RECLAMATION

Managing Water in the West

Jensen Unit Block Notice Environmental Assessment

PRO-EA-14-001

Upper Colorado Region
Provo Area Office
Provo, Utah

U.S. Department of the Interior
Bureau of Reclamation
Provo, Utah

October 2014

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The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

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Upper Colorado Region
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Chapter 1 Need for Action

1.1 Introduction and Background

The Bureau of Reclamation's, Provo Area Office, has prepared this Environmental Assessment (EA), to examine the potential environmental impacts of issuing the proposed Jensen Unit municipal and industrial (M&I) Block Notice 2 to the Uintah Water Conservancy District (District). If approved, Reclamation would sell 3,300 acre-feet (AF) of Central Utah Project (CUP), Jensen Unit water to the District.

On April 11, 1956, Congress authorized the construction, operation, and maintenance of the initial phase of the CUP, as a participating project of the Colorado River Storage Project Act. The Jensen Unit of the CUP was designed to provide 22,600 AF of water annually, with 18,000 AF for M&I uses and 4,600 AF for irrigation. The Jensen Unit was intended to be built in two parts: First, Red Fleet Dam and Reservoir (originally Tyzack), located on Big Brush Creek about 10 miles northeast of Vernal, was designed to have 24,000 AF active storage capacity and was completed in 1980. It currently provides 4,600 AF of irrigation water and 6,000 AF of M&I water. The second phase was not built. There were plans to construct an additional pumping plant (Burns Bench Pumping Plant) on the Green River to supply an additional 12,000 AF of M&I water.

Under a repayment Block Notice, issued on February 18, 1987, the District subscribed for all 6,000 AF of M&I water from Red Fleet Reservoir. However, the anticipated need for M&I water did not occur, so the District lobbied for and secured Section 203(g) of the 1992 Central Utah Project Completion Act (CUPCA) legislation to relieve a part of its repayment obligation. Section 203(g) directed the Secretary of the Interior to: execute an amendatory repayment contract with the District, and establish a conservation pool of 4,000 AF in Red Fleet Reservoir. The Amendatory Contract relieved the District of repayment and marketing responsibility for all but 2,000 AF of the M&I water developed by the project and provided terms under which the remaining 3,300 AF of M&I water could be acquired in the future by the District or third parties. This 3,300 AF of Jensen Unit M&I water is the amount currently being requested by the District. Of the 6,000 AF, Red Fleet Reservoir's annual allotment of M&I water is 5,300 AF (700 AF was remanded to the dead pool by the CUPCA legislation) with 2,000 AF currently under Block Notice to the District. The 2,000 AF is pumped from Red Fleet Reservoir by the Tyzack Pumping Plant, to the Tyzack Aqueduct Reach 1 and conveyed to the Ashley Creek Water Treatment Plant, before being delivered to the towns of Vernal, Maeser, and Jensen for M&I purposes.

Recognizing rising selenium levels in Stewart Lake, located within critical habitat for the four endangered Colorado River fish, and within the action area consulted upon for the Jensen Unit, the Service issued a Biological Opinion (BO) in 1998 (see Appendix A) for Reclamation's provision of water to the Stewart Lake Wildlife Management Area, located in Uintah County, Utah, to address water quality issues at Stewart Lake. To address and rectify these issues, Reclamation agreed to implement a 3 phased approach, with phase 3 being optional if remediation was not completed after phase 2. In the BO it was estimated that during phase 1 "about 1,800 AF of good quality water (selenium <2μg/L) will be needed to replace the irrigation subsurface return flows eliminated by piping drainage into the Green River..." The BO stated,"Three options are under consideration for delivering a permanent water supply to Stewart Lake." The first option mentioned was an open water channel, "An open water channel would be constructed from the northeast corner of Stewart Lake to the Green River, to provide a seasonal supply of good quality water to Stewart Lake." The next option discussed was a pumping station, "Water would be pumped from a sump connected to an infiltration gallery, constructed adjacent to the Green River. A small pumping plant would be installed and sized to deliver water at a flow rate of between 14 and 20 cubic feet per second (cfs) to Stewart Lake." The third option was not discussed in the BO. To achieve one of the above options the BO proposed that "...Existing Department of Interior water rights will be used to provide about 1,800 AF of water annually from the Green River for Stewart Lake." Although anticipated in the BO, the only Green River water that currently enters Stewart Lake occurs during high spring flows when the entry gates are left open to receive whatever water will enter. Water has never been pumped from the Green River to Stewart Lake. The rest of the water has been provided out of Red Fleet Reservoir using Reclamation's Jensen Unit M&I water rights.

In 1999, a Letter of Understanding on Stewart Lake Remediation was signed between the U.S. Fish and Wildlife Service (FWS), the District, the Utah Division of Wildlife Resources, and Reclamation (see Appendix B). As part of the Letter of Understanding, Reclamation agreed to provide 1,000 AF of water per year to Stewart Lake. Of this 1,000 AF, 220 AF would be Jensen Unit irrigation water, given back to the Department of the Interior, under Section 207 of the CUPCA Conservation Credit Program, through the Sunshine Canal Company's Sunshine Canal Pipeline. This leaves Reclamation with a commitment to provide at least 780 AF of water (1,000 AF – 220 AF Sunshine Canal Company water) to Stewart Lake. The agreement also stated that Reclamation might make additional waters available through other sources, such as the Green River flows that could be diverted to Stewart Lake. Although never mentioned in the 1998 BO as an option, it was agreed upon in the Letter of Understanding that "The water supply option selected is to deliver the above 1,000 AF (780 AF from Reclamation) per year to Stewart Lake from Red Fleet Reservoir through an enlarged Burns Bench Canal Pipeline replacement."

In 2000, Reclamation entered into a Memorandum of Understanding (MOU), with the District and the Burns Bench Canal Company (see Appendix C) wherein Reclamation would provide 1,000 AF base, and up to an additional 1,500 AF on a short-term basis (first 5 to 10 years), to "flush" Stewart Lake after which Reclamation would provide 1,000 AF annually for the life of the MOU. Of this 1,000 AF, 220 AF are being provided by the Sunshine Canal Company. To deliver the remaining 780 AF of Jensen Unit water, the Burns Bench Canal Company agreed to "deliver 1,000 AF long-term...of water to Stewart Lake each year through the Burns Bench Pipeline and Stewart Lake Lateral, as requested by Reclamation." The MOU states that "when a portion of the 2,280 or 780 AF blocks is required to meet M&I demand, Reclamation will discontinue delivery of that portion to Stewart Lake and will seek and use other water sources to meet its Stewart Lake water supply obligations".

In 2003, the parties to the 1999 Letter of Understanding, agreed to a water management plan for Stewart Lake and the continuing use of Red Fleet water. They agreed to conduct seven flooding cycles to attempt to meet the 4.7 µg/L selenium remediation goal for Stewart Lake. They recognized that if the flood-and-drain remediation of Stewart Lake was to continue, they needed to determine which water supply would be used long-term for Stewart Lake. As described below, the District has requested 3,300 AF of Jensen Unit water, and due to the fact that selenium levels in Stewart Lake are not below the State's water quality standard, and given that the FWS wants to continue to use Stewart Lake to rear endangered fish, an alternative source of water for Stewart Lake must be found in order to sell the water to the District.

1.2 Need for Action

Reclamation's need for action is to respond to the District's request to purchase an additional 3,300 acre-feet of Jensen Unit M&I water for use within the District's service area (see Figure 1). The District proposes to use the water for M&I purposes within the boundaries of their service area.

1.3 Project Area/Action Area

The project area consists of the Jensen Unit of the CUP and the District's service area, in northeastern Utah in Ashley Valley and extending east of the valley to the Green River, being centered roughly around the cities of Vernal and Jensen, in Uintah County, Utah (see Figure 1). It is anticipated that the water issued under this Block Notice would be sold to third parties for use within the Project Area.

The Endangered Species Act defines "project area" as all areas where project-specific activities will occur, while "action area" is all areas that might be affected directly or indirectly by the Federal action (50 CFR 402.02). In the original consultation on the Jensen Unit, the action area included the Green River downstream, to the confluence with the Colorado River, but with this proposed action only involving 3,300 AF out of the 24,000 active capacity of Red Fleet, the area of potential indirect effects only extends downstream to Horseshoe Bend.

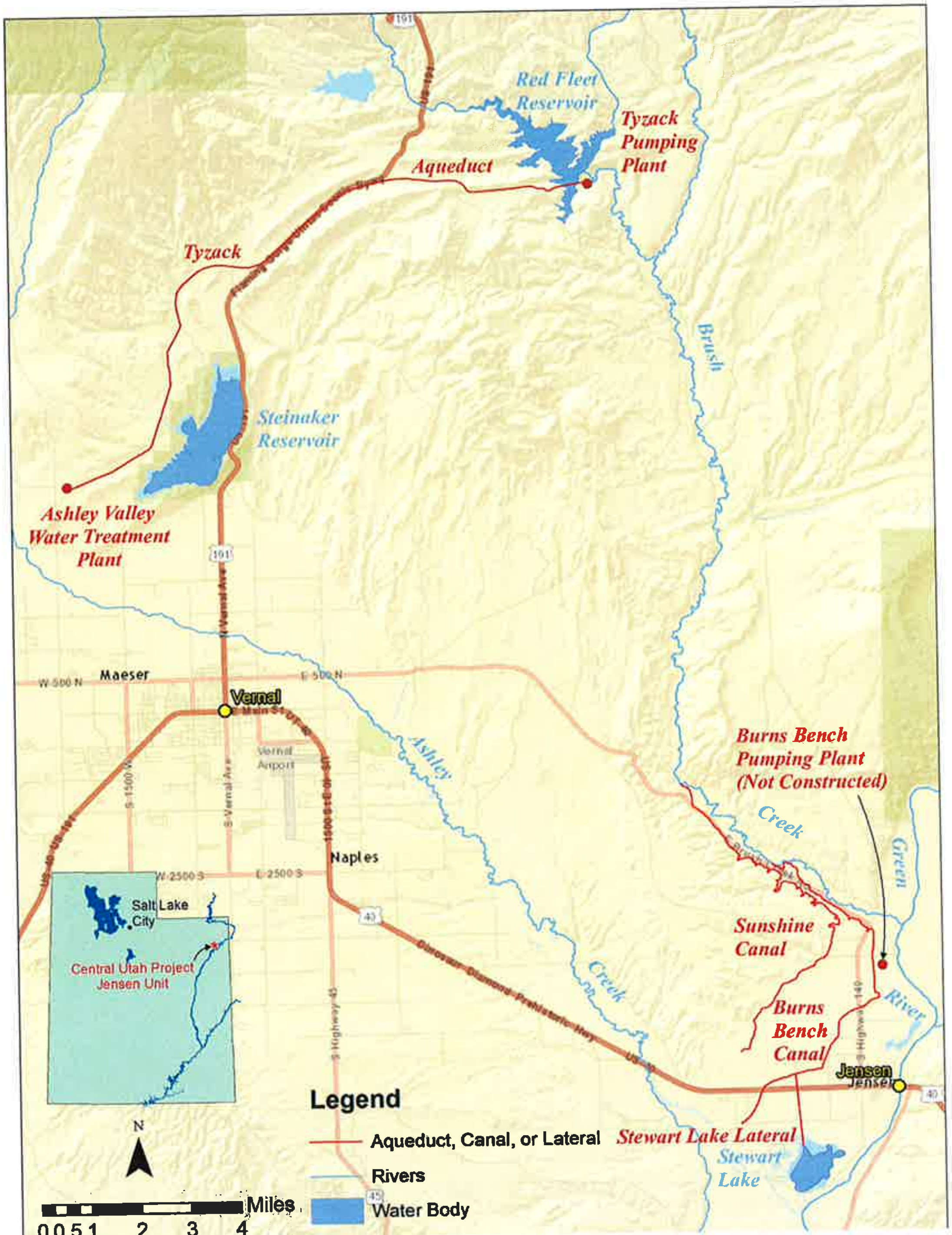

Figure 1. Map showing the Jensen Unit of the Central Utah Project.

1.4 Scoping and Public Involvement

No formal public scoping was conducted for this EA.

1.5 Related Actions

Past Federal actions related to the proposed action include the 1956 Colorado River Storage Project and construction of Flaming Gorge Dam and Reservoir, and the Environmental Impact Statement (EIS) for implementation of endangered fish flow recommendations in the Green River below Flaming Gorge Dam. The Record of Decision for this action was signed in 2006.

Construction and operation of the Jensen Unit of the CUP is a connected action, as described in the Jensen Unit Definite Plan Report (1975) and 1975 EIS. The EIS makes the provision of water to Stewart Lake a connected action, as indicated by the subsequent 1997 EA for selenium remediation in the Stewart Lake Waterfowl Management Area.

Actions of local government agencies include, the land use zoning and trends described in the Uintah County Land Use Plan (2011). Implementation of the Ashley Valley Storm Water Plan (Uintah County 2008) is also considered a connected action. Effects of these non-Federal actions are included in each of the resource sections of Chapter 3.

Chapter 2 Alternatives

This chapter describes the two alternatives considered by Reclamation for the proposed Jensen Unit Block Notice. Included in this chapter is a description of mitigation measures, monitoring, and other features common to both alternatives.

2.1 No Action Alternative

Under the No Action Alternative, Reclamation would not sell the 3,300 AF of Jensen Unit water to the District—in other words, Reclamation would reject the District's application for the Block Notice. Under the No Action Alternative, the United States would continue to be responsible for marketing the remaining Jensen Unit M&I water, and based on the Reclamation Projects Authorization and Adjustment Act of 1992, (Section 203(g)(1) Public Law 102-575), Reclamation would occasionally market the 2,300 AF, along with other irrigation water from the project. There would be no change in the fill-and-flush operation at Stewart Lake, meaning that 1,000 AF would continue to be provided annually to Stewart Lake for at least another 3 years until the larval fish study plan is completed, and until such time as the Utah Division of Water Quality, the Division of Natural Resources.

2.2 Proposed Action Alternatives (Preferred)

The proposed action is two-fold: (1) Issue a Block Notice for the sale of 3,300 AF of Jensen Unit water to the District and (2) Continue to convey 780 AF of water into Stewart Lake. The 3,300 AF of water in the Block Notice would come from Red Fleet Reservoir, based on the history and background described above. From Red Fleet, it would be released into Big Brush Creek and then conveyed in the Brush Creek channel to points of diversion, or it could be lifted by the Tyzack Pumping Plant and conveyed southwest to Ashley Creek, where it could be exchanged for higher quality Ashley Springs water. From these sources, the District would contract with local entities and communities to provide the water for M&I purposes.

The first and preferred option of water delivery is to convey water to Stewart Lake in the same manner in which it is being provided presently from Red Fleet Reservoir. This method would be a viable option until there are not sufficient AF of water (780) left for sale and/or until all water is purchased by third parties. The time that the District anticipates that it would take to sell all shares of Red Fleet water is estimated at 5 to 10 years. At that time, Reclamation would use 780 AF of Reclamation water rights on the Green River, and have that water pumped by the Burns Bench Canal Company's Brush Creek Water Users Pump Station, on the Green River, and delivered to Stewart Lake through the Burns Bench Pipeline.

Chapter 3 Affected Environment and Environmental Consequences

3.1 Introduction

Reclamation, working in cooperation with the District, formed an interdisciplinary team to study the environmental, social, and economic changes that might result from implementing the project; i.e., permitting the issuance of the Block Notice. The direct, indirect, and cumulative effects on physical, biological, and socioeconomic resources within the project area are described in this chapter. The following resources are reviewed:

- Water Rights
- Water Deliveries
- Water Quality and Pollutants
- Sensitive Wildlife Species
- Fisheries
- Threatened and Endangered Species
- Environmental Justice
- Socioeconomics

The impact area or study area equates with the project area shown in Figure 1.

3.2 Resources Eliminated from Analysis

Table 3.1 shows the resources that have been eliminated from further analysis. Impacts to these resources were considered, but not analyzed in detail, because they were determined to not be affected directly, indirectly, or cumulatively by the Proposed or No Action Alternatives.

Table 3.1
Environmental Effects

Resource	Rationale for Elimination from Further Analysis
Public Health and Safety	Public Health and Safety would not be affected by implementing either the Proposed Action or No Action Alternatives.
Wilderness Areas and Wild and Scenic Rivers	There are no designated wilderness areas or Wild and Scenic Rivers within the project area; therefore, Wilderness and Wild and Scenic Rivers would not be affected by implementing the Proposed or No Action Alternatives.
Prime and Unique Farmland	There is Prime and Unique Farmland within the project area. But, there would be no conversion of farmland to non-agricultural use, as defined by the Farmland Protection Policy Act (USC 4201-4209), by implementing Proposed Action or No Action Alternatives.
Vegetation and Wildlife	Vegetation and wildlife would not be affected by implementing the Proposed Action or No Action Alternatives, because the effects of selling the water or continuing to convey the water would be negligible.
Energy and Public Utilities	Energy and public utilities would not be affected by implementing the Proposed Action or No Action Alternatives.
Air Quality and Climate Change	Air quality and climate change would not be affected by implementing the Proposed Action or No Action Alternatives.
Paleontological Resources	Paleontological resources would not be affected by implementing the Proposed Action or No Action Alternatives.
Indian Trust Assets	There are no Indian Trust Assets related to the Jensen Unit or Stewart Lake.
Cultural Resources	No cultural resources would be affected by implementing the Proposed Action or No Action Alternatives.

3.3 Water Rights

Six major water rights have been filed for the Jensen Unit of the CUP, and these water rights fall into three general categories: Red Fleet Reservoir water storage, Red Fleet Reservoir Stored water exchange to Ashley Creek, and Green River direct flow diversions, described in more detail below.

Water Right No. 45-97 (A17558) allows for 30 cfs, up to 10,000 AF, of Brush Creek water to be stored in Red Fleet Reservoir and used for the irrigation of 5,000 acres. The irrigated lands under this permit are along Brush Creek below Red Fleet Reservoir and near the town of Jensen, and the primary crop grown is alfalfa. This right was filed by Reclamation on April 23, 1946 (the priority date of the water right), and was approved by the State Engineer on March 17, 1961.

Water Right No. 45-3489 (A30414a) is a 40,000 acre-foot segregation from the original Flaming Gorge Reservoir water right filling Application to Appropriate No. A30414 (41-2963). Reclamation filed **Change Application No. a5769** to move this segregated water right to Brush Creek for storage in Red Fleet Reservoir. This right allows for the irrigation of 10,000 acres, the watering of 5,320 livestock, the indoor water needs of approximately 5,000 homes, and unspecified industrial, fish, wildlife, and recreational uses. Reclamation filed the original Flaming Gorge water right on August 7, 1958 (priority date). This water right was segregated for Jensen Unit purposes on February 21, 1969 (the priority date of Change Application No. a5769), and this change application was approved by the State Engineer on July 9, 1969.

There are also two exchange applications (E856 and E857) that combined, allow up to 18,000 AF of water captured in Red Fleet to be pumped and discharged into Ashley Creek, in exchange for an equivalent quantity of water to be taken from Ashley Springs for M&I purposes. These exchange applications are described in more detail below.

Exchange Application No. E856 (45-4648) exchanges up to 18,000 AF under Water Right No. 45-3489 from Red Fleet Reservoir to Ashley Springs. This exchange allows water from Red Fleet Reservoir to be pumped and discharged into Ashley Creek in exchange for a similar quantity of water to be taken from Ashley Springs M&I purposes. This exchange was filed on January 28, 1975, and was approved on March 10, 1977. No proof is required for this application.

Exchange Application No. E857(45-4649) exchanges 30 cfs, up to 10,000 AF of water under Water Right No. 45-97, from Red Fleet Reservoir to Ashley Springs. This exchange allows water from Red Fleet Reservoir to be pumped and discharged into Ashley Creek in exchange for a similar quantity of water to be taken from Ashley Springs for M&I purposes. This exchange was filed on January 28, 1975, and was approved on March10, 1977. No proof is required for this application. The combined total of water exchanged under E856 and E857 is 18,000 AF.

