).
Barneby Woody Aster (Sensitive) *Aster kingii var. barnebyana*	No	Rock outcrops, cliffs and ledges. On lower elevations restricted to northern aspects. Elevation range 5000-11,750 feet (Tuhy 1991).
Dainty Moonwort (Sensitive) *Botrychium crenulatum*	Yes	Wet meadows, marshes and bogs. In UT, only known from rare sites above 9000 feet (Farrar, 2004).
Slender Moonwort (Sensitive and ESA Candidate) (*Botrychium lineare*)	Yes	It has been found at sea level in cool climates, in Utah is most likely at higher elevations (about 4500-9000 ft) in mountains, specific habitats have ranged from meadow dominated by knee-high grass, shaded woods and woodlands, grassy horizontal ledges on a north-facing limestone cliff, and a flat upland section of a river valley (Natureserve 2004). There have been two documented populations, in Wasatch and Duchesne Cos., none on the Uinta NF (Farrar 2004).
Garrett bladderpod (Sensitive) *Lesquerella garrettii*	No	Alpine, subalpine talus and rock outcrops. Davis, Salt Lake, Utah and Wasatch counties. Elevation range 8900-11,400 feet (Tuhy 1991).

Rockcress draba (Sensitive) *Draba densifolia var. apiculata*	No	Alpine tundra, meadows and talus in rock stripes above timberline. Spruce-fir krummholz, moist soils on receding snowbanks. Uintah Mts, rare in Wasatch range (Salt Lake Co) and Deep Creek Mts (western Juab Co.). Elevation range 9420 to 11,450 feet (Welsh et al. 1993).
Wasatch jamesia (Sensitive) *Jamesia americana var. macrocalyx*	No	Rock crevices and cliffs in mountain brush and spruce-fir types. Northern aspects or shaded sites at lower elevations (Welsh et al. 1993).

Dainty Moonwort and Slender Moonwort

Dainty moonwort is a wet meadow species known in Utah from Silver Meadow on the Uinta National Forest in Wasatch County, two sites in Summit County, one in Juab and one in Cache County (Farrar 2004). The project area is below the known elevation range for the species in Utah, but does include some perennial streamside with continually saturated soil. Slender moonwort has been found in Duchesne and Salt Lake Counties. Recent searches for it in the general collection area in Salt Lake County failed to relocate it (Farrar 2004). It apparently has a somewhat wider range of habitat adaptability than dainty moonwort as far as elevation range and moisture conditions. The riparian streamsides and saturated areas in the general project area may be suitable habitat for both dainty moonwort and slender moonwort. That none were found during this survey does not guarantee their absence.

Weeds

The most threatening weeds currently in the project area are Canada thistle and to a lesser extent musk thistle. Canada thistle is a rhizomatous perennial whose roots and rhizomes can extend 20 feet or more down into the soil. Cutting up its roots for any reason, including soil disturbance with heavy equipment, just promotes creation of additional plants. In addition, it spreads readily from airborne seeds. Musk thistle is a taprooted annual, but has airborne seeds that land and create a long-lasting seed bank in the soil. In disturbed soil, any musk thistle seed within about two inches of the surface is liable to germinate. Both species are well adapted to thrive and take over areas not already occupied by existing, established plants. The other weed species in the area also prefer such conditions.

Environmental Consequences

Alternative A – No Action

Disturbance associated with project construction would not occur.

Alternative B – Proposed Action

The proposed actions involve using heavy equipment to reshape portions of the streambanks, and planting willows and riparian herbaceous grasses and forbs. Areas

where the equipment digs up the soil can be expected to have all existing vegetation killed. Areas over which the equipment travels is likely to be moderately to severely compacted, with adverse consequences for *Botrychium* if present. Project related ground disturbance other than compaction may present an opportunity for airborne *Botrychium* spores to occupy the disturbed areas. It would take about 10 years after establishment for such a new population to put leaves aboveground.