Lastly, the Jensen Unit has water rights for the undeveloped Burns Bench Pumping Plant. Water rights (45-824 and 45-6168) allow up to 150 cfs to be diverted from the Green River, to irrigate lands near Jensen and along Brush Creek. By using the pumping plant to meet existing irrigation water needs, more water is available on Brush Creek for M&I uses. Although the Burns Bench Pumping Plant has not been constructed, it remains an authorized feature of the Jensen Unit and could be developed depending on water demands. The Burns Bench Pumping Plant rights are described in more detail below.

Water Right No. 45-824 (A30415) allows for a 50 cfs diversion from the proposed Burns Bench Pumping Plant on the Green River. Water under this right is to be used for the irrigation of 4,500 acres (2,200 acres of new ground and 2,300 acres of existing irrigated ground). The 2,300 acres of existing irrigated ground is currently being served by Red Fleet Reservoir. If the Burns Bench Pumping Plant is constructed, Red Fleet water currently being used for irrigation can be used for M&I purposes. This water right was filed by Reclamation on August 7, 1958, and was approved by the State Engineer on April 3, 1961.

Water Right No. 45-6168 (A30416) allows for a 100 cfs diversion from the proposed Burns Bench Pumping Plant on the Green River. Water under this right is to be used for the irrigation of 4,300 acres (1,800 acres of sole supply irrigation and 2,500 acres of supplemental irrigation). This water right was filed by Reclamation on August 7, 1958, and was approved by the State Engineer on March 17, 1961.

3.3.1 No Action Alternative

Under the No Action Alternative, 1,000 AF of Jensen Unit water would continue to be allocated annually to Stewart Lake and the 2,300 AF that is currently unsubscribed would not be developed at this time.

Under No Action, there is no change in any water right as described above. Because most of these water rights are unperfected, there is a risk that the unused portion of these water rights would be lost if proof is submitted on these rights.

3.3.2 Proposed Action Alternative

Under the Proposed Action, the last 3,300 AF of the anticipated yield of Red Fleet Reservoir would be sold to the District and placed to beneficial use. This action more fully utilizes the Red Fleet Storage water rights for their intended purposes.

The 3,300 AF requested by the District would have the priority date of the project water rights, so there would be no or minimal effects on extant water rights, due to the relatively junior priority date of Red Fleet storage rights, and the relatively short distance between Red Fleet Dam and the Green River. The most senior water right Red Fleet Reservoir (45-97) has a 1946 priority date which makes it junior to most of Brush Creek direct flow water rights. These senior water rights are protected against potential impacts of increased Jensen Unit diversions, because they can take water ahead of storing water in Red Fleet. Partly because of the junior priority date the Red Fleet water rights, this reservoir stores much of its water during the winter and early spring months when irrigation water rights are dormant or Brush Creek flows greatly exceed the irrigation demand.

The other factor that limits the potential water right impacts of the proposed action is the proximity of the Jensen Unit to the Green River. Red Fleet Reservoir is located about 14 miles upstream of the confluence of Brush Creek and the Green River. Potential impacts from increased Jenson Unit diversion would be limited to Brush Creek water rights in this 14 mile stretch. Green River water rights after the Brush Creek confluence, have a much larger base flow to satisfy water needs. Therefore, Green River water rights are rarely subject to priority cuts and would not notice decreases in Brush Creek Flows.

The average household in Vernal, and other cities in Uintah County, use approximately 1 AF of M&I water each year. The water delivered under the Proposed Action would accommodate an additional 3,000 connections. With the median household income at $61,850, the additional 3,000 connections would equate to $185,550,000 of annual income for those reliant upon the 3,300 AF of additional Jensen Unit M&I water.

3.4 Water Deliveries

3.4.1 No Action

Under No Action, up to 1,000 AF of water would be provided annually to Stewart Lake. The 2,300 AF of water in Red Fleet would remain in storage in the reservoir unless it could be marketed for irrigation.

3.4.2 Proposed Action

Under the Proposed Action, Reclamation would sell 3,300 AF of Red Fleet water to the District, based on demand from the municipalities in the project area. The water would be delivered to the towns of Jensen and Vernal for M&I use. Reclamation would provide 780 AF of water to Stewart Lake from Red Fleet Reservoir until the 3,300 AF of water sold to the district is all subscribe to. After which, Reclamation would provide the 780 AF of water to Stewart Lake out of its water rights on the Green River. The Stewart Lake water would be released to the Green River approximately 90 days after delivery or to grow out the fish.

3.5 Water Quality and Pollutants

In 1972, Congress amended the Federal Water Pollution Control Act, making the addition of pollutants to the waters of the U.S. from a point source, unlawful unless the discharge is in compliance with a National Pollutant Discharge Elimination System (NPDES) Permit. Known today as the Clean Water Act (CWA), Congress has amended the CWA several times, including 1987 amendments which directed dischargers of storm water from M&I point sources to comply with the NPDES permit system. Relevant sections of the CWA for this action are:

- Sections 303 and 304 which require states to promulgate water quality standards.
- Section 401 which requires an applicant for a Federal contract or license to conduct any activity which might result in a discharge to waters of the United States, to obtain certification from the State that the discharge would comply with the CWA.

- Section 402 which established the NPDES permitting system for discharges (except for dredge or fill material) of any pollutant into waters of the United States. The State of Utah Department of Environmental Quality, Division of Water Quality administers this permitting program in Utah. Section 402(p) requires permits for discharges of storm water from industrial/construction and municipal separate storm sewer systems (MS4s).

Selenium, phosphorus, and ammonia are pollutants of concern in multiple water bodies in the Uintah Basin. Under Section 303(d) of the CWA, Red Fleet Reservoir, Steinaker Reservoir, Brush Creek, Lower Ashley Creek, Lower Dry Fork Creek, and Middle Ashley Creek are listed on the State of Utah's List of Water Quality Limited Water Bodies, because they exceed one or more water quality standards.

Red Fleet Reservoir, Steinaker Reservoir, and Feeder Canal have been identified as impaired, due to dissolved oxygen and phosphorus from organic enrichment and oxygen depletion. A total daily maximum load (TMDL) for phosphorus has been prepared, but other TMDLs are needed. The State Division of Water Quality has indicated that Stewart Lake will be added to the 303d impaired list during 2014 and after listing, they have 6 to 10 years to complete either a TMDL or alternative strategy and implementation plan to reduce the pollutants.

3.5.1 No Action Alternative

Under the No Action, the State and managing partners will continue to work to reduce pollutants and prepare TMDLs. Under both alternatives, the water quality of multiple water bodies in the project area are impaired. Red Fleet Reservoir, Steinaker Reservoir, and Feeder Canal are impaired due to dissolved oxygen and phosphorus from organic enrichment and oxygen depletion. Stewart Lake will be declared an impaired water of the State during 2014, and sampling work will begin to help prepare a TMDL or alternative strategy and implementation plan.

3.5.2 Action Alternative

Based on the anticipated timing of water being released from Red Fleet Reservoir (spring through fall), the release of 2,300 AF of Red Fleet water should not affect water quality. Its status as impaired due to low dissolved oxygen and high levels of phosphorus would remain. The Green River is not listed as impaired water and therefore, water provided to Stewart Lake out of the Green River would not affect water quality negatively.

The other water quality effect is likely to be minor amounts of increased storm water runoff into the Green River; however, this should be managed by the CWA permitting processes of the municipalities and District. The District would need to review their need for Section 401 or 402 Permits with the Utah Division of Water Quality, and they would need to meet with Uintah County to ensure conformance with the Ashley Valley MS4 permitting system.

3.6 Sensitive Wildlife Species

There are a total of 32 sensitive wildlife species on the state sensitive species list for Uintah County. Of the 32 species, three are addressed in the Fisheries section below, four in the Threatened and Endangered Species section below, nine species either do not have habitat or do not occur in the project area, and two species that could potentially be listed under Endangered Species Act in the future, (Greater sage-grouse and yellow-billed cuckoo) are not found in the action area due to a lack of quality habitat. That leaves the following 14 species that could occur in the action area: American white pelican, bald eagle, big free-tailed bat, black-footed ferret, bobolink, burrowing owl, ferruginous hawk, Lewis's woodpecker, long-billed curlew, mountain plover, short-eared owl, smooth greensnake, Townsend's big-eared bat, and white-tailed prairie dog. If these species could occur in the area, the habitat associated with them is likely present.

Greater sage-grouse are considered a candidate species for ESA listing. There is not sufficient quality habitat, nor would the No Action or Action Alternative affect their habitat or the species if it was present. There would be no effects to this species.

Yellow-billed cuckoo are a proposed species for ESA listing. There is not sufficient quality habitat, nor would the No Action or Action Alternative affect the extant habitat of the species if it was present. At best, this species may move through the area in search of quality habitat. Therefore, there would be no measureable effects to this species.

3.6.1 No Action Alternative

Under the No Action Alternative, there would be no changes to the sensitive species or their habitats potentially found in the area. Conditions would remain the same.

3.6.2 Proposed Action Alternative

Under this alternative, there would be no effects to these species due to the sale of Jensen Unit water. Habitats would not be modified, nor would prey or plant species needed for food or cover be substantially altered or changed, causing a disruption in normal behavior.

3.7 Fisheries

The Green River and Red Fleet Reservoir support fisheries consisting of 27 fish species, of which 16 are exotic species that dominate the system (see Table 3.2). There are 11 native species, four of which are federally listed as endangered. (Endangered fish are covered in the next section.)

Table 3.2
Exotic (introduced) and Native Fish Species in the Project Area

Abundant	Common	Rare-incidental	Special Status
		Exotic Fish Species	
Carp	Fathead minnow	Rainbow trout	
Red shiner	Channel catfish	Brown trout	
	Black bullhead	Northern pike	
		Longnose dace	
		Creek chub	
		Sand shiner	
		White sucker	
		Utah sucker	
		Green sunfish	
		Smallmouth bass	
		Walleye	
		Native Fish Species	
None	Speckled dace	Mountain whitefish	Razorback sucker
	Bluehead sucker	Mountain sucker	Humpback chub
		Mottled sculpin	Bonytail chub
		Flannel-mouth sucker	Colorado pikeminnow
		Roundtail chub	

Several studies done in the 1990s, as part of the Middle Green River Basin Study, documented high selenium levels in fish found at Stewart Lake. Fish tissue samples from carp and catfish collected at Stewart Lake showed selenium levels ranging from 5.6 to 25.5 µg/L. The normal background level of selenium in fish tissue is 1.7 µg/L. These tissue levels of selenium from Stewart Lake and the Green River near the Stewart Lake outlet routinely exceed the threshold of 4 µg/L for whole body samples known to cause impaired fish reproduction (Lemly, 1993). These high selenium levels lead to a Jeopardy Opinion from the FWS in 1998, and Reclamation's subsequent remediation efforts.

3.7.1 No Action Alternative

Under the No Action Alternative, there would be no changes to the habitat for sport fish and native fish in the project area. There would be no change to the source from which the water is provided.

3.7.2 Proposed Action Alternative

Under the Proposed Action, the amount of water that is currently provided to Stewart Lake would not change. There would be no changes to the habitat that the fish species present at Stewart Lake use. There would be no measureable effects to fish or their habitat.

3.8 Threatened and Endangered Species

Under the ESA (ESA, 16 USC 1531), Federal agencies are required to ensure that any action federally authorized, funded, or carried out, does not jeopardize the continued existence of threatened or endangered species or modify their critical habitat. The proposed action, as described above, would have no effect on listed species (Table 3.3 below – and subsequent rationale in 3.8.2).

The FWS has recognized, in multiple biological opinions, that flow diversion and depletions to the Colorado River and its tributaries have affected the Colorado River fishes and contributed to the original listing of the four endangered species. Flow depletions affect the ability of the river to create and maintain habitat. As a tributary to the Colorado River, new depletions to the Green River would be considered as having an adverse effect on the Colorado River endangered fish species. The 780 AF water right of Green River water that Reclamation proposes to use to supply water to Stewart Lake, was previously consulted on in the 2005 Operation of Flaming Gorge Dam EIS. No additional consultation with the FWS would be required for the use of the 780 AF.

Table 3.3
ESA Listed Species Potentially Found in Uintah County

Species (common and scientific name)	Status	Present in Action Area?	Addressed further in this document?	Rationale for addressing or dismissing species and effects determination (in bold)
Bonytail chub (*Gila elegans*)	Endangered	Yes	Yes	Impacts may occur; **No effect**
Colorado pikeminnow (*Ptychocheilus lucius*)	Endangered	Yes	Yes	Impacts may occur; **No effect**
Humpback chub (*Gila cypha*)	Endangered	Yes	Yes	Impacts may occur; **No effect**
Razorback sucker (*Xyrauchen texanus*)	Endangered	Yes	Yes	Impacts may occur; **No effect**
Critical habitat for the four endangered fish	-	Yes	Yes	Impacts may occur; **No effect**
Mexican Spotted owl (*Strix occidentalis lucida*)	Threatened	No	No	Project is not near or around old growth forests; **No effect**
Mexican Spotted owl critical habitat	-	No	No	Project is not near or around old growth forests; **No effect**
Clay reed-mustard (*Schoenocrambe argillacea*)	Threatened	No	No	Habitat requirements for species not present in project or action area; **No effect**
Pariette cactus (*Sclerocactus brevispinus*)	Threatened	No	No	Habitat requirements for species not present in project or action area; **No effect**
Shrubby reed-mustard (*Schoenocrambe suffrutescens*)	Endangered	No	No	Habitat requirements for species not present in project or action area; **No effect**

Uinta Basin hookless cactus (*Sclerocactus wetlandicus*)	Threatened	No	No	Habitat requirements for species not present in project or action area; **No effect**
Ute ladies'-tresses (*Spiranthes diluvialis*)	Threatened	No	No	Surveyed August 2014, none found;– **No effect**
Black-Footed ferret (*Mustela nigripes*)	Experimental Population, Non-Essential	No	No	Not found in project or action area; **No effect**
Canada Lynx (*Lynx canadensis*)	Threatened	No	No	Not found in project or action area; **No effect**
Yellow-billed cuckoo (*Coccyzus americanus*)	Proposed Threatened	No	No	Habitat requirements for species not present in project or action area; **No effect**

3.8.1 No Action Alternative

Under the No Action Alternative, there would be no changes to the current conditions or additional effects to listed species or their critical habitat

3.8.2 Action Alternative

For the four endangered fish, the Action Alternative, would produce no measureable negative effect to the three Primary Constituent Elements, which include: (1) High quality water (i.e., temperature, dissolved oxygen, lack of contaminants, nutrients, turbidity, etc.), (2) Physical habitat for use in spawning, nursery, feeding, and rearing, or corridors between these areas, including the river channel, bottom lands, oxbows, backwaters, and other areas in the 100-year flood plain; and (3) Biological environment including food supply, predation, and competition. Fish would continue to have high quality water, good physical habitat, and food necessary to survive, especially those entrained in Stewart Lake. In addition, there would be no effect to critical habitat.

Overall, the effects of the sale of Jensen Unit water on the fish or their habitat is negligible. Depletions related to the Jensen Unit were previously considered in the 2005 Operation of Flaming Gorge Dam EIS. Therefore, based on our analysis our determination is that the proposed action would have **no effect** on the four endangered fish, nor would it **adversely affect or modify** critical habitat. Therefore, due to these effects determinations, Reclamation will not initiate consultation with FWS nor write a Biological Assessment.

3.9 Environmental Justice

All projects involving a Federal action must comply with Executive Order (E.O.) 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," signed by President Clinton on February 11, 1994. This E.O. directs Federal agencies to take the appropriate and necessary steps to identify and address disproportionately high and adverse effects of Federal projects on the health or environment of minority and low-income populations to the greatest extent practicable and permitted by law.

From 1970 to 2011, the population of Uintah County, Utah increased by 159 percent compared to 53 percent for the United States, but most of the population of the county is white. Most recently, from 2008 to 2012, the racial category with the highest percent of the population in Uintah County was white (84.9 percent), while the racial category with the lowest percent of the population was Black or African American (0.1 percent) (Commerce, 2013). Across the United States, people who self-identify as Hispanic or Latino is 16.4 percent and in Uintah County, only 7.1 percent of the population is Hispanic.

During the 2008 to 2012 period, the United States had 14.9 percent of individuals living in poverty (defined by the Office of Management and Budget), while Uintah County had 10.5 percent of its population below the poverty line. In terms of families, from 2008 to 2012, the United States had 10.9 percent of families living in poverty, while Uintah County had 6.9 percent of its families living below the poverty line.

Given these statistics on low-income populations and minorities, no environmental justice communities have been identified that would be adversely affected by the project as proposed. Therefore, this project is not subject to the provisions of E.O. 12898.

3.10 Socio-Economics

Uintah County was named for a portion of the Ute Indian Tribe that has lived previously in the area, and is one of four Utah counties bordering the state of Colorado. Vernal is the largest city in the area and is also the county seat. Other important area cities include Fort Duchesne, Jensen, Maeser, and Naples. Non-native population in the area was nearly non-existent until the discovery of Gilsonite in 1888. Since that time, the population of Uintah County has ebbed and flowed based on boom and bust cycles related to the extraction of various natural resources including oil, natural gas, phosphate, and Gilsonite. Agriculture production in Uintah County is primarily focused on raising cattle and sheep, and cultivating alfalfa.

Population Characteristics

As of 2012, the population of Uintah County was 34,524 with males comprising 50.8 percent of the inhabitants. From 2000 to 2010 the population in the area increased 29.2 percent from 25,224 to 32,588, making this the sixth fastest growing county in Utah, and one of the top 100 fastest growing counties in the United States. The racial make-up of the county is 82.3 percent White, 7.8 percent American Indian, 7.7 percent Hispanic or Latino, with all other races encompassing the remaining 2.2 percent. While only 16.6 percent of the residents of Uintah County have the educational equivalent of a Bachelor's Degree or higher, compared with 29.9 percent of the State of Utah, the median household income is $61,850 compared to the state median household income of $58,164.

The population in Uintah County is expected to grow, and additional MSI water supplies will be needed to accommodate the increase in residents. Table 1 below shows the projected increase in population based on the Governor's Office of Planning and Budget from 2008.

Table 1. Unitah County Population Projections

	(Actual) 2010	2020	2030	2040	2050	2060
Uintah County	32,588	37,950	40,638	42,536	46,445	51,300

*Governor's Office of Planning and Budget

Two years ago the Ashley Valley Water Treatment Plant underwent an expansion project, where the plant capacity was nearly doubled from 8 million gallons per day to 15 million gallons per day, in anticipation of a population increase.

Chapter 4 Consultation and Coordination

The following agencies were consulted during the development of this EA.

Table 4.1
Agencies, Tribes, and Individuals Consulted for this EA

Name	Purpose & Authorities for Consultation or Coordination	Findings or Conclusions
Fish and Wildlife Service	Consultation under Section 7 of the ESA (16 USC 1531	FWS were coordinated with for possible endangered species issues. A meeting between Reclamation and FWS was held on September 29, 2014. At the meeting FWS agreed with Reclamation's determination that no consultation was needed for the proposed project.
Utah Division of Wildlife Resources (DWR)	Consult with DWR as the agency with expertise on wildlife and management responsibility for Stewart Lake	Coordination with DWR is ongoing due to their management of the Stewart Lake Waterfowl Management Area.
Utah Water Quality (WQ) Division (	Consult with WQ as agency with jurisdiction and expertise on water quality	Coordination with WQ on Selenium contamination at Stewart Lake is ongoing.

Chapter 5 References

Bureau of Reclamation. (1975). *Final Environmental Statement - Jensen Unit, Central Utah Project, Utah.* Provo: Bureau of Reclamation.

Bureau of Reclamation. (1997). *Middle Green River Basin Study - Stewart Lake Waterfowl Management Area.* Provo: Bureau of Reclamation.

Commerce, U. D. (2013). *American Community Survey*. Retrieved 02 2014, from www.census.gov: https://www.census.gov/acs/www/

Commerce, U. D. (2014, April 28). *Bureau of Economic Analysis, Regional Economic Information System*. Retrieved from Bureau of Economic Analysis: http://www.bea.gov/regional/index.htm

Theobald, D. (2013). *Land Use Classes for ICLUS/SERGoM v2013.* Fort Collins: Colorado State University.

Uintah County. (2008). Ashley Valley Storm Water Plan. Accessed on line at: http://co.uin tah.ut.us.

----- (2011). Uintah County Land Use Plan 2010, Amended 2011. Accessed on line at: http://co.uin tah.ut.us. United States [U.S.]

U.S. Bureau of Reclamation, Upper Colorado Region. 1975. Jensen Unit, Central Utah Project Definite Plan Report., Salt Lake City, Utah

U.S. Fish & Wildlife Service. (2014, April 28). *IPaC - Information, Planning, and Conservation System*. Retrieved from U.S. Fish & Wildlife Service: http://ecos.fws.gov/ipac/

U.S. Geological Survey. (2014, April 9). *National Gap Analysis Program Protected Areas* . Retrieved from USGS National Gap Anaylsis Program: http://gapanalysis.usgs.gov/padus/

Appendix A

Fish and Wildlife Service's Biological Opinion for Stewart Lake Waterfowl Management Area, Middle Green River Basin Study, August 28, 1998.

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United States Department of the Interior

FISH AND WILDLIFE SERVICE
UTAH FIELD OFFICE
LINCOLN PLAZA
145 EAST 1300 SOUTH, SUITE 404
SALT LAKE CITY, UTAH 84115

SURNAME'

In Reply Refer To
(CO/KS/NE/UT)
UT-97-F-009

August 28,1998

MEMORANDUM

TO: Upper Colorado Regional Office, Bureau of Reclamation, 125 South State Street, Room 6107, Salt Lake City, Utah 84138-1102

FROM: Field Supervisor, Ecological Services, Utah Field Office, Fish and Wildlife Service, Salt Lake City, Utah

SUBJECT: Formal Section 7 Consultation for the Middle Green River Basin Study, Stewart Lake Wildlife Management Area, National Irrigation Water Quality Program

In accordance with section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.) (Act), and the Interagency Cooperation Regulations (50 CFR 402), this transmits the Fish and Wildlife Service's (Service) biological opinion for impacts to federally listed endangered species from the Stewart Lake Waterfowl Management Area Middle Green River Basin Study. This Study was initiated as part of the National Irrigation Water Quality Program. This opinion is provided to you as the lead Federal Agency regarding section 7 consultation for this project.

This biological opinion is based on information provided in the biological assessment, draft environmental assessment, draft risk assessment, and numerous studies conducted as part of the Middle Green River Basin Study, Stewart Lake Waterfowl Management Area. A complete administrative record of this consultation is on file in the Service's Utah Field Office, Salt Lake City, Utah.

BACKGROUND

On March 21, 1997, the Fish and Wildlife Service received your biological assessment for the Middle Green River Basin Study, Stewart Lake Waterfowl Management Area, requesting formal consultation pursuant to the Endangered Species Act of 1973, as amended (Act).

The Middle Green River Basin Study is an element of the National Irrigation Water Quality Program. The National Irrigation Water Quality Program was initiated in 1985 and is an interagency program to identify the nature and extent of irrigation-induced water quality problems that might exist in the Western United States. Reclamation's Jensen Unit of the Central Utah Project, in the Middle Green River Basin containing Stewart Lake, was one of nine (9) areas assigned high priority for possible remediation.

The National Irrigation Water Quality Program was initiated in 1985 and is an interagency program to identify the nature and extent of irrigation-induced water quality problems that might exist in the Western United States. Reclamation's Jensen Unit of the Central Utah Project, in the Middle Green River Basin containing Stewart Lake, was one of nine (9) areas assigned high priority for possible remediation.

The Jensen Unit was completed in 1981 to provide additional irrigation water to lands in the area. The Jensen Unit area contains 4, 654 acres of irrigated land. Subsurface drains, J1-J4, were constructed to control high groundwater conditions under about 700 acres of Jensen Unit irrigated lands that were experiencing drainage deficiencies.

In 1980, the Service issued a jeopardy biological opinion on the Jensen Unit of the Central Utah Project. Since the issuance of this biological opinion, the razorback sucker *(Xyrauchen texanus)* was listed as an endangered species and critical habitat was designated for four Colorado River endangered fishes. Reclamation has not consulted, pursuant to the Act, on the impacts of the Jensen Unit on the razorback sucker and on designated critical habitat. Additionally, new information identified high selenium concentrations in endangered fish in the Green River near Stewart Lake. Ashley Creek, directly downstream of the Stewart Lake outlet channel, was found to contribute high selenium concentrations to the Green River and a separate action to stop leakage from the Ashley Valley Sewer lagoons, which were found to be leaching selenium to Ashley Creek, has been initiated. Further information, gathered through the Middle Green River Basin Study, in response to concerns over high selenium concentrations due to irrigated agriculture, has identified that water quality problems in Stewart Lake, at least partially resulting from implementation of the Jensen Unit of the Central Utah Project, may be jeopardizing the four endangered Colorado River fishes and adversely modifying designated critical habitat. It is the Service's opinion that implementation of the proposed action should remove the jeopardy situation and the adverse modification of critical habitat.

The Service concurs with Reclamation's determination in the biological assessment that the proposed action may affect the bald eagle *(Haliaeetus leucocephalus)*, bonytail chub *(Gila elegans)*, Colorado squawfish *(Ptychocheilus lucius)*, peregrine falcon *(Falco peregrinus)*, razorback sucker, Ute Ladies'-tresses *(Spiranthes diluvialis)*, and whooping crane *(Grus americanus)*. However, we have additionally found that the proposed action is not likely to adversely affect the bald eagle, bonytail chub, peregrine falcon, Ute Ladies'-tresses and whooping crane. The proposed action may adversely affect the Colorado squawfish and razorback sucker and adversely modify or destroy their designated critical habitat. Therefore, the biological opinion for this proposed action will concentrate on these two species.

The Service believes that implementation of the proposed action should be initiated as soon as possible. The high water predictions for the Green River 1997 spring flows indicated that river water would likely spill over the dikes and pool in Stewart Lake. Since construction activities were not able to be initiated prior to this event, the dike separating Stewart Lake from the Green River was breached prior to the peak in the 1997 spring hydrograph to facilitate flushing Green River water through Stewart Lake.

CONSULTATION HISTORY

The Fish and Wildlife Service, Geological Survey, and Bureau of Reclamation have been involved with the Stewart Lake Project through the National Irrigation Water Quality Program (NIWQP), Middle Green River Basin Study, since its inception in 1986. Through numerous studies (Finger *et al.* 1994; Hamilton and Waddell 1994; Modde 1993; Peltz and Waddell 1991; Stephens *et al.* 1988; Stephens *et al.* 1992; Waddell and May 1994; Waddell and Stanger 1992; Waddell and Wiens 1992; Waddell and Wiens 1994a; Waddell and Wiens 1994b) in phases I-IV of the NIWQP, conducted to elucidate the selenium problem, it was determined that drains J1-J4, constructed as part of the Jensen Unit of the Central Utah Project and emptying into Stewart Lake, were contributing large amounts of selenium to the Stewart Lake system.

The Service has maintained, throughout the studies and planning phases of the project that, due to the impacts to endangered species, Bureau of Reclamation as the lead Federal Agency for phases IV and V of the Project, needed to enter into formal section 7 consultation with the Service prior to implementing any remediation actions. On May 12, 1995, in a letter to Reclamation, the Service identified all endangered, threatened, proposed and candidate species that occur in Uintah County, Utah and that may be affected by the proposed action. On March 21, 1997, the Service received a biological assessment on the Middle Green River Basin Study, Stewart Lake Waterfowl Management Area, with a cover letter requesting formal section 7 consultation pursuant to the Endangered Species Act. On June 16, 1997, the Service issued a draft biological opinion to the Bureau of Reclamation. Comments on this draft opinion were received from the Bureau of Reclamation on July 24, 1997 and a meeting to discuss the biological opinion and comments was held on August 25, 1997.

BIOLOGICAL OPINION

This biological opinion is based on the best scientific and commercial data available. After reviewing the current status of the razorback sucker and Colorado squawfish, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects, it is the Service's biological opinion that the project, as described, will remove the jeopardy situation currently existing at Stewart Lake for the razorback sucker and Colorado squawfish, and will also remove the adverse modification of designated critical habitat that currently exists. Therefore, it is the Service's opinion that the proposed action can serve as the reasonable and prudent alternative to the existing situation that resulted, in part, from installation of the Jensen Unit drains, J144, installed as part of the Jensen Unit of the Central Utah Project.

DESCRIPTION OF PROPOSED ACTION

The proposed action encompasses a two-phased approach to restore the productivity of Stewart Lake and to eliminate selenium hazards to endangered fish and waterfowl. The proposed action would reduce the selenium levels in the water, sediment, aquatic organisms, and plants and invertebrates that fish and invertebrates consume in Stewart Lake, the outlet channel, and the mixing zone of the Green River.

The phased approach is used because of the uncertainties of the selenium sources and water budgets at Stewart Lake, and the lack of selenium laden sites that have been successfully remediated, and the effectiveness and permanency of any proposed action. The proposed action can be evaluated independent of any later remediation because the uncertainties addressed by this action must be dealt with before further remediation can be undertaken. It is also possible that no further remediation may be needed.

The phased approach will follow successive steps with evaluation and interpretation at each step to reduce the uncertainty and provide the quickest benefits for the least cost. This approach uses adaptive management. Phasing the proposed action is intended to increase the probability of success of achieving a selenium concentration of less than 2big/L in Stewart Lake. This process provides for flexibility and professional judgement throughout the study activities. The phased proposed action will include the following activities essentially in the order presented. However, items in the phases may overlap, depending upon the adaptive management process results. Should additional remediation, or phase 3, be necessary, further National Environmental Policy Act compliance would be undertaken, and additional section 7 consultation required.

Phase 1

- Reconstruct the Stewart Lake outlet structure to be rebuilt two feet lower for better control.of the water level in the Lake. Initially, a drainage channel would be excavated about two feet deep from the middle of the Lake to the outlet structure, providing for the ability to more fully drain the Lake. The reconstruction of the outlet structure itself would be designed and implemented at a later date. The outlet structure will be designed so that it will not become a pollution point source or an attractive nuisance to fish.

  The initial draining of Stewart Lake will allow an evaluation of how much selenium is actually entering the Lake. The new outlet structure will (1) facilitate draining (and later managing Stewart Lake), (2) potentially reduce selenium in the sediment in Stewart Lake by oxidation, (3) allow determination of unknown seeps and springs in the Lake, and (4) dry out areas where surface work would occur.

- Construct collection pipeline, including a seepage collection system, between the existing drains and extend the drains to discharge into the Green River. A pipeline would be constructed to connect the existing outlets of drains J1 and JIA. A new drain extension will extend east of Stewart Lake to discharge the flows to the Green River. A 15-inch pipe was designed for 3.25cfs flows in drain J1. A 12-inch pipe was designed for 0.85cfs flows in drain J1A. Maximum flows are less than design estimates. A new manhole will provide future maintenance access and flow monitoring. The Manhole will be 48 inches by six (6) feet and will connect to an 18-inch diameter drain extension. The distance to the River is approximately 1,300 feet for the shortest discharge route to the River. This route may prove difficult to construct.

If the land is saturated, the extension will be constructed along the existing access road on the existing dike, due south of the current drain outlets. The 500-foot longer route will extend the pipe southeast for a total length of about 1,800 feet. This route includes construction of an earth berm along the side of the road to contain the 18-inch diameter drain extension. Additional surface survey data will help to determine which route to select. The drain extension will extend into the river far enough to quickly disperse the drainwater to avoid creating an attractive backwater habitat for fish at low flow times of the year.

Combining drains J2, J3, and J4 in a collector pipeline will involve removing the existing outlets, installing two manholes to make the new connections, and constructing the drain extension to the river. The collection pipe from the J2 outlet and to the J3 outlet will require 1,400 feet of 12-inch diameter collector pipe. To connect the J3 and J4 outlets will require about 1,500 feet of 18-inch diameter collector pipe. The collector pipe will contain holes to collect other seeps.

A 24-inch, 6,800 foot drain extension and outlet works will be constructed around the west side of the lake to directly discharge the drain flows to the river. The route will be along the side of the existing access road/dike. Earthwork for the existing drain extension berm along the existing dike and road will be about 15,000 cubic yards. The existing road will be widened, and the drain extension will then be constructed in the road embankment. The outlet pipe will be a low pressure, sealed joint pipe used in storm drain construction with a pressure rating of 2 lb/in' extending into the river.

- Monitor additional seepage inflow to determine sources of high selenium; monitoring and evaluation will be an integral part of each step to determine the appropriate next step. Extensive water quality monitoring and evaluation of inflows, lake water and outflow will be conducted, as well as periodic monitoring of the Green River downstream. Flow recording devices will be installed to measure discharge to the river from the drain extensions. Samples of water and sediment at specific monitoring sites in Stewart lake and in selected backwater areas in the Green River have been taken prior to draining the lake. During initial draining additional monitoring of seeps, shallow groundwater, and sediments will be conducted to reduce selenium budget uncertainties.

Once the main body of Stewart Lake is refilled, biota, with emphasis on fish and plankton, will be collected periodically. Samples of whole body fish, eggs, and muscle plugs will be taken from fish in the Green River and analyzed for selenium content.

- About 1,800 acre-feet of good quality water (selenium<2,ug/L) will be needed to replace the irrigation subsurface return flows eliminated by piping drainage into the Green River. The water flow will be provided by pumping. Existing Department of Interior water rights will be used to provide about 1,800 acre-feet of water annually from the Green River for Stewart Lake.

  An interim water supply will be delivered by existing pumps (currently in storage) placed on the bank of the Green River north of the J1 and Jl A drain extension. Flexible, temporary pipelines would be placed in the river and extended to Stewart Lake to convey water from the river to Stewart Lake. Water could be pumped at any water level. Two pumps have a 12-inch discharge, with Ford engines that run on propane. A third pump is electric and has an 18-inch discharge and 15 cfs capacity. The pumping rate would probably be about 10 to 20 cfs for as long as needed.

- Flushing Stewart Lake with spring floodflows. Stewart Lake will be dewatered to allow the lakebed sediments to dry. This will oxidize selenium in the top sediment layers. Spring floodwaters will be allowed to flush through Stewart Lake to dissolve and remove both soluble and suspended selenium.

<u>Phase 2</u>

- Continue monitoring water, sediment, and biota. Extensive water quality monitoring and evaluation of inflows will be conducted, as well as periodic monitoring of the Green River downstream. Flow recording devices will be installed to measure discharge to the river from the drain extensions. Samples of water and sediment at specific monitoring sites in Stewart Lake and in selected backwater areas in the Green River have been taken prior to draining the Lake. During initial draining additional monitoring of seeps, shallow groundwater, and sediments will be conducted to reduce selenium budget uncertainties. Extensive lakebed monitoring will occur at smaller pilot research plots for various bioremediation methods. Evaluate in-situ sediment remediation options. Quarterly or event sampling will be taken thereafter until such a time when all parties agree monitoring is no longer necessary.

  Once the main body of Stewart Lake is refilled, biota, with an emphasis on fish and plankton, would be collected periodically. Samples of whole body fish, eggs, and muscle plugs will be taken from fish in the Green River and analyzed for selenium content.

- Continue to evaluate in-situ sediment remediation options. The less contaminated sediments in the larger portion of Stewart Lake would be remediated by a combination of natural bioremediation and/or flushing during flooding by the Green River. Natural remediation would be accomplished by allowing lakebed sediments to dry, allowing the selenium to oxidize. Subsequent natural or induced wetting events would make the oxidized selenium soluble and available to plants and bacteria which would volatilize portions of the oxidized selenium to the atmosphere. Portions of this oxidized selenium may also be leached into deeper groundwater or be flushed into the Green River during the annual flood. The selenium fraction leached into the groundwater may precipitate in deeper sediments, flow as dispersed seepage into the river, or enter the river cobble aquifer and either re-enter surface water or migrate to deeper aquifers. Methods to flush selenium and exchange sediments from the larger portion of Stewart Lake by controlled flooding with the Green River would also be evaluated.

- Depending upon how much water enters the Lake from seeps and springs in the northwest part of Stewart Lake, a dike and/or drain would be constructed to isolate the highly contaminated northwest perimeter of Stewart Lake from the rest of the Lake. If the decision is made to permanently isolate this highly contaminated area from the rest of Stewart Lake, a four foot high dike, six feet wide and up to 4,000 feet long, would be constructed. The dike would be constructed of the material on-site and would isolate about 94 acres of the most highly contaminated sediment from the main part of Stewart Lake. This area would be set aside for research on various bioremediation and phytoremediation techniques.

- Sediment Remediation and Research. The less contaminated sediments in the larger portion of Stewart Lake will be remediated by a combination of natural bioremediation and/or flushing during flooding by the Green River. Sediment on up to 20 acres would be plowed or disked monthly to aerate and mix, accelerating selenium volatilization. Additional disking could be required to control weeds and aerate the soil. Natural microbial populations, primarily fungi, would develop and volatilize selenium from the sediment aerobically. Selenium would be released primarily as dimethylselenide gas that would diffuse into the atmosphere. Other research plots could explore the use of bacterial remediation or phytoremediation. The number of acres involved in research activities at any one time would depend upon the success in dewatering Stewart Lake and interim successes with various approaches. If high selenium flows cannot be removed from the area, portions of the area above this dike may have to be used as permanent bioremediation sites. This would likely be considered a phase III activity.

  Methods to bioremediate or leach and bioconcentrate selenium from the higher concentrated sediments near the irrigation drain inflows into smaller areas would also be evaluated. The selenium leaching from these higher concentration sediments would not be allowed to migrate into the larger portion of Stewart Lake. Such selenium runoff would be directed to small impoundment areas with a system of berms, ditches, or dikes. Selenium from this area would not be flushed into the Green River unless a very large flood inundated a very large area. In this case, there would be no control of selenium flushing, bu the dilution of this lame a flood event should keep the Green River concentrations below 2-3 *ktg/L.* If selenium migrates and becomes highly concentrated in a few smaller impounded areas, eventually a method to bioremediate or remove these sediments from the site would have to be considered.

- Provide a permanent good quality water supply to Stewart Lake. Three options are under consideration for delivering a permanent supplemental water supply to Stewart Lake. During phase 1 detailed analyses will be conducted to determine the most appropriate permanent water delivery method.

Open Water Channel. An open water channel would be constructed from the northeast corner of Stewart Lake to the Green River to provide a seasonal supply of good quality water to Stewart Lake. A diversion structure in the Green River may be necessary to divert water into the canal except during, high flows. The open channel would be excavated through either the old oxbow to the north and east of the J1 and J1A drain outlets or through a more direct route across State land located to the south and east of the J1 and J1A drain outlets. Excavating the channel through the oxbow would necessitate purchasing or obtaining an easement for the right-of-way required on the private land portion. This excavation would be approximately 4,000 feet long. The shorter excavation across State land would be about 1,300 feet long.

Connecting the open channel to the Green River would require placing rock slope protection (riprap) along the slopes of the channel and the bank of the Green River. The first 200 feet of the canal and the riverbank and 50 feet upstream and downstream of the channel would be lined with this slope protection to reduce erosion. Survey and river stage elevation data would be collected during the fall of 1996 and spring of 1997 to determine the necessity of a small diversion structure in the Green River to divert water into the canal.

Pumping Station. Water would be pumped from a sump connected to an infiltration gallery constructed adjacent to the Green River. A small pumping plant would be installed and sized to deliver water at a flow rate of between 14 and 20 cfs to Stewart Lake. A pumping facility with this desim flow rate would be capable of filling Stewart Lake in two to three weeks, when starting from empty. An infiltration gallery would keep sediment out of Stewart Lake and is necessary to prevent entry of juvenile and adult razorback suckers or other fish species or sand into the pumps. The infiltration gallery would consist of four 90-foot-long lines of 12-inch diameter (100-slot screen) pipe.

- Water conservation. Public education about water conservation measures will be promoted throughout the Jensen Unit to reduce the volume of subsurface drainage. Existing Federal and State programs will be encouraged, such as the ongoing salinity control program administered by the Natural Resources Conservation Service and the mitigation and conservation program established by the Central Utah Completion Act.