The soil disturbance created by the streambank reshaping will lead to large quantities of soil unoccupied by mature established plants of desirable species for at least two years, despite the revegetation activities. This presents a major threat of increased weed occupation compared to current levels (already at grievous levels), from on-site propagules and from adjacent non-project areas.

Standard Weeds-9 of the Uinta National Forest 2003 LRMP states: "For at least three years after a project is completed, treat invading noxious weeds, as needed, on areas impacted by ground-disturbing operations." This is complicated in relation to this streamside project by the direction included in our existing weed management NEPA and Decision Memo (USDA Forest Service 1994, *Safety and Herbicide Use Controls* section), stating "22. - Unless label requirements or other mitigation needs are more strict minimum spray distances from live water application will be 20' with backpack sprayers and 50' when mechanical ground application is involved…". That direction does not rule out detailed hand application of herbicides that prevent application to the ground and water in riparian areas, though such treatments are very labor intensive and expensive to conduct, and have led to relatively less weed treatment near live water. Additional issues concerning weeds relative to this project are contained in Weeds-7 and Weeds-12 (USDA Forest Service 2003a).

Determinations

Implementation of the Strawberry River Restoration Phase II project will have no effect on the Ute Ladies'-tresses orchid. There is no habitat for the species in the project area, because the Strawberry River is almost a thousand feet higher than the highest recorded occupied site.

Since there is no suitable habitat for these species in the project area, the proposed project will have No Impact on Barneby Woody Aster, Garrett bladderpod, Rockcress draba or Wasatch jamesia. For Dainty moonwort and Slender moonwort, the proposed project may impact individuals or habitat, but will not likely contribute to a trend towards Federal listing or cause a loss of viability to the species.

Additional information used in determining the effects of the proposed action relative to vegetation is presented in *Biological Assessment and Evaluation – Plants, Strawberry Restoration Phase II Project* (VanKeuren 2004).

Visuals and Recreation

Analysis Area

The action area is defined as the area directly or indirectly affected by the proposed action. For the purposes of this analysis, the action area is defined as the 1.3-mile-long

reach of stream channel and a 30-foot-wide buffer along each channel edge (see project area map). The action area is located along the Strawberry River immediately upstream and downstream of the Forest Service visitor center in Wasatch County on the northwest side of Strawberry Reservoir (Township 3 South, Range 12 West, northeast ¼ of Section 12; Strawberry Reservoir NW Quadrangle).

Environmental Consequences

Alternative A – No Action

The eroded unstable bank coupled with the imposing barrier of thick declining vegetation has removed the stream from public appreciation as a natural resource and recreational amenity of the Strawberry Reservoir Visitor Center Boardwalk Trail.

No Action Alternative would have long-term direct impact or irreversible effects by further degrading the stream ecology, channel, soils, boardwalk structural integrity, water quality and safety.

Alternative B – Proposed Action

The Stream restoration could have some positive environmental consequences to recreation and visual resources. Refurbish non-functional sections of the Visitor Center board walk with additional signing on the river walk for public education opportunities. The eroded streambed at the Strawberry Visitor Center will be raised re-connecting the stream with its flood plain and riparian zone. Cobble rocks and selected large boulders will be used for stabilizing banks, creating new streambed and establishing fish pools for habitat and public viewing at key locations along the existing boardwalk for users to enjoy. Establishing this viable habitat for fish and insects restores the aquatic ecology necessary for sustaining a healthy stream environment.

Additional information used in determining the effects of the proposed action relative to recreation is presented in *Visuals and Recreation Resources – Strawberry Fish Habitat Phase II Project* (Barthelenghi 2005).

Wildlife

The action area is defined as the area directly or indirectly affected by the proposed action. For the purposes of this analysis, the action area is defined as the 1.3-mile-long reach of stream channel and a 30-foot-wide buffer along each channel edge (see project area map). The action area is located along the Strawberry River immediately upstream and downstream of the Forest Service visitor center in Wasatch County on the northwest side of Strawberry Reservoir (Township 3 South, Range 12 West, northeast ¼ of Section 12; Strawberry Reservoir NW Quadrangle). Elevation is approximately 7,600 feet. Vegetation is dominated by riparian herbaceous plants (grasses, sedges, rushes, and forbs), willows, and sagebrush. Both silver sagebrush (*Artemisia cana*) and mountain big sagebrush (*Artemisia tridentata*) occur along this stream reach. There is no forested vegetation in or near the action area.