- Evaluation of phase 1 and phase 2. The success of phase 1 and phase 2 activities will be evaluated. If it is determined that adaptive management methods cannot successfully reduce selenium in most of the Stewart Lake area by the actions proposed as phase 1 and phase 2, then additional remediation may be considered. Specifically, if the high selenium sediments from the irrigation drainage inflow channels cannot be remediated, then additional sediment removal may be necessary. If additional sediment remediation is necessary, NEPA compliance on the additional remediation would be conducted, and congressional authority and funding would be sought as necessary.

Phase 3

- Additional remediation could include more advanced bioremediation activities, as well as developing or refining bioremediation or phytovolatilization techniques based on the research activities in phase 1 and 2, or new technology discovered elsewhere. The chosen techniques would be implemented to further reduce the selenium concentrations in Stewart Lake. In the worst case, some sediment may be removed for offsite disposal.

Operation and Maintenance

- Interim operating plans may be developed and revised as conditions change and as construction proceeds. Annual O&M costs include those for the outlet channel, drain extensions, water supply, research, and extensive monitoring. In phase 2, as well as long term, costs could include the O&M of a pumping plant and power.

  Extensive water, sediment and biological monitoring of inflows, lake, and outflow would be conducted, as well as periodic monitoring of the Green River downstream. The drain extensions would require periodic maintenance to keep them free flowing. Periodic monitoring of sediment and biota in Stewart Lake and Green River backwaters would be conducted.

STATUS OF THE SPECIES

Colorado Squawfish

The Colorado squawfish evolved as the main predator in the Colorado River system. The diet of Colorado squawfish longer than 3 or 4 inches consists almost entirely of other fishes (Vanicek and Kramer 1969). The Colorado squawfish is the largest cyprinid fish (minnow family) native to North America and, during predevelopment times, may have grown as large as 6 feet in length and weighed nearly 100 pounds (Behnke and Benson 1983). These large fish may have been 25-50 years of age.

Based on early fish collection records, archaeological finds, and other observations, the Colorado squawfish was once found throughout warmwater reaches of the entire Colorado River Basin, including reaches of the upper Colorado River and its major tributaries, the Green River and its major tributaries, and the Gila River system in Arizona (Seethaler 1978). Colorado squaw fish were apparently never found in colder, headwater areas. Seethaler (1978) indicates that the species was abundant in suitable habitat throughout the entire Colorado River basin prior to the 1850's. Historically, Colorado squawfish have been collected in the upper Colorado River as far upstream as Parachute Creek, Colorado (Kidd 1977).

A marked decline in Colorado squavvfish populations can be closely correlated with the construction of dams and reservoirs between the 1930's and the 1960's, introduction of nonnative fishes, and removal of water from the Colorado River system. Behnke and Benson (1983) summarized the decline of the natural ecosystem. They pointed out that dams, impoundments, and water use practices are probably the major reasons for drastically modified natural river flows and channel characteristics in the Colorado River Basin. Dams on the main stem have essentially segmented the river system, blocking Colorado squawfish spawning migrations and drastically changing river characteristics, especially flows and temperatures. In addition, major changes in species composition have occurred due to the introduction of nonnative fishes, many of which have thrived as a result of changes in the natural riverine system (i.e., flow and temperature regimes). The decline of endemic Colorado River fishes seems to be at least partially related to competition or other behavioral interactions with nonnative species, which have perhaps been exacerbated by alterations in the natural fluvial environment.

The Colorado squawfish currently occupies about 1,030 river miles in the Colorado River system (25 percent of its original range) and is presently found only in the Upper Basin above Glen Canyon Dam. It inhabits about 350 miles of the main stem Green River from its mouth to the mouth of the Yampa River. Its range also extends 160 miles up the Yampa River ,104 miles up the White River, and 35 miles up the Price River, several of the major tributaries of the Green River. In the main stem Colorado River, it is currently found from Lake Powell extending about 201 miles upstream to Palisade, Colorado, and in the lower 33 miles of the Gunnison River, a tributary to the main stem Colorado River (Tyus et al. 1982).

Critical Habitat

Critical habitat, as defined in section 3(5)(A) of the Act, means: "(I) the specific areas within the geographical area occupied by the species at the time it is listed***, on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protection; and (ii) specific areas outside the geographic area occupied by a species at the time it is listed***, upon a determination by the Secretary that such areas are essential for the conservation of the species."

Designated critical habitat for the endangered Colorado River fishes includes those portions of the 100-year floodplain that contain constituent elements. The constituent elements are those physical and biological features that the Service considers essential for the conservation of the species and include, but are not limited to, the following items: (1) Space for individual and population growth, and for normal behavior; (2) Food, water, air, light, minerals, or other nutritional or physiological requirements; (3) Cover or shelter; (4) Sites for breeding, reproduction, rearing of offspring, germination, or seed dispersal; and generally (5) Habitats that are protected from disturbance or are representative of the historical geographical and ecological distributions of the species. The primary constituent elements determined necessary for the survival and recovery of the four endangered Colorado River fishes include, but are not limited to:

> Water - A quantity of water of sufficient quality (i.e., temperature, dissolved oxygen, lack of contaminants, nutrients, turbidity, etc.) that is delivered to a specific location in accordance with a hydrologic regime that is required for the particular life stage for each species;
>
> Physical Habitat - Areas of the Colorado River system that are inhabited or potentially habitable by fish for use in spawning, nursing, feeding, and rearing, or corridors between these areas. In addition to river channels these areas also include bottom lands, side channels, secondary channels, oxbows, backwaters, and other areas in the 100-year floodplain, which when inundated provide spawning, nursery, feeding, and rearing habitats, or access to these habitats;
>
> Biological Environment - Food supply, predation, and competition are important elements of the biological environment and are considered components of this constituent element. Food supply is a function of nutrient supply, productivity, and availability to each life stage of the species. Predation and competition, although considered normal components of this environment, are out of balance due to introduced nonnative fish species in many areas.

Critical habitat has been designated within the 100-year floodplain of the Colorado squaw fish's historical range in the following sections of the Upper Basin, excluding the San Juan River Basin (59 F.R. 13374).

> Colorado, Moffat County. The Yampa River and its 100-year floodplain from the State Highway 394 bridge in T. 6 N., R. 91 W., section 1 (6th Principal Meridian) to the confluence with the Green River in T. 7 N., R. 103 W., section 28 (6th Principal Meridian).
>
> Utah, Uintah, Carbon, Grand, Emery, Wayne, and San Juan Counties; and Colorado, Moffat County. The Green River and its 100-year floodplain from the confluence with the Yampa River in T. 7 N., R. 103 W., section 28 (6th Principal Meridian) to the confluence with the Colorado River in T. 30 S., R. 19 E., section 7 (Salt Lake Meridian).
>
> Colorado, Rio Blanco County; and Utah, Uintah County. The White River and its 100-year floodplain from Rio Blanco Lake Dam in T. 1 N., R. 96 W., section 6 (6th Principal

Meridian) to the confluence with the Green River in T. 9 S., R. 20 E., section 4 (Salt Lake Meridian).

Colorado, Delta and Mesa Counties. The Gunnison River and its 100-year floodplain from the confluence with the Uncompahgre River in T. 15 S., R. 96 W., section 11 (6th Principal Meridian) to the confluence with the Colorado River in T. 1 S., R. 1 W., section 22 (Ute Meridian).

Colorado, Mesa and Garfield Counties; and Utah, Grand, San Juan, Wayne, and Garfield Counties. The Colorado River and its 100-year floodplain from the Colorado River Bridge at exit 90 north off Interstate 70 in T. 6 S., R. 93 W., section 16 (6th Principal Meridian) to North Wash, including the Dirty Devil arm of Lake Powell up to the full pool elevation, in T. 33 S., R. 14 E., section 29 (Salt Lake Meridian).

Biology

The life-history phases that appear to be most critical for the Colorado squawfish include spawning, egg fertilization, and development of larvae through the first year of life. These phases of Colorado squawfish development are tied closely to specific habitat requirements. Natural spawning of Colorado squawfish is initiated on the descending limb of the annual hydrograph as water temperatures approach 20 °C. Spawning, both in the hatchery and in the field, generally occurs in a 2-month timeframe between July 1 and September 1, although high flow water years may suppress river temperatures and extend spawning in the natural system into September. Conversely, during low flow years when the water warms earlier, spawning may occur in late June.

Temperature also has an effect on egg development and hatching. In the laboratory, egg mortality was 100 percent in a controlled test at 13 °C. At 16 °C to 18 °C, development of the egg is slightly retarded, but hatching success and survival of larvae was higher. At 20 °C to 26 °C, development and survival through the larval stage was up to 59 percent (Hamman 1981). Juvenile temperature preference tests showed that preferred temperatures ranged from 21.9 °C to 27.6 °C. The most preferred temperature for juveniles and adults was estimated to be 24.6 °C. Temperatures near 24 °C are also needed for optimal development and growth of young (Miller et al. 1982).

Only two Colorado squawfish confirmed spawning sites, as defined in the Colorado Squawfish Recovery Plan, have been located in the Basin: river mile 16.5 of the Yampa River and river mile 156.6 of the Green River. These areas have the common characteristics of coarse cobble or boulder substrates forming rapids or riffles associated with deeper pools or eddies. It is believed that a stable, clean substrate is necessary for spawning and incubation. Substrates are swept clean of finer sediments by high flows scouring the bed prior to the spawning period.

O'Brien reported a cobble size range of 50-100 mm with a median size of 75 mm at the spawning site. Milhous (1982) proposes discharges of approximately 0.50 of that required to initiate cobble movement will be capable of extracting sands and fines from the cobble substrate. Thus, after the supply of sand diminishes, flows of sufficient magnitude and duration are required to scour the cobble bed in preparation for spawning and incubation.

Miller et al. (1982) and Archer et al. (1986) demonstrated that Colorado squaw fish often migrate considerable distances to spawn in the Green and Yampa Rivers, and similar movement has been noted in the main stem Colorado River. Miller et al. (1982) concluded from collections of larvae and young-of-year below known spawning sites that there is a downstream drift of larval Colorado squawfish following hatching. Extensive studies in the Yampa and upper Green Rivers have demonstrated downstream distribution of young Colorado squawfish from known spawning areas (Archer et al. 1986; Haynes et al. 1985). Miller et al. (1982) also found that young-of-year Colorado squawfish, from late summer through fall, preferred natural backwater areas of zero velocity and less than 1.5-foot depth over a silt substrate. Juvenile Colorado squawfish habitat preferences are similar to that of young-of-year fish, but they appear to be mobile and more tolerant of lotic conditions away from the sheltered backwater environment.

Information on radio-tagged adult Colorado squawfish during fall suggests that fish seek out deepwater areas in the Colorado River (Miller et al. 1982), as do many other riverine species. River pools, runs, and other deep water areas, especially in upstream reaches, are important winter habitats for Colorado squawfish. During winter, adult Colorado squawfish n the Yampa River use backwaters, runs, and eddies, but are most common in shallow ice-covered shoreline areas (Wick and Hawkins 1989). Valdez and Masslich (1989) found that squawfish overwinter in specific regions generally less than three (3) miles long. The fish move periodically to one of several "favorite spots" or micro habitats characterized by greater than average depths and low velocity. Two radio-tagged Colorado squawfish were located at RM 289.7 to 289.8 above the Bonanza Bridge on the Green River and at RM 291.8 near the Alhandra Ferry site (about ten miles below Stewart Lake).

In spring and early summer, adult squawfish use shorelines and lowlands inundated during typical spring flooding. This lowland inundation is important for health and reproductive conditioning (Tyus 1990). Use of these habitats may offset winter stress and replenish energy stores needed for long migrations and spawning. During the spawning season adults have been reported to migrate up to 200 miles upstream or downstream to reach spawning areas (Tyus 1990). Migration is an important component in the reproductive life cycle of Colorado squawfish. Tyus (1990) reported that migration cues, such as high spring flows, increasing river temperatures, and possible chemical inputs from flooded lands and springs, were important to successful reproduction.

Very little information is available on the influence of turbidity on the endangered Colorado River fishes. It is assumed, however, that turbidity is important, particularly as it affects the interaction between introduced fishes and the endemic Colorado River fishes. Because these endemic fishes have evolved under natural conditions of high turbidity, it is concluded that the retention of these highly turbid conditions is an important factor for these endangered fishes. Reduction of turbidity may enable introduced species to gain a competitive edge which could further contribute to the decline of the endangered Colorado River fishes.

Colorado squawfish spawn in white water canyons in the Yampa and Green Rivers during the period of declining flows in June, July, or August, and rising water temperatures ranging from 22 to 25°C (Tyus and Haines 1991). After hatching, larvae drift downstream for about six days. They drift up to 100 miles where they are entrained in backwater nursery habitats in alluvial river reaches (Stanford 1994; Tyus and Haines 1991). These backwater areas are productive habitats that consist of ephemeral, along-shore embayments that develop as spring flows decline.

Larvae captured in the Yampa and upper Green Rivers hatched about 54 days after maximum flows. Postlarvae were captured in two concentration areas between river mile 208 and river mile 280, or about 99 miles downstream of the Yampa Canyon spawning area. Another concentration area was located about 99 miles downstream of Gray Canyon (between river mile 32 and river mile 160. Tyus and Haines (1991) found most postlarval Colorado squawfish in backwaters 84 percent of the time. They were also found in shorelines, side channels and eddies. Tyus and Haines (1991) also believe that the vast majority of age-0 Colorado squawfish found in the upper Green River are the result of downstream drift from the Yampa River.

After spawning, adults use a variety of habitats including eddies, backwaters, and shorelines. Most squawfish do not stay more than a few days in the Jensen area of the Green River while migrating upstream to spawning areas in the Yampa River.

Razorback Sucker

The razorback sucker, an endemic species unique to the Colorado River Basin, was historically abundant and widely distributed within warmwater reaches throughout the Colorado River Basin. Historically, razorback suckers were found in the main stem Colorado River and major tributaries in Arizona, California, Colorado, Nevada, New Mexico, Utah, Wyoming, and in Mexico (Ellis 1914; Minckley 1983). Bestgen (1990) reported that this species was once so numerous that it was commonly used as food by early settlers and, further, that commercially marketable quantities were caught in Arizona as recently as 1949. In the Upper Basin, razorback suckers were reported in the Green River to be very abundant near Green River, Utah, in the late 1800's (Jordan 1891). An account in Osmundson and Kaeding (1989) reported that residents living along the Colorado River near Clifton, Colorado, observed several thousand razorback suckers during spring runoff in the 1930's and early 1940's. In the San Juan River drainage, Platania and Young (1989) relayed historical accounts of razorback suckers ascending the Animas River to Durango, Colorado, around the turn of the century.

A marked decline in populations of razorback suckers can be attributed to construction of dams and reservoirs, introduction of nonnative fishes, and removal of large quantities of water from the

Colorado River system. Dams on the main stem Colorado River and its major tributaries have segmented the river system and drastically altered flows, temperatures, and channel geomorphology. Major changes in species composition have occurred due to the introduction of numerous nonnative fishes, many of which have thrived due to human-induced changes to the natural riverine system.

The current distribution and abundance of the razorback sucker have been significantly reduced throughout the Colorado River system (McAda 1987; McAda and Wydoski 1980; Holden and Stalnaker 1975; Mincldey 1983; Marsh and Minckley 1989; Tyus 1987). The only substantial population of razorback suckers remaining, made up entirely of old adults (McCarthy and Minckley 1987), is found in Lake Mohave; however, they do not appear to be successfully recruiting. While limited numbers of razorback suckers persist in other locations in the Lower Colorado River, they are considered rare or incidental and may be continuing to decline.

In the Upper Basin, above Glen Canyon Dam, razorback suckers are found in limited numbers in both lentic and lotic environments. The largest population of razorback suckers in the Upper Basin is found in the upper Green River and lower Yampa River (Tyus 1987). Lanigan and Tyus (1989) estimated that from 758 to 1,138 razorback suckers inhabit the upper Green River. In the Colorado River, most razorback suckers occur in the Grand Valley area near Grand Junction, Colorado; however, they are increasingly rare. Osmundson and Kaeding (1991) report that the number of razorback sucker captures in the Grand Junction area has declined dramatically since 1974.

Razorback suckers are in imminent danger of extirpation in the wild. The specific causes of this species' continued decline are largely unknown at this time. As Bestgen (1990) pointed out:

> "Reasons for decline of most native fishes in the Colorado River Basin have been attributed to habitat loss due to construction of mainstream dams and subsequent interruption or alteration of natural flow and physio-chemical regimes, inundation of river reaches by reservoirs, charmelization, water quality degradation, introduction of nonnative fish species and resulting competitive interactions or predation, and other man-induced disturbances (Miller 1961, Joseph et al. 1977, Behnke and Benson 1983, Carlson and Muth 1989, Tyus and Karp 1989). These factors are almost certainly not mutually exclusive, therefore it is often difficult to determine exact cause and effect relationships."

The virtual absence of any recruitment suggests a combination of biological, physical, and/or chemical factors that may be affecting the survival and recruitment of early life stages of razorback suckers. Within the Upper Basin, recovery efforts endorsed by the Recovery Implementation Program include the capture and removal of razorback suckers from all known locations for genetic analyses and development of discrete brood stocks if necessary. These measures have been undertaken to develop refugia populations of the razorback sucker from the same genetic parentage as their wild counterparts such that, if these fish are genetically unique by subbasin or individual population, then separate stocks will be available for future augmentation. Such augmentation may be a necessary step to prevent the extinction of razorback suckers in the Upper Basin.

Critical Habitat

Critical habitat has been designated within the 100-year floodplain of the razorback sucker's historical range in the following sections of the Upper Basin, excluding the San Juan River Basin (59 F.R. 13374).

Colorado, Moffat County. The Yampa River and its 100-year floodplain from the mouth of Cross Mountain Canyon in T. 6 N., R. 98 W., section 23 (6th Principal Meridian) to the confluence with the Green River in T. 7 N., R. 103 W., section 28 (6th Principal Meridian).

Utah, Uintah County; and Colorado, Moffat County. The Green River and its 100-year floodplain from the confluence with the Yampa River in T. 7 N., R. 103 W., section 28 (6th Principal Meridian) to Sand Wash in T. 11 S., R. 18 E., section 20 (6th Principal Meridian).

Utah, Uintah, Carbon, Grand, Emery, Wayne, and San Juan Counties. The Green River and its 100-year floodplain from Sand Wash at river mile 96 at T. 11 S., R. 18 E., section 20 (6th Principal Meridian) to the confluence with the Colorado River in T. 30 S., R. 19 E., section 7 (6th Principal Meridian).

Utah, Uintah County. The White River and its 100-year floodplain from the boundary of the Uintah and Ouray Indian Reservation at river mile 18 in T. 9 S., R. 22 E., section 21 (Salt Lake Meridian) to the confluence with the Green River in T. 9 S., R 20 E., section 4 (Salt Lake Meridian).

Utah, Uintah County. The Duchesne River and its 100-year floodplain from river mile 2.5 in T. 4 S., R. 3 E., section 30 (Salt Lake Meridian) to the confluence with the Green River in T. 5 S., R. 3 E., section 5 (Uintah Meridian).

Colorado, Delta and Mesa Counties. The Gunnison River and its 100-year floodplain from the confluence with the Uncompahgre River in T. 15 S., R. 96 W., section 11 (6th Principal Meridian) to Redlands Diversion Dam in T. 1 S., R. 1 W., section 27 (Ute Meridian).

Colorado, Mesa and Garfield Counties. The Colorado River and its 100-year floodplain from Colorado River Bridge at exit 90 north off Interstate 70 in T. 6 S., R. 93 W., section 16 (6th Principal Meridian) to Westwater Canyon in T. 20 S., R. 25 E., section 12 (Salt Lake Meridian) including the Gunnison River and its 100-year floodplain from the

Redlands Diversion Dam in T. 1 S., R. 1 W., section 27 (Ute Meridian) to the confluence with the Colorado River in T. 1 S., R. 1 W., section 22 (Ute Meridian).

Utah, Grand, San Juan, Wayne, and Garfield Counties. The Colorado River and its 100-year floodplain from Westwater Canyon in T. 20 S., R. 25 E., section 12 (Salt Lake Meridian) to full pool elevation, upstream of North Wash, and including the Dirty Devil arm of Lake Powell in T. 33 S., R. 14 E., section 29 (Salt Lake Meridian).

Biology

Specific information on biological and physical habitat requirements of the razorback sucker is very limited. Until very recently, fisheries research investigations throughout the Upper Basin have focused on the other three listed Colorado River fishes, and data collected on the razorback sucker was largely coincident to those studies. Localized extirpation of razorback suckers from some localities, coupled with the species continued decline in numbers and distribution, has prompted some research; however, details of its life history requirements, particularly in riverine environments, are still not fully understood.

In general, a natural hydrograph with a large spring peak, a gradually descending limb into early summer, and low stable flows through summer, fall, and winter is thought to create the best habitat conditions for endangered fishes while maintaining the integrity of the channel geomorphology. Prior to construction of large main stem dams and the suppression of spring peak flows, low velocity, off-channel habitats (seasonally flooded bottomlands and shorelines) were commonly available throughout the Upper Basin (Tyus and Karp 1989; Osmundson and Kaeding 1991). The absence of these seasonally flooded riverine habitats is believed to be a limiting factor in the successful recruitment of razorback suckers in their native environment (Tyus and Karp 1989; Osmundson and Kaeding 1991). Tyus (1987) and McAda and Wydoski (1980) reported springtime aggregations of razorback suckers in off-channel impoundments and tributaries; such aggregations are believed to be associated with reproductive activities. Tyus and Karp (1990) and Osmundson and Kaeding (1991) reported off-channel habitats to be much warmer than the main stem river and that razorback suckers presumably moved to these areas for feeding, resting, sexual maturation, spawning, and other activities associated with their reproductive cycle. While razorback suckers have never been directly observed spawning in turbid riverine environments within the Upper Basin, captures of ripe specimens, both males and females, have been recorded (Valdez et al. 1982; McAda and Wydoski 1980; Tyus 1987; Osmundson and Kaeding 1989; Tyus and Karp 1989; Tyus and Karp 1990; Osmundson and Kaeding 1991; Platania 1990) in the Yampa, Green, Colorado, and San Juan Rivers. Sexually mature razorback suckers are generally collected on the ascending limb of the hydro graph from mid-April through June and are associated with coarse gravel substrates (depending on the specific location).

Outside of the spawning season, adult razorback suckers occupy a variety of shoreline and main channel habitats including low runs, shallow to deep pools, backwaters, eddies, and other relatively slow velocity areas associated with sand substrates (Tyus 1987; Tyus and Karp 1989; Osmundson and Kaeding 1989; Valdez and Masslich 1989; Osmundson and Kaeding 1991; Tyus and Karp 1990).

Habitat requirements of young and juvenile razorback suckers in the wild are largely unknown, particularly in native riverine environments. Collection of life stages, other than adults, have been extremely rare in the Upper Basin in recent times. However, larval razorback suckers have been collected in the upper Colorado River Basin in the last 10 years (Tyus 1987; Gutermuth et al. 1994), but no significant recruitment has been documented unequivocally (Tyus and Karp 1990; Minckley et al. 1991; Modde et al. 1996).

ENVIRONMENTAL BASELINE

Colorado Squawfish

Colorado squawfish populations now only occupy historical habitats in the Upper Colorado River Basin in Colorado, New Mexico, Utah and Wyoming (USFWS 1996a). The Green River subbasin contains the largest and most viable population of squawfish in the Colorado River Basin and, as such, is the highest priority area for recovery and maintenance of Colorado squawfish (USFWS 1990). Catches of young., juvenile, and adult Colorado squawfish are reported to be an order of magnitude higher in the Green River subbasin of Colorado and Utah than elsewhere (Tyus et al. 1986; Tyus 1990) and recent investigations have found many young, juveniles, and adults in the Green River from the mouth of the Yampa River to its confluence with the Colorado (USFWS 1990). Valdez and Cowdell (1996) reported higher catch rates of Colorado squawfish in the Green River at River Miles 265-255, at the Ouray NWR, than other areas of the Upper Green River (River Miles 310-215).

Radiotelemetry studies suggest that squawfish spawning in the Green River Basin is concentrated in two major sites: (1) the lower 20 miles of the Yampa River Canyon; and (2) Gray Canyon of the Green River (USFWS 1990). Within the immediate vicinity of the project area of the Green River (from Jensen to Ouray, Utah) are several high concentration areas of adult Colorado squawfish as well as a suspected spawning area and two high density nursery areas (USFWS 1990). These nursery areas are nutrient rich habitats, such as flooded bottomlands. Two adult Colorado squawfish were collected in Stewart Lake on June 10, 1997 by Fish and Wildlife Service personnel.

Razorback Sucker

The current range of the razorback sucker in the upper Colorado River Basin is greatly reduced from its historical distribution (Holden and Stalnaker 1975; McAda and Wydoski 1980; Tyus et al. 1982). The species is widely distributed in the Green and lower Yampa Rivers, but the largest concentration is in the Upper Green River, including the project area, from the mouth of the Duchesne River upstream to the mouth of the Yampa and in the lower four (4) miles of the Yampa (USFWS 1996b). Lanigan and Tyus (1989) estimated that less than 1,000 adult razorback suckers inhabited the Upper Green River Basin. More recent study indicates that this population consists of a precariously small but dynamic population that appears to be stable or declining slowly, and may consist only of about 500 fish (Modde *et al.* 1996).

Razorback sucker are known to congregate and spawn at two locations (Tyus and Karp 1990) in the middle Green River, upstream of the town of Jensen, adjacent to the Escalante Ranch (River Mile 308-313), and at the mouth of the Yampa River. Juvenile and subadult razorback suckers have recently been collected in the upper Colorado River Basin. Larvae suspected to be razorback sucker have been collected below the Escalante Ranch site by Tyus (1987) in 1986, and confirmed collections were made in 1992, 1993, and 1994 (Modde *et al.* 1996).

Razorback sucker within this middle Green River reach are known to stage in flooded lowlands and the large, shallow eddy produced by Ashley Creek and the Stewart Lake outlet channel, prior to moving to main-channel sand, gravel and cobble bars for egg deposition (Tyus 1987; Tyus and Karp 1990). Young-of-the-year razorback suckers use shallow, alongshore embayments for nursery habitats (Tyus 1987; Tyus and Haines 1991), and these habitats occur at and below the mouth of Ashley Creek and the Stewart Lake outlet, where irrigation return flows are concentrated. One razorback sucker has been captured in Stewart Lake (Bruce Waddell, USFWS personal communication, 1997).

Critical Habitat

Designated critical habitat for both Colorado squawfish and razorback sucker occurs within the entire proposed project area, which includes the Green River mixing zone adjacent to Stewart Lake and the 100-year floodplain, including all of Stewart Lake. One of the constituent elements of designated critical habitat is the lack of contaminated water. Current conditions in Stewart Lake, the outlet channel, and the Green River mixing zone do not meet the requirements of this constituent element due to selenium contamination.

Selenium Contamination

In April 1988, the State of Utah revised its water quality criteria and standards. The standard for dissolved selenium in water to protect aquatic wildlife was reduced from 50ktg/L to 5/2g/L. This value was qualified to be a four day average, not to exceed 20/../g/L for more than 1-hour during a three year period (Utah Department of Health 1988). Stewart Lake and the Green River, among others, are protected as Utah class 3B (aquatic wildlife) and class 4 (agricultural) water; therefore, the Utah standard of 5/2g/L chronic and 20 Atg/L acute applies to the entire proposed project area.

While EPA and State of Utah water criterion for selenium is 5 ktg/L to protect freshwater aquatic life, there is concern that waterborne selenium concentrations less than 5,ug/L could be hazardous to fish and wildlife populations under certain conditions. There is an extremely narrow margin between necessary and toxic levels of selenium (Lemly 1993). Even at concentrations in water of less than or equal to 5/./g/L there could be high potential for food chain bioaccumulation leading to dietary toxicity and reproductive failure in fish and wildlife. Lemly and Smith (1987) documented field and laboratory data that indicated waterborne selenium concentrations greater than 2 to 54g/L can cause toxicity and reproductive failure in fish. Sorensen (1991) concluded that waterborne selenium concentrations as low as 31g/L can cause mortality in freshwater fish. Skorupa and Ohlendorf (1991) found that water with 3 to 20 ug/L selenium is hazardous to some species of aquatic birds under certain environmental conditions while water with more than 20,ug/L is hazardous to most species under most environmental conditions. Lemly (1993) stated that, "Waterborne selenium concentrations of 2ug/L or greater should be considered hazardous to the health and long-term survival of fish and wildlife populations".

However, waterborne selenium is not the only cause of concern. Selenium is known to bioaccumulate through the food chain and can bioaccumulate to more than 1000 times the water concentration. Therefore, even in the presence of non-contaminated water, selenium concentrations in the sediments can result in bioaccumulation in biota to chronic and acute levels, resulting in reproductive impairment, reduced growth and mortality.

The Preliminary Draft Ecological Risk Assessment for the Middle Green River Basin (Miller, 1997) incorporates "A Protocol for Aquatic Hazard Assessment of Selenium" from Lemly (1995). Applying Lemly's protocol to the current conditions found throughout most of the Colorado River Basin results in a low to moderate selenium hazard (Miller 1997). In contrast, Stewart Lake, Ashley Creek and other bottomland habitats along the Green River associated with the seleniferous Manchos Shale Formation in the project area currently have a high selenium hazard ranking (Miller 1997).

Throughout the middle Green River Basin study, research has been conducted to reveal and demonstrate the extent of the selenium contamination at Stewart Lake Waterfowl Management Area (Stephens *et al.* 1988; Waddell and Weins 1994; Hamilton 1993; Peltz and Waddell 1991; Finger et al. 1994). Stephens *et al.* (1992) found that median concentrations of selenium in drainwater entering Stewart Lake in water years 1988-1989 exceeded the acute toxicity levels at 30.5, 34, 77, and 74 ug/L for drains J1, J2, J3, and J4 respectively. During water years 1986-1987 and 1988-1989 median selenium concentrations from every drain exceeded the 5/../g/L standard established by the State of Utah for wildlife protection, and 98.8 percent of all samples of drainwater exceeded 5.g/L. The Lake, however, retained a sufficient quantity of selenium such that the discharge to the Green River exceeded the standard of 5/..tg/L in only 80 percent of the samples. The largest concentrations and generally the most variable, occurred in drains J3 and J4. However, the drains are not the only source of selenium input to Stewart Lake. Stephens et al. (1992) found that several seeps along the north shore of the Lake between the outflows of the J1 and J3 drains contained high selenium concentrations at 17, 8, and 110 *g/L.* The seeps were discharging water into Stewart Lake at about 20, 50, and 2,000 gal/hr, respectively.

These various inputs of selenium are concentrated in Stewart Lake sediments and are bioaccumulated in plants, invertebrates, fish and waterfowl. Sediments have been analyzed and found to contain from 3 to 318 ug/g total selenium in sediments from various locations in Stewart Lake. Plant tissue within Stewart Lake was likewise analyzed and found to contain anywhere from < 1 ug/g to 73 ug/g selenium. Invertebrates within Stewart Lake were found to contain from 10.4 ug/g to 37.4 ,ug/g selenium (Peitz and Waddell 1991).

Selenium has been found to bioaccumulate through the food chain. Waterfowl at Stewart Lake have been found to contain from <1 ug/g to as much as 86.9 ug/g selenium in muscle tissue. Bird eggs samples have been found to contain anywhere from 2 ug/g to 33 ,u.g/g selenium. Fish within Stewart Lake have been found to contain from 4 ug/g to 58.5 ug/g selenium in whole body composites (Peltz and Waddell 1991). The only endangered fish to be sampled in Stewart Lake, a razorback sucker, contained 13 ug/g selenium in a muscle plug (Bruce Waddell, USFWS, pers communication, 1997). Eggs of razorback suckers collected from Razorback Bar, about 20 km. upstream from Stewart Lake in the Green River, contained from 3.7 to 10.6 ,ug/g total selenium dry weight. Milt from males at the same location contained <1.1 to 6.7 ug/g selenium dry weight (Hamilton and Waddell 1994). Reference eggs from Dexter National Fish Hatchery contained only 2.8 ',leg selenium dry weight. Muscle plugs from the same razorback suckers at Razorback Bar contained from 3.6 kigig to 32 ,u.g/g selenium dry weight (Hamilton and Waddell 1994).

Hamilton and Waddell (1994) report that accumulation of high selenium concentrations in fish gonads is believed to be the cause of reduced reproduction and subsequent species disappearances in Belews Lake, North Carolina (Cumbie and Van Horn 1978), Hyco Reservoir, North Carolina (Woock and Summers 1984), and Martin Lake, Texas (Garrett and Inman 1984; Sorensen 1988).

Analyses of the selenium concentrations in razorback sucker muscle and egg tissue have led Hamilton and Waddell (1994) to conclude that a significant portion of the small number of razorback suckers found in the vicinity of the project area, which is the last remaining remnant population of the species known in the upper Colorado River Basin (Tyus and Karp 1990; Quartarone 1993), is likely to be reproductively impaired due to elevated selenium concentrations. Additionally, they concluded that this reproductive impairment due to selenium contamination is contributing to the decline of the species in the upper Colorado River Basin.

The Service has determined that the current situation, high selenium concentrations in Stewart Lake, the outlet channel, and the Green River mixing zone, is jeopardizing the continued existence of the endangered razorback sucker and Colorado squawfish.

EFFECTS OF THE ACTION

The proposed action is intended to reduce the selenium loading to Stewart Lake and the Green River, thereby, reducing the impacts of high selenium concentrations to the endangered species, as well as all wildlife using Stewart Lake, the outlet channel, or the adjacent Green River. While this is intended to be a beneficial action which the Service supports, there are a lack of selenium laden sites that have successfully been remediated. Therefore, many of the short and long-term impacts of the proposed action are uncertain. The Service has, however, determined that the proposed action may result in short term adverse impacts to the endangered species. These are discussed below.

Short-Term

The annual dehydration of the sediments in Stewart Lake, and subsequent flooding, and flushing during high water years, of the sediments with Green RiVer water, may release large amounts of selenium into the Green River mixing_ area during the spring floods and later, as waters recede during the descending limb of the hydrouaph. Because the periodic draining of water and movement of sediment is commonly used in management of waterfowl areas, Stephens *et al.* (1992) investigated the effect of dewatering sediment from Stewart Lake and then refiooding using isolated core samples. The cores, each about 30cm in length were collected near the outlet from Stewart Lake. The selenium concentration in the surface sediment of an adjacent core was 7 ug/g. The cores were allowed to air dry in the laboratory in the core tubes for six (6) weeks. Organic layers near the top of the cores changed from black to tan over the drying and aeration period. The cores were rehydrated with water that was collected from the Green River immediately upstream of Stewart Lake and had a selenium concentration of 34g/L. Within 0.7 hours, the selenium concentration in water overlying both cores had doubled to 6 and 7 ug/L. The concentrations in the overlying water were sampled four more times over 189 hours. The selenium concentration of water in one core remained near 7 or 8 ug/L throughout the experiment. Selenium concentrations in water in the second core increased to 17 gg/L within 18 hours but declined to 14 ,ug/L by 189 hours. These results indicated that lake sediment containing even small selenium concentrations, once removed from anaerobic and reducing conditions, can quickly release significant quantities of selenium into the water column upon rehydration.

Therefore, fish exposed to water flushed from Stewart Lake or water in Stewart Lake are likely to be exposed to high selenium concentrations. Flushing of 5,000 pounds of selenium under a worst case scenario during a single years flood event of more than 20,000 cfs sustained for 14 days would result in a dissolved selenium concentration for two weeks of 34g/L in the Green River. Fish utilizing the Stewart Lake area during this time would be subject to selenium contamination above background levels in the Green River. Additionally, contaminated sediments deposited in backwaters of the Green River could subject fish to long-term selenium and higher concentrations of selenium exposure.

The results and levels of contamination are uncertain at this time. Because selenium bioaccumulates in the food chain, concentrations of selenium in algae and plankton produced in Stewart Lake during the flushing flow period would likely exceed 3/4g/L. Larval fish utilizing plankton and algae produced in Stewart Lake would be subject to chronic or acute selenium contamination.

Numerous investigators have documented the hazardous effects of high selenium concentrations on fish and wildlife (Finger *et al.* 1994; Hamilton and Waddell 1994; Modde 1993; Peltz and Waddell 1991; Stephens *et al.* 1988; Stephens *et al.* 1992; Waddell and May 1994; Waddell and Stanger 1992; Waddell and Wiens 1992; Waddell and Wiens 1994a; Waddell and Wiens 1994b). Fish and wildlife in Stewart Lake, the outlet channel, and the Green River mixing zone would be exposed to high selenium concentrations and may exhibit reproductive impairment, reduced growth and mortality.

In addition to exposure to high selenium concentrations flushed from Stewart Lake, endangered fish may enter Stewart Lake during high flows. Fish entering Stewart Lake would be exposed to high selenium concentrations for longer periods and may be stranded in Stewart Lake when flows recede.

Construction activities to lower the outlet channel and construct an open water channel as a permanent water source for Stewart Lake also may impact the razorback sucker and Colorado squawfish. Construction dredging the channels will increase the sediment load in the outlet channel and Green River mixing zone possibly impacting larval fish. Direct mortality of fish may occur as a result of the construction equipment working in the channel and the placement of rock riprap to stabilize the open channel.

Long-Term

With the diversion of the Jensen Unit drains to the Green River, as yearly dehydration and subsequent flooding of Stewart Lake occurs, and as remediation progresses, selenium levels in Stewart Lake sediments, as well as biota, should decrease over time. Modeling based on the best available data indicates that if the lake is flushed with floodwater from the Green River, that flushing of about 5,000 pounds of selenium associated with bottom sediment in the main portion of Stewart Lake has the potential to decrease sediment concentrations of selenium in the top six inches to less than 3 to 4 ppm in two to four years.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, local or private actions that are reasonably certain to occur in the action area considered in this biological and conference opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

The mosquito abatement program in Uintah County may use pesticides in and around Stewart Lake to control mosquitoes. Pesticide applications may increase the amount of harmful chemicals that endangered fish are exposed to, further stressing them and possibly resulting in higher mortality.

CONCLUSION

Listed Species

After reviewing the current status of the razorback sucker and Colorado squawfish, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that implementation of the remediation phase of the middle Green River Basin Study, Stewart Lake Waterfowl Management Area, as proposed, is not likely to jeopardize the continued existence of the razorback sucker and Colorado squawfish.

Critical Habitat

After reviewing the current status of the razorback sucker and Colorado squawfish critical habitat, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that implementation of the remediation phase of the middle Green River Basin Study, Stewart Lake Waterfowl Management Area, as proposed, is not likely to destroy or adversely modify designated critical habitat.

INCIDENTAL TAKE STATEMENT

Sections 4(d) and 9 of the ESA, as amended, prohibit taking (harass, harm, pursue, hunt, wound, shoot, kill, trap, capture or collect, or attempt to engage in any such conduct) of listed species of fish and wildlife without a special exemption. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, or sheltering. Harass is defined as actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns, which include but are not limited to, breeding, feeding, or sheltering. Incidental take is any take of listed animal species that results from, but is not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or the applicant. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to, and not intended as part of the agency action is not considered a prohibited taking provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The measures described below are nondiscretionary, and must be implemented by the agency so that they become binding conditions of any grant or permit issued to the applicant, as appropriate, in order for the exemption in section 7(o)(2) to apply. The Bureau of Reclamation has a continuing duty to regulate the activity covered by this incidental take statement. If Reclamation (1) fails to require the applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, and/or (2) fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse.

AMOUNT OR EXTENT OF TAKE

Listed Species

An undetermined amount of take of young-of-the-year Colorado squawfish and/or razorback sucker may occur during the initial flushing of selenium out of Stewart Lake and into the Green River. Additionally, an undetermined number of adult razorback sucker and Colorado squawfish may be reproductively impaired due to intake of high selenium concentrations during the initial flushing of selenium out of Stewart Lake and into the Green River. However, long term reductions in selenium inputs to Stewart Lake and the Green River mixing zone should be beneficial to both species.