Sage Grouse

The only Threatened, Endangered, and Sensitive (TES) wildlife species likely to be affected by the proposed action is greater sage-grouse. Sage-grouse is a Forest Service sensitive species, and the project area occurs within the range of the Strawberry Valley greater sage-grouse population. Radiotelemetry research conducted by Brigham Young University indicates that sage-grouse are not currently using habitat within the project area. Riparian habitats provide important brood-rearing habitat for sage-grouse.

Beaver

Beaver is a Management Indicator Species on the Uinta National Forest. The Forest Service is trying to encourage beaver recolonization within the Strawberry River watershed because of the positive hydrologic and ecosystem effects beaver have by building dams and creating ponds. Conflicts have arisen in certain parts of the Strawberry watershed where Utah Division of Wildlife Resources (UDWR) needs to maintain fish passage to key areas such as the UDWR fish trap or important Kokanee spawning habitat, and beaver dams create barriers to fish passage.

Migratory Birds

Of the 24 species identified as Priority Species in the Utah Partners in Flight Avian Conservation Strategy (Parrish et al. 2002, page 52), species that potentially occur within the action area are greater sage-grouse, Brewer's sparrow, and broad-tailed hummingbird. Greater sage-grouse is discussed above. Brewer's sparrows typically nest in sagebrush plants. Broad-tailed hummingbirds nest in a variety of shrubs and trees. A field survey was conducted within the action area by the Heber Ranger District wildlife biologist (Jeff Waters) on May 19, 2005. No Brewer's sparrows or broad-tailed hummingbirds were detected within the action area. Most of the project impact would be along the channel edge and streambanks; few willows would be disturbed during project implementation.

Environmental Consequences

Alternative A – No Action

Disturbance associated with project construction would not occur. However, beaver would not be allowed to colonize in the Strawberry River between the UDWR fish trap and the Strawberry Reservoir. Beaver populations within the action area would continue to be controlled by UDWR using lethal means.

Alternative B – Proposed Action

The proposed action would have short-term negative effects on riparian wildlife habitat in the project area but long-term positive effects. Heavy equipment operation to alter bank conditions would disturb soil and vegetation, but these areas would be re-vegetated and would likely recover quickly during the next few years.

Disturbance caused by the proposed action would have a short-term negative effect on a small amount of sage-grouse brood-rearing habitat. Long-term effects would be neutral or positive. The effect on sage-grouse habitat would not be significant because such a small area of riparian habitat would be affected, and the effects would be short-term.

Fencing would be used to try and keep beaver from building dams along the designated stream reach within the project area. If successful, this would force beaver into stream reaches outside of the project area but would not harm beaver. The beaver fencing was designed to allow passage of small animals, and the fencing would not impede movement of larger animals such as deer, moose, and elk.

The proposed action would have a short-term negative effect on beaver in the project area, but it would not affect the population trend or status of beaver on the Uinta National Forest or within the Strawberry Reservoir Management Area.

Disturbance caused by the proposed action may have a short-term negative effect on a small amount of riparian habitat for migratory birds, but long-term effects would be positive. Short-term negative effects would not occur under Alternative A , but longer-term positive effects on stream and riparian ecosystem function would take longer to be achieved compared to the proposed action.

Biological Determinations

Rationales for biological determinations listed below are summarized in *Wildlife Biologist Report: Biological Assessment and Biological Evaluation, Strawberry River Restoration Project* (Waters 2005).

No Effect for bald eagle, western yellow-billed cuckoo, and Canada lynx.

No Impact for northern goshawk, peregrine falcon, flammulated owl, American three-toed woodpecker, or fisher.