Critical Habitat

Critical habitat for both the razorback sucker and Colorado squavvfish in the Upper Green River will be modified. A total of 696 acres of floodplain habitat (Stewart Lake) will be temporarily adversely modified during remediation activities, as will critical habitat in the Green River adjacent to Stewart Lake. All three constituent elements of designated critical habitat for razorback sucker and Colorado squawfish may be temporarily adversely modified. These constituent elements include a lack of contaminated water, physical habitat potentially habitable by fish during all life stages, and a biological environment capable of providing a food supply for the endangered fishes. Project activities may result in temporary high inputs of contaminated water to the Green River mixing zone, temporarily disturbed physical habitat during construction activities, and a temporary highly contaminated food supply coming out of Stewart Lake.

Depending on the outcome of the adaptive management actions, various scenarios may result for the long-term functioning of Stewart Lake Waterfowl Management Area. Long-term plans to restore Stewart Lake to a functioning wetland marsh, with lower levels of selenium, should benefit the species and restore marginal to harmful critical habitat to productive habitat. At the very least, if Stewart Lake is not able to be restored to a functioning wetland marsh, high concentrations of selenium in the water, sediments, and biota in Stewart Lake and the Green River mixing zone, will be reduced.

EFFECT OF THE TAKE

In the accompanying biological opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat. On the contrary, the Service has determined that the proposed action should remove the jeopardy situation currently existing at Stewart Lake and the mixing zone of the Green River. The proposed action may result in an undetermined take of larval razorback sucker and Colorado squawfish and reproductive impairment of an undetermined number of adult razorback sucker and Colorado squawfish. Additionally, the project will modify 696 acres of critical habitat (Stewart Lake), as well as the mixing zone in the Green River by altering the water, physical habitat and biological constituent elements of that critical habitat. However, critical habitat will not be destroyed or adversely modified to the extent that the constituent elements are appreciably diminished and the habitat no longer serves its role in the survival and recovery of the species. This amount of take and modification of critical habitat should be offset by the long-term beneficial effects of the action on listed species and critical habitat.

REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize take of Colorado squaw fish and razorback sucker and minimize the adverse modification of critical habitat:

1. Conduct all proposed actions in a manner that will minimize take of listed species and minimize the modification of critical habitat.

2. Extensively monitor the effects of the proposed action to determine project impacts, beneficial and adverse.

TERMS AND CONDITIONS

To be exempt from the prohibitions of section 9 of the ESA, the Bureau of Reclamation must comply with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are nondiscretionary.

1. To implement reasonable and prudent measure number one, the following terms and conditions shall be implemented.

   a. To ensure that remediation activities are conducted in a timely manner so that endangered fish exposure to selenium is minimized, the following timeline shall be followed for Phase 1 remediation activities:

      i.) Excavation of the Stewart Lake outlet channel shall be completed by April 30, 1998.

      ii.) The collection pipeline and extension of the drains to discharge into the Green River shall be completed by April 30, 1998.

   b. In dewatering Stewart Lake to allow the lakebed sediments to dry, the lake shall be dewatered as soon as high flows recede and surveys shall be conducted to salvage any native fish stranded in Stewart Lake. Dead fish may be collected for contaminant analyses as determined by the Service.

Surveys and salvage of fish shall be conducted by individuals possessing the appropriate State and Federal collecting permits. The disposition of any fish collected in Stewart Lake shall be determined by the Service.

c. If pumping water from the Green River to Stewart Lake is determined necessary during phases I and II to provide a short-term water supply, the intake pipe shall be designed to avoid intake of endangered fish and to reduce the sediment load carried into Stewart Lake.

d. If a permanent pumping station is chosen as the preferred long-term water supply to Stewart Lake, the intake pipe shall be designed to avoid intake of endangered fish and to reduce the sediment load carried into Stewart Lake.

e. In excavation of the outlet channel to Stewart Lake, if construction is not begun in the spring of 1997, prior to high flows, a seasonal restriction on reconstruction activities shall be put in place to limit sediment inputs to the Green River during critical periods when endangered fish are known to use the area. Endangered fish stage in the area prior to spawning and larval fish occur in the drift and may use the outlet channel as a nursery area. Construction shall be limited to the period from September 1 to April 30 or when adult fish begin staging in the area, whichever is earlier.

f. If an open channel is chosen as the preferred source of a permanent water supply to Stewart Lake, the channel shall be constructed such that only a small jetty is necessary to divert water from the Green River into the canal.

g. In constructing the drain extension for drains J2, J3, and J4, the outlet pipe shall be extended into the Green River in such a way as to avoid deposition of selenium in the backwater or eddy areas at the confluence of Ashley Creek.

h. In the discussion of sediment remediation, one proposed action is to dike the highly contaminated northwest perimeter of Stewart Lake from the rest of the Lake. This area will be backflooded by the river unless the dike is extraordinarily high, possibly trapping larvae and adult endangered fish in the worst contaminated site. Therefore, if this option is implemented, a control structure shall be included in the design of the dike to allow for the release of endangered fish. Additionally, Bureau of Reclamation shall be responsible for monitoring the dike during high flows to ensure that endangered fish are not trapped behind the dike where they would be exposed to high concentrations of selenium.

2. To implement reasonable and prudent measure number two, the following terms and conditions shall be implemented.

   a. The results of the adaptive management strategy for the Stewart Lake remediation shall be evaluated on a confirms' basis in coordination with the Service. Semiannual meetings between all interested parties shall evaluate the results of monitoring and determine the next course of action.

   b. A detailed monitoring plan for Stewart Lake, the outlet channel, and the Green River mixing zone shall be developed in conjunction with the Service.

   c. If monitoring shows signs of increased selenium contamination in the Green River, or Stewart Lake sediment fails to respond to remediation efforts, Reclamation shall reinitiate section 7 consultation pursuant to the ESA.

The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize incidental take that might otherwise result from the proposed action. With implementation of these measures, the Service believes that take of razorback sucker and Colorado squawfish, and adverse modification of critical habitat will be minimized and reduced over the long term. If, during the course of the action, take of adult endangered fish within Stewart Lake is identified, such incidental take represents new information requiring review of the reasonable and prudent measures provided. The Bureau of Reclamation must immediately provide an explanation of the taking: and review with the Service the need for possible modification of the reasonable and prudent measures.

REPORTING REQUIREMENTS

The incidental take statement provided in this biological opinion satisfies the requirements of the Endangered Species Act of 1973, as amended. This statement does not constitute an authorization for take of listed migratory birds under the Migratory Bird Treaty Act, the Bald Eagle Protection Act, or any other Federal statute.

Upon locating dead, injured or sick bald eagles, razorback suckers, or Colorado squawfish, immediate notification must be made to the Service's Salt Lake City Field Office at (801)524-5001, the Service's Division of Law Enforcement, Ogden, Utah, at telephone number (801) 625-5570 and to the Utah Division of Wildlife Resources, 152 East 100 North, Vernal, UT 84078, telephone (801) 789-3103. Pertinent information including the date, time, location, and possible cause of injury or mortality of each eagle taken shall be recorded and provided to the Service. Instructions for proper care, handling, transport, and disposition of such specimens will be issued by the Service's Division of Law Enforcement. Care must be taken in handling sick or injured animals to ensure effective treatment and care, and in handling dead specimens to preserve biological material in the best possible state. Injured bald eagles will be transported to a qualified veterinarian, or to other locations, if directed by the Service.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of ESA directs Federal agencies to utilize their authorities to further the purposes of ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse affects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

1. All project employees should be informed of the presence of bald eagles, and of their threatened status, in the proposed project area. They should be advised as to the definition of "take", and the potential penalties (up to $25,000 in fines and six months in prison) for "taking" a species listed under the Endangered Species Act.

2. Reclamation and/or other cooperating agencies, should work with the mosquito abatement program in Uintah County to ensure that harmful pesticides are not used in the vicinity of Stewart Lake.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

REINITIATION - CLOSING STATEMENT

This concludes formal consultation on the action outlined in the Biological Assessment and accompanying request for formal consultation. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been maintained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of take is exceeded, any operations causing such take must cease pending reinitiation.

Reed E. Harris

cc: Larry Shanks, Acting Assistant Area Manager-Utah, U.S. Fish and Wildlife Service, CO/KS/NE/UT, Denver, Colorado
Dan Fritz, Steve Noyes, Utah Projects Office, Upper Colorado Regional Office, Bureau of Reclamation, 302 East 1860 South, Provo, Utah 84606-7317
Rick Larson, Northeastern Region, Utah Division of Wildlife Resources, 152 East 100 North, Vernal, Utah 84078

bcc: Project file
Reading file

c: \wp\ talesha\ stwtfbo
MIZZI/tt: 08/28/97

LITERATURE CITED

Archer, D.L., H.M. Tyus, and L.R. Kaeding. 1986. Colorado River fishes monitoring project, final report. U.S. Fish and Wildlife Service, Colorado River Fishery Project, Lakewood. 64 pp.

Behnke, R.J., and D.E. Benson. 1983. Endangered and threatened fishes of the Upper Colorado River Basin. Ext. Serv. Bull. 503A, Colorado State University, Fort Collins. 38 pp.

Bestgen, K.R. 1990. Status Review of the Razorback Sucker, Xyrauchen texanus. Larval Fish Laboratory #44. Colorado State University, Ft. Collins.

Carlson, C.A., and R.T. Muth. 1989. The Colorado River: lifeline of the American Southwest. Pages 220-239 in D.P. Dodge, ed. Proceedings of the International Large River Symposium. Canadian Special Publication of Fisheries and Aquatic Sciences 106, Ottawa.

Cumbie, P.M. and S.L. Van Horn. 1978. Selenium accumulation associated with fish mortality and reproductive failure. Proceedings of the Annual Conference Southeastern Association Fish and Wildlife Agencies. 32:612-624.

Ellis, N.M. 1914. Fishes of Colorado. University of Colorado Studies. Vol. 11(1).

Finger, S.E., A.C. Allert, S.J. Olsen and E.C. Callahan. 1994. Toxicity of irrigation drainage and associated waters in the middle Green River Basin, Utah. National Biological Survey, National Fisheries Contaminant Research Center, Columbia, MO. 111 pp.

Garrett, G.P. and C.R. Inman. 1984. Selenium-induced changes in fish populations of a heated reservoir. Proceedings Annual Conference Southeastern Association of Fish and Wildlife Agencies. 38:291-301.

Gutermuth, F.B., L.D. Lentsch and K.R. Bestgen. 1994. Collection of age-0 razorback suckers (Xyrauchen texanus) in the lower Green River, Utah. Southwestern Naturalist 39:389-391.

Hamilton, S.J. and B.Waddell. 1994. Selenium in eggs and milt of razorback sucker (Xyrauchen texanus) in the Middle Green River, Utah. Archives of Environmental Contamination and Toxicology 27:195-201.

Hamman, R.L. 1981. Spawning and culture of Colorado squawfish Ptychocheilus lucius in a raceway. In Miller et al. Colorado River Fishery Project Final Report.

Haynes, C.M., R.T. Muth, and T.P. Nesler. 1985. Identification of habitat requirements and limiting factors for Colorado squawfish and humpback chub. Final Report, Federal Aid in Fish and Wildlife Restoration, Project SE-3-4. Colorado Division of Wildlife, Denver. 62 pp.

Holden, P.B., and C.B. Stalnaker. 1975. Distribution and abundance of mainstream fishes of the middle and upper Colorado River basins, 1967-1973. Transactions of the American Fisheries Society 104(2):217-231.

Jordan, D.S. 1891. Report of explorations in Colorado and Utah during the summer of 1889 with an account of the fishes found in each of the river basins examined. Bulletin of the United States Fish Commission 9:24.

Joseph, T.W., J.A. Sinning, R.J. Behnke, and P.B. Holden. 1977. An evaluation of the status, life history, and habitat requirements of endangered and threatened fishes of the upper Colorado River system. U.S. Fish and Wildlife Service, Office of Biological Services, Fort Collins, Colorado, FWS/OBS 24, Part 2:183.

Kidd, G. 1977. An investigation of endangered and threatened fish species in upper Colorado River as related to Bureau of Reclamation Projects. Final Report, Bureau of Reclamation, Salt Lake City, Utah. 36 pp.

Lanigan, S.H., and H.M. Tyus. 1989. Population size and status of the razorback sucker in the Green River basin, Utah and Colorado. North American Journal of Fisheries Management 9:68-73.

Lemly, A.D. 1993. Guidelines for evaluating selenium data from aquatic monitoring and assessment studies. Environmental monitoring assessment. Vol. 28, pp. 83-100.

Lemly, A.D. 1995. A protocol for aquatic hazard assessment of selenium. Ecotoxicology and Environ. Safety. 32:280-288.

Lemly, A.D. and G.J. Smith. 1987. Aquatic cycling of selenium: Implications for fish and wildlife. U.S. Fish and Wildlife Service, Fish and Wildlife Leaflet 12, 10 pp.

Marsh, P.C., and W.L. Minckley. 1989. Observations on recruitment and ecology of razorback sucker: lower Colorado River, Arizona-California. Great Basin Naturalist 49(1):71-78.

McAda, C.W. 1987. Status of the razorback sucker Xyrauchen texanus in the Colorado River upstream from Lake Powell. Proceedings of the Desert Fishes Council 17(1985):185.

McAda, C.W., and R.S. Wydoski. 1980. The razorback sucker, Xyrauchen texanus, in the upper Colorado River basin, 1974-76. U.S. Fish and Wildlife Service Technical Paper 99. 50 pp.

McCarthy, C.W., and W.L. Minckley. 1987. Age estimation for razorback sucker (Pisces: Catostomidae) from Lake Mohave, Arizona and Nevada. Journal Arizona-Nevada Academy of Science 21:87-97.

Milhous, R.T. 1982. Effect of sediment transport and flow regulation on the ecology of gravel-bed rivers. In Hey, R.D., J.C. Bathwist, and C.R. Thorne, eds. Gravel-bed rivers. John Wiley and Sons, New York.

Miller, J.M. 1997. Preliminary Draft Ecological Risk Assessment-Impacts of contaminants in the middle Green River Basin, Utah, to endangered razorback suckers and Colorado squawfish. USDI, Bureau of Reclamation, Salt Lake City, Utah (in press).

Miller, W.H., D.L. Archer, J. Valentine, H.M. Tyus, R.A. Valdez, and L.R. Kaeding. 1982. Colorado River Fishery Project Final Report Summary. U.S. Fish and Wildlife Service, Salt Lake City, Utah. 42 pp.

Miller, R.R. 1961. Man and the changing fish fauna of the American Southwest. Papers of the Michigan Academy of Science, Arts, and Letters 46:365-404.

Minckley, W.L. 1983. Status of the razorback sucker, Xyrauchen texanus (Abbott), in the lower Colorado River basin. Southwestern Naturalist 28(2):165-187.

Modde, T. 1993. Distribution of razorback sucker in the Middle Green River relative to Stewart Lake outlet and Ashley Creek. U.S. Fish and Wildlife Service, Colorado River Fishery Project Report.

Modde, K.P. Burnham, and E.J. Wick. 1996. Population status of the razorback sucker in the middle Green River (U.S.A.). Conservation Biology 10(1):110-119.

Osmundson, D.B., and L.R. Kaeding. 1989. Studies of Colorado squawfish and razorback sucker use of the "15-mile reach" of the Upper Colorado River as part of conservation measures for the Green Mountain and Ruedi Reservoir water sales. Final Report. U.S. Fish and Wildlife Service, Grand Junction, Colorado.

Osmundson, D.B., and L.R. Kaeding. 1991. Flow recommendations for maintenance and enhancement of rare fish habitat in the 15-mile reach during October-June. Final Report. U.S. Fish and Wildlife Service, Grand Junction, Colorado.

Peltz, L.A. and B. Waddell. 1991. Physical, chemical, and biological data for detailed study of irrigation drainage in the middle Green River basin, Utah, 1988-1989, with selected data for 1982-87. Open File Report 91-530, U.S. Geological Survey, Salt Lake City, Utah. 213 PP.

Platania, S.P. 1990. Biological summary of the 1987 to 1989 New Mexico-Utah ichthyofaunal study of the San Juan River. Unpublished report to the New Mexico Department of Game and Fish, Santa Fe, and the U.S. Bureau of Reclamation, Salt Lake City, Utah, Cooperative Agreement 7-FC-40-05060.

Platania, S.P., and D.A. Young. 1989. A Survey of the Icthyofauna of the San Juan and Animas Rivers from Achuleta and Cedar Hill (respectively) to their Confluence at Farmington, New Mexico. Department of Biology, University of New Mexico, Albuquerque.

Quarterone, F. 1993. Historical accounts of upper basin endangered fish. Upper Colorado River Fishery Project. U.S. Fish and Wildlife Service, Denver, CO. 67 pp.

Scorupa, J.P. and H.M. Ohlandorf. 1991. Contaminants in drainage water and avian risk thresholds, *In* Dinar, A. and D. Zilberman, eds., The economics and management of water and drainage in agriculture. Kluwer Acad. Pub., Norwell, MA, p.345-368.

Seethaler, K. 1978. Life History and Ecology of the Colorado Squaw fish (Ptychocheilus lucius) in the upper Colorado River basin. Thesis, Utah State University, Logan.

Sorensen, E.M.B. 1988. Selenium accumulation, reproductive status, and histopathological changes in environmentally exposed redear sunfish. Arch. Toxicol. 61:324-329.

Stanford, J.A. 1994. Instream flows to assist the recovery of endangered fishes of the Upper Colorado River Basin. Biological Report 24. National Biological Survey, Wash., D.C. 47 pp.

Stephens, D.W., B. Waddell and J.B. Miller. 1988. Reconnaissance investigation of water quality, bottom sediment, and biota associated with irrigation drainage in the Middle Green River Basin, Utah, 1986-87. Water Resources Investigation Report 88-4011. U.S. Geological Survey, Salt Lake City, Utah.

Stephens, D.W., B. Waddell, L.A. Peltz, and J.B. Miller. 1992. Detailed study of selenium and selected elements in water, bottom sediment, and biota associated with irrigation drainage in the Middle Green River Basin, Utah, 1988-1990. U.S. Geological Survey, Water Resources Investigation Report 92-4084. 164 pp. Salt Lake City, Utah.

Tyus, H.M. 1987. Distribution, reproduction, and habitat use of the razorback sucker in the Green River, Utah, 1979-1986. Transactions of the American Fisheries Society 116:111-116.

Tyus, H.M. 1990. Potamodromy and reproduction of Colorado squawfish *(Ptychocheilus lucius).* Trans. Amer. Fish. Soc. 119:1035-1047.

Tyus, H.M. and G.B. Haines. 1991. Distribution, habitat use, and growth of age-0 Colorado squawfish in the Green River Basin, Colorado and Utah. Trans. Amer. Fish. Soc. 120:79-89.

Tyus, H.M., and C.A. Karp. 1989. Habitat Use and Streamflow Needs of Rare and Endangered Fishes, Yampa River, Colorado. U.S. Fish and Wildlife Service, Biology Report 89(14). 27 pp.

Tyus, H.M., and C.A. Karp. 1990. Spawning and movements of razorback sucker, Xyrauchen texanus, in the Green River basin of Colorado and Utah. Southwestern Naturalist 35. (In Press)

Tyus, H.M., B.D. Burdick, R.A. Valdez, C.M. Haynes, T.A. Lytle, and C.R. Berry. 1982. Fishes of the Upper Colorado River Basin: Distribution, abundance and status. Pages 12-70 in Miller, W.H., H.M. Tyus and C.A. Carlson, eds. Fishes of the Upper Colorado River System: Present and Future. Western Division, American Fisheries Society, Bethesda, Maryland.

Tyus, H.M., R.A. Valdez and B.D. Williams. 1986. Status of endangered fishes in the Upper Colorado River, 1985. Proceedings Bonneville Chapter American Fisheries Society 1986:20-30.

U.S. Fish and Wildlife Service. 1990. Revised Colorado squawfish recovery plan. Denver, Colorado. 56 pp.

U.S. Fish and Wildlife Service. 1996a. Draft Multispecies recovery plan for four endangered fishes of the mainstem Colorado River. Denver, Colorado. 125 pp. + Appendices.

U.S. Fish and Wildlife Service. 1996b. Draft Razorback Sucker *Xyrauchen texanus* Recovery Plan. Denver, Colorado. 111 pp.

Utah Department of Health. 1988. Wastewater disposal regulations-Part II, standards of quality for waters of the State. Utah Department of Health, Division of Environmental Health. 50 pp.

Valdez, R.A. and B.R. Cowdell. 1996. Survival of age-0 Colorado squawfish in the Green river and Colorado River. Annual Summary report - 1995. Prepared for the Utah Division of Wildlife Resources, Salt Lake City, Utah, contract No. 90-2558. BIO/WEST Report No. 511-2. 25 pp. + appendices.

Valdez, R.A., P.G. Mangan, R.P. Smith, and B.C. Nilson. 1982. Upper Colorado River investigation (Rifle, Colorado to Lake Powell, Utah). U.S. Fish and Wildlife Service and Bureau of Reclamation, Final Report, Part 2, Colorado River Fishery Project, Salt Lake City, Utah.

Valdez, R.A., and W.J. Masslich. 1989. Winter habitat study of endangered fish-Green River. Wintertime movement and habitat of adult Colorado squawfish and razorback suckers. Report No. 136.2. BIO/WEST Inc., Logan, Utah. 178 pp.

Vanicek, C.D., and R.H. Kramer. 1969. Life history of the Colorado squawfish Ptychocheilus lucius and the Colorado chub Gila robusta in the Green River in Dinosaur National Monument, 1964-1966. Transactions of the American Fisheries Society 98(2):193.

Waddell, B. and T.May. 1994. Selenium concetrations in the razorback sucker (Xyrauchen texanus): Substitution of nonlethal muscle plugs for muscle tissue in contaminant assessment.

Waddell, B. and M.C. Stanger. 1992. The influence of selenium on incubation patterns and nesting success of waterbirds at Ouray National Wildlife Refuge, Utah. Contaminant Report Number R6/4005192. U.S. Fish and Wildlife Service, Salt Lake City, Utah

Waddell, B. and C.Weins. 1992. Trace element concetrations in razorback sucker eggs from the Ashley Creek Area. U.S. Fish and Wildlife Service, Draft Report.

Waddell, B. and C. Weins. 1994a. Contaminant analysis of winter storage pond, lower Ashley Creek and lower Brush Creek, Utah, 1991. Final Draft Report, U.S. Fish and Wildlife Service, Salt Lake City, Utah.

Waddell, B. and C. Weins. 1994b. Monitoring of selenium in fish of the Green River, Utah. Draft Report.

Wick, E.J. and J.A. Hawkins. 1989. Observations on the use of the Little Snake River in Colorado, by endangered Colorado squawfish and humpback chub, 1988. Larval Fish Lab., Colorado State University, Fort Collins, CO 10 pp.

Woock, S.E. and P.B. Summers. 1984. Selenium monitoring at Hyco Reservoir (NC) waters (1977-1981) and biota (1977-1980). *In:* Proceedings: The effects of trace elements on aquatic ecosystems. EPRI Report EA-3329. Electric power Research Institute, Palo Alto, CA. pp. 6-1 to 6-27.

Appendix B

Letter of Understanding on Stewart Lake Remediation Water Supply, December 14, 1999.

United States Department of the Interior

BUREAU OF RECLAMATION
Upper Colorado Region
Provo Area Office
302 East 1860 South
Provo, Utah 84606-7317

FEB 28 2000

PRO-470
RES-3.20

MEMORANDUM

To: Field Supervisor, Ecological Services, Utah Field Office, U.S. Fish and Wildlife Service, Lincoln Plaza, 145 East 1300 South, Suite 404, Salt Lake City UT 84115

From: Bruce C. Barrett
Area Manager

Subject: Letter of Understanding on Stewart Lake Remediation/Water Supply, Based Upon Agreements at the August 10, 1999, Meeting - Middle Green River Basin Study, Irrigation Drainage Program

As you recall at the subject meeting held in our Provo Office on August 10, 1999, we asked that a representative from each agency sign a Letter of Understanding (LOA) acknowledging personal support of the decisions/agreements made at the meeting.

A draft LOA was sent out for review several times and a final version was agreed to, dated December 14, 1999. We desired to have Dave Rasmussen of the Uintah Water Conservancy District sign the LOA before he retired at the end of the year. Dave signed the LOA and Walter Donaldson signed for the Utah Division of Wildlife Resources, and the letter was then sent to the State Director for his signature, which took some time.

Although a period of time has passed, we still believe it important to have everyone sign as initially intended. The original copy of the LOA with signatures to date is attached. Please sign and return the original. Once all the signatures are obtained, a copy will be returned for your records.

We appreciate working together to address selenium issues in the Jensen area and to solve this challenging commitment to provide a clean water supply to Stewart Lake.

Please call Steve Noyes at (801) 379-1032 if you have any questions.

Bruce C Barrett

Attachment

cc: Director, Office of Policy, Attention: D-5010 (Harb)

(Final December 14,1999)

LETTER OF UNDERSTANDING
AMONG
NATIONAL IRRIGATION WATER QUALITY PROGRAM
U.S. FISH AND WILDLIFE SERVICE
UTAH DIVISION OF WILDLIFE RESOURCES
UINTAH WATER CONSERVANCY DISTRICT
AND
U.S. BUREAU OF RECLAMATION
ON
MIDDLE GREEN RIVER BASIN SELENIUM STUDY
STEWART LAKE REMEDIATION/ WATER SUPPLY

(August 10, 1999, Meeting)

The following items were agreed to by those persons attending the meeting held August 10, 1999, at 10:30 am at Reclamation's Provo Area Office. The people signing are not officially committing their agency, but acknowledge personal support of the decisions/agreements made. See the attached meeting notes for background information. This Letter of Understanding (LOU) is to confirm those agreements.

Long-term

1. The National Irrigation Water Quality Program (NIWQP) will provide funding (currently estimated not to exceed $500,000) for construction of an additional 5 cfs capacity in the Burns Bench Canal replacement Pipeline, a feature to be constructed under the Colorado River Basin Salinity Control Program (CRBSCP). The pipeline will allow for long-term deliveries of a clean water supply from Red Fleet Reservoir to Stewart Lake Waterfowl Management Area (Stewart Lake).

2.a. Reclamation will provide 1,000 acre-feet of water per year to Stewart Lake in satisfaction of the Jensen Unit FES commitment and its requirement to replace poor quality drain water that was diverted by the NIWQP, directly to the Green River.

2.b. The Fish & Wildlife Service (FWS) agrees, and those present who attend the Interagency Biological Assessment Team meetings also support, that the 220 acre-feet of Jensen Unit irrigation water, given back to the Department of the Interior (DOI) from the Sunshine Canal Company Pipeline under the Central Utah Project Completion Act Conservation Credit Program, can be made available as part of the above 1,000 acre-feet per year.

3. Reclamation, and the other agencies, agree to investigate opportunities to provide additional water to Stewart Lake such as the Conservation Credit Program, unused Jensen Unit water, etc.

Short-term

1. It is recognized that for the next several years, the NIWQP will continue in its attempts to

resolve selenium-related issues in water, biota, and sediment at Stewart Lake. These remediation activities may require management of Green River flows to flush sediments and occasional draw down of the lake to expose sediments and promote volatilization of selenium. Every effort will be made to ensure coordinated activities between the NIWQP, its agency representatives, and the Utah Division of Wildlife Resources (UDWR).

2. Reclamation and the Uintah Water Conservancy District (UWCD) will deliver additional unused Jensen Unit water to Stewart Lake, as needed, to assist cleanup efforts. This additional water, over and above the 1,000 acre-feet long-term commitment, could temporarily be delivered using excess capacity or flows that the UWCD or the Burns Canal Company may have available in the Burns Pipeline or other conveyances. Reclamation may also make additional waters available through other sources, such as Green River flows that could be diverted to Stewart Lake.

It is understood that this LOU is subject to availability of funding and appropriation.

The undersigned concur with these decisions/agreements:

John Harb, National Irrigation Water Quality Program

Reed Harris, U.S. Fish and Wildlife Service

Walt Donaldson, Utah Division of Wildlife Resources John Kimball, Director

David Rasmussen, Uintah Water Conservancy District

Bruce Barrett, Bureau of Reclamation

Attachment

MIDDLE GREEN RIVER BASIN SELENIUM STUDY
STEWART LAKE REMEDIATION/ WATER SUPPLY
Bureau of Reclamation/Provo Area Office
August 10, 1999, 10:30 am

Meeting Notes and General Agreements

Jay Henrie started the meeting and introductions were made.
The list of attendees is attached.

Purpose of the meeting: to discuss and try to agree on the needed water supply to Stewart Lake; and Stewart Lake operation and tamarisk control.

Remediation activities completed at Stewart Lake:

Excavated new inlet channel from Green River to flush Stewart Lake.	May 1997
Excavated drainage channels to drain Lake.	Oct 1997
Removed irrigation drainwater.	June 1998
Constructed inlet channel control structure.	May 1999
Constructed new outlet control structure.	May 1999

Stewart Lake Water Supply: The Jensen Unit FES committed Reclamation to provide a water supply of 670 acre-feet per year to the north end of Stewart Lake. The Jensen Unit Project irrigation drains have discharged an average of 1,650 acre-feet per year over the 1981-1998 period, with the average total flow ranging from a low of one-half cfs in January, to a maximum flow of almost 5 cfs in August (see attached tables). The annual flow may have decreased over this period as many farmers have converted from wild flood irrigation to sprinklers or gated pipe on laser-leveled land.

Reclamation has investigated a number of water supply options, and Brandt Demars reviewed each of them, with their estimated costs (see attached cost estimates) and advantages and disadvantages. They include:

1. Pumping from the Green River.
   a. Ranney well - perforated pipes under the Green River (like Bonanza PP).
   b. Constructed infiltration gallery.
   c. Direct pumping with fine screen.
2. Gravity flow pipeline from the Green River.
3. Deliver Red Fleet Reservoir water through the proposed Burns Bench Pipeline.

Reed Harris preferred the Ranney well system for independence and flexibility.

Because the costs are so high on all but the last option, Steve reviewed Reclamation's proposal to provide 1,000 acre-feet per year from Red Fleet Reservoir through the planned Burn's Bench Canal replacement Pipeline under the Salinity Program. Additional water needs could be met from high flows in the Green River being diverted into Stewart Lake through the new inlet channel control structure. Water available in Brush Creek includes the unsold M&I water, now about 3,300 acre-feet per year due to the newly established 4,000 acre foot conservation pool, and the 220 acre-feet of Project irrigation water that was turned back to DOI from the Sunshine Pipeline Company under the Central Utah Project Completion Act Section 207 Conservation Credit Program. Mark Holden and Reed Harris were asked if they would support using the 220 acre-feet returned irrigation water as part of the 1,000 acre foot supply to Stewart Lake, and they indicated they would.

(Note - part of the rationale for providing 1,000 acre-feet is that the annual flow of the irrigation drains is about 1,650 acre-feet, with about 440 acre-feet being delivered in May and June, when normally the Green River is flowing high enough to flow into Stewart Lake through the new inlet channel/structure. These two sources of water should normally fully replace the irrigation drainage water now removed from Stewart Lake. The attached Table 1 from the USGS shows that normally, or 70 percent of the time the Green River flows are high enough during May to flow into Stewart Lake through the inlet channel, and 63 percent of the time flows in June are high enough to flow into Stewart Lake. In April, 13 percent of the time, and in July, 10 percent of the time flows are also high enough to flow into Stewart Lake.)

Stewart Lake operation and tamarisk control were briefly discussed. Bruce Waddell reviewed the draining of Stewart Lake which started July 22, and was completely drained by August 5. Walt Donaldson wants better coordination next time Stewart Lake is drained, and they want to do the actual operating of the inlet and outlet gates in the future. The State believes that control (spraying) of tamarisk needs to be conducted this fall, and they agreed to take the lead and do the necessary spraying/control (or contract it), and Reclamation will pay for the costs. Steve will initiate an agreement immediately to pay for the necessary cost for this, and for burning if it is decided to do burning again next spring. Reclamation will pay for these costs for the next several years as needed during the ongoing work to clean up the bottom sediments, but will discontinue these payments as soon as adequate cleanup is accomplished.

The following general decisions were made and agreed upon by everyone present:

1. In addition to the high flow water available in the Green River deliverable through the New inlet channel/structure, a water supply of 1,000 acre-feet per year would be delivered to Stewart Lake from Red Fleet Reservoir through an enlarged Burns Bench Canal Pipeline replacement. This would consist of the 670 acre-feet committed to in the Jensen Unit FES which would come from the unsold M&I water for the present, an additional 110 acre-feet of unsold M&I water, and the 220 acre-feet of Conservation Credit irrigation water turned back to DOI. In the future, if and when the M&I water is needed, the Burns Pumping Plant would be constructed to replace this M&I water, or additional Conservation Credit irrigation water that has been turned back to DOI

would be applied for.

2. The water supply option selected is to deliver the above 1,000 acre-feet per year to Stewart Lake from Red Fleet Reservoir through an enlarged Burns Bench Canal Pipeline replacement. The Irrigation Drainage Program would pay to enlarge the proposed Burns Pipeline by 5 cfs, and by participating with the Burns Pipeline Company, on a space available basis up to 10 to 12 cfs capacity (the capacity of the existing drought pipeline) would be available in Feb.-March and in October as needed to fill Stewart Lake.

3. All the agencies will look for opportunities to come up with additional water, such as the Conservation Credit Program, to augment the 1,000 acre-feet of water for Stewart Lake.

Attendance List
MIDDLE GREEN RIVER BASIN SELENIUM STUDY
STEWART LAKE REMEDIATION/ WATER SUPPLY
Bureau of Reclamation/Provo Area Office
August 10, 1999, 10:00 am

Name	**Entity**	**Location**	**Phone Number**
Kib Jacobson	USBR	SLC	801 524 3888
Wayne Pullan	USBR	Provo	801 379-1081
Reed Murray	DOI	Provo	801 379-1237
Jonathan Jones	USBR	Provo	801 379-1195
Larry Fluharty	USBR	Provo	801 379-1155
Mark Holden	Mitigation Comm.	SLC	801 524-3146
Jack Lytle	UDWR	Vernal/SLC	435 789-3103
Jerry Miller	USBR	SLC	801 524-3700
F. Neil Folks	UDWR	Browns Park	435 885-3306
Kerry Schwartz	USBR	Provo	801 379-1167
W. Russ Findley	USBR	Provo	801 379-1084
Natalie Gale	UDWR	Vernal	435-789-3103
Walt Donaldson	UDWR	Vernal	435-789-3103
Reed Harris	FWS	SLC	801 524-5001 x 126
Bruce Waddell	FWS	SLC	801 524-5001 x 125
Steve Noyes	USBR	Provo	801 379-1032
John Harb	USBR	Denver	303 445-2789
Jay Henrie	USBR	Provo	801 379-1073
Brent Rhees	USBR	Provo	801 379-1210
Brandt Demars	USBR	Provo	801 379-1284
Bruce Barrett	USBR	Provo	801 379-1100
Dave Rasmussen	UWCD	Vernal	435 789-1651

Attachment - Flow Tables

Table 1. Summary of Mean Monthly Drain Flows into Stewart Lake
Period of record for each drain (1981 to 1998, maximum)
(Source: Doyle Stephens, USGS)

Mean Flow (Q) acre-ft/month

	J1	J1a	J2	J3	J4	Total Q Acre-ft	Avg. cfs	Percent
October	57.03	16.45	46.34	30.31	16.12	166.26	2.70	10.0
November			35.70	23.80	5.95	65.46	1.10	4.0
December			12.09	18.75	7.13	37.98	0.62	2.3
January			11.38	15.37	8.30	35.05	0.57	2.1
February	8.33	3.89	3.33	13.70	13.33	42.58	0.77	2.6
March	11.27	5.33	5.98	12.91	6.76	42.26	0.69	2.6
April	4.07	2.58	32.73	10.12	6.19	55.68	0.94	3.4
May	49.81	23.06	44.82	25.42	34.06	177.16	2.88	10.7
June	90.55	20.63	72.92	31.10	50.13	265.33	4.46	16.1
July	101.58	34.19	77.61	32.13	42.20	287.70	4.68	17.4
August	108.22	40.83	72.62	30.54	46.53	298.73	4.86	18.1
September	43.44	29.16	46.58	29.58	27.37	176.13	2.96	10.7
			Annual total =			**1650.32**		

Table 2.- Summary of percentage of time daily mean flow in the Green River near Jensen, Utah equaled or exceeded 8,650 cfs (point at which it enters Stewart Lake through controlled breach). Analysis for period 10-1-70 through 9-30-98, post completion of Flaming Gorge Reservoir. (Source: Doyle Stephens, USGS.)

	Percent of Time
January	0
February	0.1
March	0.9
April	13
May	70
June	63
July	10
August	1
September	0
October	0
November	0
December	0

Attachment

STEWART LAKE WATER SUPPLY FINAL COSTS

Ranney Collection System:

5 cfs	$1.021 million	+ $6,000 / yr Power Costs + $33,000 maintenance cost per unit after 10 years + $10,000 every 5 years after + $25,000 per pump replacement cost
	$1,124,000 capital cost for 25 year life * *$1,154,000 capital cost for 50 year life* *	
10 cfs	$1.83 million	+ $8,500 / yr Power Costs + $66,000 maintenance cost after 10 years + $20,000 every 5 years after + $25,000 per pump replacement cost
	$1,991,000 capital cost for 25 year life * *$2,040,000 capital cost for 50 year life* *	
15 cfs	$2.346 million	+ $10,100 / yr Power Costs + $66,000 maintenance cost after 10 years + $20,000 every 5 years after + $25,000 per pump replacement cost
	$2,527,000 capital cost for 25 year life * *$2,587,000 capital cost for 50 year life* *	
20 cfs	$3.042 million	+ $11,700 / yr Power Costs + $99,000 maintenance cost after 10 years + $30,000 every 5 years after + $25,000 per pump replacement cost
	$3,270,000 capital cost for 25 year life * *$3,346,000 capital cost for 50 year life* *	

Pumped Infiltration Gallery:

5 cfs	$986,000 + $9000 / yr O&M
10 cfs	$1.139 million + $15,500 / yr O&M

Direct Pumping: ***(Screened Intake Structure with sed basin and vertical caisson)***

5 cfs	\$1.1 million + \$15,000 - 40,000 / yr O&M
10 cfs	\$1.3 million + \$20,000 - 45,000 / yr O&M

Gravity Flow Pipeline: ***(Screened Intake Structure with sed basin and 30,000' of pipe)***

5 cfs	\$3.1 million + \$5000 to \$30,000 /yr O&M + right of way
10 cfs	\$3.4 million + similar O&M + right of way

Cooperation in Burns Bench Pipeline:

Place our water in their line:

5 cfs	\$436,000 + some O&M as negotiable
10 cfs	\$1.213 million + some O&M as negotiable

Build our own line beside theirs:

5 cfs	\$800,000 + some O&M as negotiable
10 cfs	\$885,000 + some O&M as negotiable

*** *Note that the power and maintenance costs are based on the assumption that:*

Stewart Lake is artificially filled twice per year
Stewart Lake contains approximately 600 acft of water
The pumps are used continuously, regardless of peak power costs
An interest rate of 6% was used for all present worth / capital cost calculations

Appendix C

Memorandum of Understanding on Delivery of Water on Stewart Lake, July 10, 2000.

United States Department of the Interior

BUREAU OF RECLAMATION
Upper Colorado Region
Provo Area Office
302 East 1860 South
Provo, Utah 84606-7317

U.S. Department of the Interior 1849•1999

PRO-470
ADM-13.00

JUL 10 2000

MEMORANDUM

To: Field Solicitor, Salt Lake City Field Office, Salt Lake City UT
Attention: Mr. Chris Rich

From: ACTING FOR Bruce C. Barrett
Area Manager

Subject: Submittal of Memorandum of Understanding Among the United States Bureau of Reclamation, the Uintah Water Conservancy District, and the Burns Bench Irrigation Company to Deliver Water to Stewart Lake, Middle Green River Basin Study, National Irrigation Water Quality Program

Attached are four signed copies of the subject Memorandum of Understanding. They have been signed by all parties and are ready for your approval. You reviewed the semifinal version in Provo, Utah, on June 12, 2000, and said the wording was acceptable but suggested the format be changed to underline paragraph headings for easier reading. That change was made.