May Impact Individuals or Habitat, but Will Not Likely Contribute to a Trend Towards Federal Listing or Loss of Viability to the Population or Species for greater sage-grouse, spotted bat, and Townsend's big-eared bat.

Additional information used in determining the effects of the proposed action relative to wildlife is presented in *Wildlife Biologist Report: Biological Assessment and Biological Evaluation, Strawberry River Restoration Project* (Waters 2005).

CUMULATIVE EFFECTS

Overview

The cumulative effects area for this analysis includes Strawberry River drainage above Strawberry Reservoir. Past and historic activities that have contributed to the existing environment of the Strawberry River include the Strawberry River Phase I restoration; upland and Strawberry Project lands grazing; construction of existing UDWR fish weir; recreation, roads, trails, and timber harvests; upper Co-Op Creek head-cut; grazing-associated herbicide spraying; and Bjorkman head cut restoration (USDA Forest Service 2004a).

Strawberry River Phase I restoration took place in the summer of 2002 affected a one mile segment of Strawberry River starting at the electric fish weir and going upstream. Restoration rerouted one small turn on the river immediately upstream from the weir.

Other activities included bank repair and stabilization. The short term effects temporarily increased sediment into the Strawberry River; however, the long term effects were most beneficial with decreased overall sediment with decreased bank erosion. (Davidson 2005)

The original Bureau of Reclamation Project Lands were used for grazing by the Strawberry Water Users from early 1900s to 1985. Historic overgrazing coupled with herbicide spraying between 1965 and 1971 resulted in elevated upland and bank erosion rates which contributed an excess of fine sediments to Strawberry River. (Davidson 2005)

Beginning in 1936 and until 1983, the Strawberry Water Users through contractual agreement with the US Bureau of Reclamation diverted water from Currant Creek drainage over into the Strawberry River using the Currant Creek feeder canal. Diversion of water into Co-Op Creek caused channel erosion to depths of 50-70 feet in this upper canyon segment. The gully is estimated to have produced an estimated average of 30,000 tons of sediment per year, or over an estimated 1.7 million tons of sediment to lower Co-Op Creek and ultimately to the lower segment of Strawberry River below the confluence, and eventually to Strawberry Reservoir. In 1983, use of the Currant Creek feeder canal was abandoned with completion of an open water connection between the Vat Tunnel and the Currant Creek pipeline, which feeds Currant Creek Dam water into the Strawberry Aqueduct and Collection System. (Davidson 2005)

Restoration of the Bjorkman head cut took place during 2003. The head cut was the result of water diversion from Willow Creek over and into Bjorkman Hollow that took place from the 1930s to 2002. The eroding head cut continued to pump sediment into Bjorkman Hollow and eventually the Strawberry River. Restoration completely removed the head-cut which resulted in some short-term soil erosion, but with long-term beneficial reductions in soil erosion. (Davidson 2005)

Present day activities that continue to contribute either positively or negatively to the existing environment of the Strawberry River include upland grazing; recreation use; roads and trails; timber health treatment projects; no grazing on Strawberry Project lands; and Co-Op Creek upper head cut. The 2003 LRMP (USDA Forest Service 2003a) has a no-grazing policy on the original Bureau of Reclamation Project Lands. (Davidson 2005)

Foreseeable future activities that may contribute either positively or negatively to the future environment of the Strawberry River include upland grazing; recreation use; roads and trails; timber health treatment projects; continued no-grazing on Strawberry Project lands; future river restoration projects; and future upland restoration projects. (Davidson 2005)

Cultural Resources

Because there are no known cultural and/or historic sites within or adjacent to the identified action area there will be no cumulative effects relative to these resources as a result of implementation of the proposed project.

Additional information used in determining the cumulative effects of the proposed action relative to cultural resources is presented in the *Specialist Report for the Strawberry Fish Habitat Phase II Project* (Thompson 2005).

Fisheries and Aquatic Resources

Past and historic activities that have influenced fisheries and aquatic resources in the Strawberry River include the Strawberry River Phase I restoration; upland and Strawberry Project lands grazing; construction of existing UDWR fish weir; recreation, roads, trails, and timber harvests; upper Co-Op Creek head-cut; and Bjorkman head cut restoration. (USDA Forest Service 2004a)

Present day activities that continue to influence fisheries and aquatic resources in the Strawberry River include upland grazing; recreation use; roads and trails; timber health treatment projects; elimination of grazing on Strawberry Project lands; and Co-Op Creek upper head cut.

Foreseeable future activities that may influence fisheries and aquatic resources in the Strawberry River include upland grazing; recreation use; roads and trails; timber health treatment projects; continued no-grazing on Strawberry Project lands; future river restoration projects; and future upland restoration projects.

Following review of the proposed Strawberry River Restoration Phase II project and potential effects of project implementation, it was determined that the greatest risk to fisheries and aquatic resources within the action area would result from displacement and mortality of individual aquatic organisms, physical habitat disruption, increased turbidity and sedimentation during project implementation. These effects would be temporary and only extend through the end of active project implementation.

It is determined that the overall impact of this project will be beneficial for fisheries and aquatic resources and that there will be **no negative long-term impacts or adverse cumulative effects** to aquatic species or their habitat resulting from implementation of the Strawberry River Restoration Phase II project.

Additional information used in determining the cumulative effects of the proposed action relative to fisheries and aquatic resources is presented in *Fisheries and Aquatic Resources of the Strawberry River, Utah* (Smith 2005a), *Strawberry River Fish Habitat Phase II – Environmental Effects for Fisheries and Aquatic Resources* (Smith 2005b) and *Biological Assessment and Evaluation, Fisheries and Aquatic Resources – Strawberry River Fish Habitat Phase II* (Smith 2005c).

Additional information relative to the cumulative effects of the proposed action relative to fisheries and aquatic resources is included in *Soils Specialist Report for the Strawberry Fish Habitat Phase II Project* (Davidson 2005) and *Hydrology Report – Strawberry River Restoration II* (Jarnecke 2005a).

Hydrology

The proposed Strawberry River Fish Habitat Phase II project would improve water quality, aid in wetland and floodplain development, and improve stream function. It is determined that the overall impact of this project will be beneficial to the hydrologic

function as well as desired future condition for the Strawberry River and that there will be no negative long-term impacts or adverse cumulative effects.

The cumulative effects are derived from the Strawberry River Restoration Report (USDA Forest Service 2004a) and are included in *Soils Specialist Report for the Strawberry Fish Habitat Phase II Project* (Davidson 2005) and are summarized under *Soils* in the *Cumulative Effects* section of this EA.

Additional information used in determining the cumulative effects of the proposed action relative to hydrological issues is presented in *Hydrology Report – Strawberry River Restoration II* (Jarnecke 2005a).

Soils

Discussion for soils cumulative effects are taken primarily from the *Strawberry Watershed Restoration Report* (USDA Forest Service 2004a) and focus on impacts that increase soil erosion which result in an increase of stream sedimentation and phosphorus levels.

Past and historic activities that have contributed to soil erosion and stream sedimentation rates to the Strawberry River include the Strawberry River Phase I restoration (USDA Forest Service 2002); upland and Strawberry Project lands grazing; construction of existing UDWR fish weir; recreation, roads, trails, and timber harvests; upper Co-Op Creek head-cut; and Bjorkman head cut restoration (USDA Forest Service 2004a).

Present day activities that continue to contribute either positively or negatively to soil erosion and ultimately stream sedimentation into the Strawberry River include upland grazing; recreation use; roads and trails; timber health treatment projects; no grazing on Strawberry Project lands; and Co-Op Creek upper head cut.

Foreseeable future activities that may contribute either positively or negatively to soil erosion and ultimately stream sedimentation into the Strawberry River include upland grazing; recreation use; roads and trails; timber health treatment projects; continued no-grazing on Strawberry Project lands; future river restoration projects; and future upland restoration projects.

Short-term effects of project implementation include a localized increase in erosion, sedimentation, and turbidity immediately adjacent to areas of where stream channel and bank stabilization activities occur. The proposed Strawberry River Fish Habitat Phase II project would in the long-term increase bank stability, decrease bank erosion, and decrease sedimentation. It is determined that the overall impact of this project will be beneficial to soil resources as well as desired future condition for the Strawberry River and that there will be no negative long-term impacts or adverse cumulative effects.

Additional information used in determining the cumulative effects of the proposed action relative to soils is presented in the *Soils Specialist Report for the Strawberry Fish Habitat Phase II Project* (Davidson 2005).

Vegetation

In the past, actions affecting vegetation were mostly creation of the Strawberry Reservoir, heavy livestock grazing and human-caused stream downcutting resulting in conversions of meadows to sage flats, with a fairly recent cessation of livestock grazing on part of this watershed. There was also timber felling and fuelwood collection, small fuel reduction projects, overall fire suppression, road establishment and heavy recreational use. Of these activities, the most likely to affect moonworts are the gullying and other hydrological impacts of heavy livestock grazing, grazing-associated herbicide spraying in riparian areas to kill willows and other vegetation, and the hydrological effects of fire suppression, followed by gullying from roads and recreational vehicle use. All these serve to dry out riparian zones which would be the most likely habitats for moonworts, making them less or completely unsuitable habitat.

Current activities in the watershed are heavy recreational use, especially fishing and including OHV use, small amounts of fuelwood collection near roads, fuel reduction projects and watershed improvement activities. Little active gullying is going on within the watershed at present. None of the above-mentioned activities are focused in riparian areas (*Botrychium crenulatum* and *B. lineare*) except fishing and some portions of watershed improvement projects. The Strawberry River Restoration Phase II project added to these cumulative activities does not present a threat to the viability of either moonwort species, or excessive likelihood of introduction of new weed species into the project area.

Additional information used in determining the cumulative effects of the proposed action relative to vegetation is presented in *Biological Assessment and Evaluation – Plants, Strawberry Restoration Phase II Project* (VanKeuren 2004).

Visuals and Recreation

Recreation and visual resources are not included in the cumulative effects consideration because it has been determined that they will not be affected by the Proposed Action.

Additional information used in determining the cumulative effects of the proposed action relative to visuals and recreation is presented in *Visuals and Recreation Resources – Strawberry Fish Habitat Phase II Project* (Barthelenghi 2005).

Wildlife

It is not anticipated that the effects of implementing the proposed project would increase risk or negatively influence wildlife populations in the long-term. Potential cumulative effects for wildlife are similar to those previously identified and are detailed in the Soils, Hydrology, Fisheries and Aquatic Resources, and Vegetation sub-sections of the Cumulative Effects section of this EA. It is anticipated that the combined cumulative effects of past, present, and future conditions and activities would have an overall beneficial impact on wildlife populations as a result of implementing the proposed project.

Additional information used in determining the cumulative effects of the proposed action relative to wildlife is presented in *Wildlife Biologist Report: Biological Assessment and Biological Evaluation, Strawberry River Restoration Project* (Waters 2005).

CONSULTATION AND COORDINATION

The Forest Service consulted the following individuals, Federal, State, and local agencies, tribes and non-Forest Service persons during the development of this environmental assessment:

FEDERAL, STATE, AND LOCAL AGENCIES:

Utah Division of Wildlife Resources
Natural Resource Conservation Service
Kamas City
Utah Division of Wildlife Resources
Wasatch County Council
Utah Division of Water Rights
U.S. Fish and Wildlife Service
Natural Resource Division
Utah Division of Water Resources

TRIBES:

Northern Ute tribe

OTHERS:

Utah Environmental Congress
Utah Rivers Council
Friends of Wasatch Mountain State Park
Great Salt Lake Audubon
Byron Gunderson
Utah Wildlife Federation
Trout Unlimited, Utah Council
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Stonefly Society
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