Please sign all four copies and return them to this office for distribution. You may keep one original if desired.

If you have any questions or need additional information, please contact Stephen Noyes at (801) 379-1032.

[signature]

Attachment - 4 copies

cc: Manager, Technical Services and Dams Division, Salt Lake City UT, Attention: UC-242
Director, Operations - West, Attention: D-6200 (N. John Harb)
(each w/o atts)

**MEMORANDUM OF UNDERSTANDING
AMONG
THE UNITED STATES BUREAU OF RECLAMATION,
THE UINTAH WATER CONSERVANCY DISTRICT
AND
THE BURNS BENCH IRRIGATION COMPANY
TO
DELIVER WATER TO STEWART LAKE**

1. BACKGROUND

The United States Bureau of Reclamation (Reclamation) constructed the Jensen Unit of the Central Utah Project (Project) to serve M&I and supplemental irrigation water needs in the area of Jensen, Utah. Water from the Project flows through Mancos shale formations and soils, which are naturally high in salt and selenium. As a result, irrigation drain flows from the Project may have contributed to high selenium levels in the Stewart Lake Waterfowl Management Area (Stewart Lake). Reclamation has committed to provide a long-term clean water supply of 1,000 acre-feet per year to Stewart Lake. Reclamation has also committed, on a temporary (short-term not to exceed 5-10 years) basis, to supply an additional 1,500 acre-feet per year during the cleanup construction period, as it is available and beneficial for flushing Stewart Lake sediments.

The Uintah Water Conservancy District (District) operates the Jensen Unit of the Central Utah Project.

The Burns Bench Irrigation Company (Company) diverts both private and Project water from Brush Creek and supplies irrigation water to its water users.

Jensen Unit Irrigation Water Supply. The total irrigation water supply from the Jensen Unit of the Central Utah Project is 4,800 acre feet. Under Section 207 of CUPCA, 220 acre-feet of that irrigation water was permanently returned by the water users in the Sunshine Canal Company. The Fish and Wildlife Service (Service), in consultation with the Interagency Biological Assessment Team, decides how water returned under Section 207 will be used. The Service has agreed to dedicate the 220 acre-feet of irrigation water available for a water supply to Stewart Lake. This leaves an additional 780 acre-feet (1,000 acre-feet minus 220 acre-feet) of water for Reclamation to supply to Stewart Lake on a long-term basis.

Jensen Unit M&I Water Supply. The M&I water supply from the Jensen Unit was planned to be 18,000 acre-feet. Twelve thousand acre-feet of that water supply was not developed because the Burns Bench Pumping Plant (a project feature described in the Jensen Unit DPR) was never constructed. Six thousand acre-feet of the M&I supply was developed. Initially, a block notice for 6,000 acre-feet was issued allowing the District to begin taking delivery of that block of water and to start repayment of the obligation associated with that block. There was, however, insufficient demand for a block of water that large and an accompanying insufficient source of revenue to pay the obligation.

Section 203(g) of CUPCA. Section 203(g) of CUPCA remedied the situation. Under Section 203(g), the Secretary was authorized to enter into Amendatory Contract No. 6-05-01-000143 with the District to relieve them of 4,000 acre-feet of its M&I water repayment obligation. That Contract reserves to the United States the unmarketed 4,000 acre-feet of developed O&M water and the 12,000 acre-feet of undeveloped Project M&I water for marketing by the Secretary. The District shall have the right of first refusal to acquire both the remaining unmarketed 4,000 acre-feet of developed M&I water and the 12,000 acre-feet of undeveloped M&I water. That contract also delayed the construction of the Burns Pumping Plant until such time as the demand develops for the additional 12,000 acre-feet of M&I water. The Burns Pumping Plant also was designed to pump water from the Green River to Stewart Lake through the Burns Bench Canal to meet the Jensen Unit NEPA commitment to provide water to Stewart Lake.

Reclamation Use of Surplus M&I Supply at Stewart Lake. At the present time there are no users for the 4,000 acre-feet of developed M&I water and it remains surplus to the needs of the Jensen Unit. It is Reclamation's intention to use a portion of this surplus water supply to provide water to Stewart Lake. During the temporary study period, Reclamation will supply up to 2,280 acre-feet from this surplus water (1,500 acre-feet plus 780 acre-feet). Beyond the study period, Reclamation will continue to provide 780 acre-feet from the surplus. It is anticipated that the M&I demand from the Jensen Unit will develop incrementally--in a series of small blocks. Until a portion of the 2,280 acre-feet or the 780 acre-feet is required to meet M&I demand, Reclamation will continue to use the surplus water to meet its obligations to supply water to Stewart Lake. When a portion of the 2,280 or 780 acre-foot blocks is required to meet M&I demand, Reclamation will discontinue delivery of that portion to Stewart Lake and will seek and use other water sources to meet its Stewart Lake water supply obligations.

Use of Surplus Water Does Not Constitute a Reallocation of Water Supply. It is important to note that the temporary use of surplus water as described herein does not constitute a reallocation of the Jensen Unit water supply and associated costs of construction or O&M. If and when a reallocation of Jensen Unit costs occurs, the use of the surplus water at Stewart Lake may be considered in the reallocation; however, until that time, the delivery of Jensen Unit M&I water to Stewart Lake remains a temporary use of water that is surplus to the project.

Under the Drought Relief Program (Public Law 102-250), funds were approved in 1993 for supplying water to Stewart Lake during drought conditions. A pipeline was constructed to deliver water to Stewart Lake from the end of the Burns Bench Canal, along with a desilting structure at the diversion. This pipeline is referred to as the Stewart Lake Lateral.

Under Public Law 104-20, Reclamation is funding salinity improvement projects within the Colorado River Basin. The Burns Bench Canal Salinity Improvement Proposal has been accepted for implementation. An agreement is concurrently being negotiated to replace the Burns Bench Canal with a pipeline to reduce salinity (Burns Bench Salinity Improvement Project Agreement), and to increase the capacity by five cfs over that needed for irrigation, to deliver water to Stewart Lake.

Under Public Law 105-245, Reclamation may apply its Departmental Irrigation Drainage Program (IDP) funds in a non-reimbursable (expenditures need not be reimbursed by the Project water users) manner to meet program objectives; so, in order to meet its obligation to provide water to Stewart Lake, Reclamation has proposed to increase the capacity of the Burns Bench Salinity Improvement Project pipeline, as explained above. The additional capacity will allow Reclamation to deliver water to Stewart Lake through the Burns Bench Salinity Improvement Project Pipeline and the Stewart Lake Lateral.

Reclamation has committed to provide a long-term water supply of 1,000 acre-feet per year to Stewart Lake. Reclamation has sufficient water rights to provide 1,000 acre-feet of water for mostly non-consumptive use at Stewart Lake. This water will be delivered to the head of the Burns Bench Pipeline. During the next five to ten year clean-up phase at Stewart Lake, Reclamation may also provide an additional, temporary water supply not to exceed 1,500 acre-feet per year (2,500 total) to Stewart Lake. This additional water will temporarily be used to facilitate flushing Stewart Lake and cleaning up Stewart Lake sediments.

2. PURPOSE

This Agreement describes the partnership among Reclamation, the District, and the Company that will make delivery of a water supply to Stewart Lake through the proposed enlarged Burns Bench Pipeline possible.

3. PROJECT DESCRIPTION

The Burns Bench Canal is located in Uintah County, in and around Jensen, Utah. The proposed method of salinity improvement under the Burns Bench Salinity Improvement Project Agreement and associated funding is to replace the Burns Bench Canal with a pipeline. Under that Salinity Agreement, the Company will increase the capacity of the entire proposed salinity pipeline by 5 cfs over the size needed to meet the requirements of the Burns Bench Irrigation Company (as initially designed by the Contractor). The Burns Bench pipeline system will be designed and constructed to include sufficient capacity for 1,000 acre-feet of water to be delivered each year to Stewart Lake at a minimum of 5 cfs during the normal irrigation season (April 15 to October 31) and up to 10 cfs on a space-available basis from February 15 to October 31. The system will be designed for cold weather operation.

4. AGREEMENTS

There are three separate agreements pertaining to Reclamation's cooperating with the Burns Bench Irrigation Company in replacing their canal with a pipeline to reduce salinity under an approved Salinity Improvement Proposal, and to increase the capacity by five cfs over that needed for irrigation, to deliver water to Stewart Lake. These agreements are needed to meet Reclamation's legal contracting requirements, as determined by legal council.

4.1. **Cooperative Agreement between the United States Bureau of Reclamation and the Burns Bench Irrigation Company for work associated with the Burns Bench Salinity Improvement Project and Stewart Lake water supply.** This agreement obligates funding for construction of the Salinity pipeline and the 5 cfs enlargement to make it possible for the Burns Bench Irrigation Company to deliver water to Stewart Lake for Reclamation.

4.2. **Contract between the United States Bureau of Reclamation, and the Burns Bench Irrigation Company to deliver water to Stewart Lake (Water Delivery Contract).** This agreement obligates funding for the annual operation, maintenance, and replacement costs for Reclamation's prorated proportion of total expenses for the Burns Bench Irrigation Company to operate the new enlarged salinity pipeline and deliver water to Stewart Lake for Reclamation. The contract will be renewed every five years upon the same terms and conditions, with Reclamation paying the same Burns Bench per acre-foot assessment as that assessed to Company shareholders (plus the Jensen Unit equivalent per acre-foot assessment and off-season delivery charge described below).

4.3. This **Memorandum of Understanding (MOU) among the United States Bureau of Reclamation, the Uintah Water Conservancy District and the Burns Bench Irrigation Company to deliver water to Stewart Lake.** This MOU ties all three agreements together and spells out more comprehensively the overall intent and good faith of the three agencies to work together for everyone's mutual benefit.

5. AGREEMENT

5.1. Bureau of Reclamation. Reclamation will:

5.1.a. Provide Equivalent Operation, Maintenance, and Replacement (OM&R) Funds to the Company. Reclamation will reimburse the Company for all costs incurred in delivering water to Stewart Lake. Reclamation's annual assessment will be based upon the following:

5.1.a.1. One Thousand Acre-foot Base. Regardless of how little water Reclamation requests and receives in one year, it will pay as if it had received 1,000 acre-feet. In other words, Reclamation's minimum annual payment will be based upon 1,000 acre-feet delivery to Stewart Lake.

5.1.a.2. Burns Bench Per Acre-foot Assessment. For the 1,000 acre-foot base and for each acre-foot of additional temporary water (up to an additional 1,500 acre-feet), Reclamation will pay to the Company an amount equal to the per acre-foot equivalent of the OM&R charge assessed to Company shareholders by the Company. The Company assessment is levied against shares (304 Primary shares total). Each share represents 11.56 acre-feet. As a result, Reclamation's per acre-foot assessment shall be equal to the amount assessed by the company per share divided by 11.56. For example, the FY 2000 assessment per share is $43.00. Reclamation's per acre-foot assessment would be $3.72 ($43.00/11.56).

5.1.a.3. Jensen Unit Equivalent Per Acre-foot Assessment. For the 1,000 acre-foot base and for each acre-foot of additional temporary water (up to an additional 1,500 acre-feet), Reclamation will pay the equivalent per acre-foot O&M charge assessed against Jensen Unit Project Water. For example, the FY 2000 assessment per acre-foot is $1.50.

5.1.a.4. Off-Season Delivery Charge. For each month or portion of a month outside the regular irrigation season (between February 15 and April 15) during which Reclamation calls for and takes delivery of water, Reclamation will pay the actual additional costs associated with that delivery. The anticipated off-season request period for water is between February 15 and April 15 as weather conditions permit. Any request for water delivery outside of that period, and the regular irrigation season, would be negotiated on a case-by-case basis by the Utah Division of Wildlife Resources, and would be subject to the oversight and final approval of Reclamation. The off-season delivery charge is equal to the prorated monthly cost required to pay the ditch rider during the off-season delivery period and any other costs resulting from off-season delivery. For example, the current cost is estimated to be $1,200 per month. If Reclamation were to take delivery beginning on March 1 (one and one-half months before the irrigation season begins), Reclamation would pay $1,200 for the full month and an additional $600 for the portion (1/2) of the month during which the ditch rider's work was required. Depending upon weather conditions, request for water delivery to Stewart Lake may start as early as February 15.

5.1.a.5. Payment of Water Delivery Assessments and Deadlines. Reclamation will ensure that payment is made to the Company within forty five days of billing by the Company.

5.1.a.6. Examples of Reclamation Assessments.

5.1.a.6.a. Example 1 - Reclamation takes delivery of only 900 acre-feet, all deliveries are during the irrigation season. Based upon fiscal year 2000 assessments, Reclamation would pay $3,720 (1,000 acre-feet * $3.72) in Company per acre-foot assessments, and $1,500 (1,000 acre-feet * $1.50) in Jensen Unit equivalent per acre-foot assessments. The total payment would be $5,220.

5.1.a.6.b. Example 2 - Reclamation takes delivery of 1,000 acre-feet, a portion of which is delivered during three weeks before the irrigation season starts. Based upon fiscal year 2000 assessments, Reclamation would pay $3,720 (1,000 acre-feet * $3.72) in Company per acre-foot assessments, $1,500 (1000 acre-feet * $1.50) in Jensen Unit equivalent per acre-foot assessments, and $900 for the off-season deliveries (three/fourths of a month at $1,200 per month). The total payment would be $6,120.

5.1.a.6.c. Example 3 - Reclamation takes delivery of 2,500 acre-feet, a portion of which is delivered during six weeks before the irrigation season. Based upon fiscal year 2000 assessments, Reclamation would pay $9,300 (2,500 acre-feet * $3.72) in Company per acre-foot assessments, $3,750 (2500 acre-feet * $1.50) in Jensen Unit equivalent per acre-foot assessments, and $1,800 for the off-season deliveries between March 1 and April 15 (1.5 * $1,200). The total payment would be $14,850.

5.1.b. Notification of Proposed Delivery Schedule. Inform the Company of the volume and timing of water to be delivered to Stewart Lake. Requests will be made by Reclamation after close coordination with the Utah Division of Wildlife Resources (UDWR) during the interim cleanup efforts at Stewart Lake. Once normal operation of Stewart Lake occurs after cleanup efforts are complete, Reclamation may delegate the UDWR to work directly with the Company in requesting water deliveries to Stewart Lake. Requests for water will be estimated each spring by February 1 for the year, but actual requests will be on a call basis, as they are for irrigators.

5.1.c. Stewart Lake Water Measuring Instruments. Install meters, as necessary, to accurately measure water deliveries to Stewart Lake. (The existing meters on Stewart Lake Lateral do not function properly at the current time due to debris in the canal. With the installation of the pipeline, however, the existing meters should function properly.)

5.1.d. Major Maintenance or Repair of the Stewart Lake Lateral. During the first five years of water delivery to Stewart Lake through the Stewart Lake Lateral, Reclamation shall perform any major maintenance or repair of the Stewart Lake Lateral (Lateral). It is believed there may be sticks and debris caught at sharp elbows in the Lateral, limiting the capacity. The Lateral will be tested/checked as necessary to determine proper capacity and operation, and cleaned or repaired as necessary. After the first five years, the District shall be responsible to perform any major maintenance or repair of the Stewart Lake Lateral.

5.1.e. Use of Excess Capacity. As requested by the Company, provide use of the 5 cfs capacity reserved for delivery of the Stewart Lake Water Supply to the Company for its use on a space available basis.

5.2 Uintah Water Conservancy District. The District will:

5.2.a. Deliver waters ordered by Reclamation (or its designee) in accordance with Sections 5.1.b. and 5.3.b.

5.2.b Review of Reclamation Obligations. Upon receipt of assessment billing for water delivery costs from the Company, the District shall review the billing and give to the Company and Reclamation its view on the accuracy and correctness (based upon Section 5.1.a.) of the billing, within 15 days of receipt.

5.2.c. Major Maintenance or Repair of the Stewart Lake Lateral. After the first five years of delivery of water to Stewart Lake, the District shall be responsible to perform any major maintenance or repair of the Stewart Lake Lateral.

5.3. Burns Bench Canal Company. The Company will:

5.3.a. Operation, Maintenance and Replacement (OM&R). Fund and perform all future OM&R of the water distribution system, and related features, at no additional cost to the Federal Government, except the annual equivalent OM&R costs as outlined in Section 5.1.a. These features include the Burns Bench Pipeline, the Burns Bench Diversion, the Burns Bench Diversion Desilting Structure, and the Stewart Lake Lateral. Reclamation and/or the District shall perform any major maintenance or repair of the Stewart Lake Lateral as described above, but normal operation and maintenance shall be the responsibility of the Company. Operation and maintenance shall be in a prompt manner to assure that the Project's salinity improvement benefits are realized to the best extent possible, as well as the requested water supplies are delivered to Stewart Lake. The Company will submit an annual report of total OM&R costs for each year to the District and Reclamation, along with the assessment of costs to Reclamation, in accordance with Section 5.1.a. Based upon Reclamation's request and receipt of water deliveries, the Company shall invoice Reclamation, with a copy to the District, for the year's equivalent OM&R costs by October 1 of each year. The Company will allow Reclamation forty five days to ensure that funds have been transferred.

5.3.b. Stewart Lake Deliveries. Deliver 1,000 acre-feet long-term [and up to an additional 1,500 acre-feet temporarily (2,500 acre-feet total)] of water to Stewart Lake each year through the Burns Bench Pipeline and Stewart Lake Lateral, as requested by Reclamation (or its designee) as described in Sections 5.1.a. and 5.1.b. Delivery shall be at a rate of 5 cfs but may increase to 10 cfs between February 15 and October 31 if space is available in the system and if weather conditions permit. The Pipeline will be designed to operate in cold weather (Section 3.).

5.3.c. Notification of Shareholder Meetings. The Company will notify Reclamation and the District of any shareholder meetings in a timely fashion and allow them to attend and participate in the meetings. Neither Reclamation nor the District shall have voting rights in the Company.

6. PERIOD OF PERFORMANCE

6.1. Water Delivery. The Company will deliver water, per this Agreement, as long as a Water Delivery Contract is in place, or in the absence of a Contract, the Company is reasonably certain that payment of assessments will be forthcoming. The duration of this Agreement shall be from the date of signing for as long as necessary, up to 50 years.

6.2. Water Delivery Contract. The Water Delivery Contract which obligates funding will be for a term of five years and may be renewed/extended every five years dependent upon mutual agreement of the parties to that Contract. The Contract may be reissued with the same terms and conditions every 5 years for as long as the parties are in agreement (as long as 50 years).

7. FUNDING

Reclamation's projected fund needs associated with the Stewart Lake Water Supply are presently estimated to be up to $80,000 for the next 5-year agreement period, but all funding commitments will be covered in the Water Delivery Contract. The expenditure of any future money or the performance of any work by the United States hereunder, which may require future appropriations of money by the Congress or the allotment of funds, shall be contingent upon such appropriation or allotments being made. The failure of the Congress to so appropriate funds or the absence of any allotment of funds shall not relieve the Company from any prior obligation under this MOU, and no liability shall accrue to the United States in case such funds are not appropriated or allotted.

8. TERMINATION

This agreement may not be terminated unless all parties are in agreement.

9. KEY TECHNICAL REPRESENTATIVES

The parties respectively designate the following persons to act as Key Technical representatives in matters and decisions pertaining to the timely performance under this Agreement:

For the Company:
Boyd Snow (435) 789-0295
President, Burns Bench Irrigation Company
6805 South 8000 East
Jensen, Utah 84035

For the District:
Scott Ruppe (435) 789-1651
Manager, Uintah Water Conservancy District
78 West 3325 North
Vernal, Utah 84078
Fax: (435) 789-1670

For Reclamation:
Stephen Noyes (801) 379-1032
Project Team Leader
Bureau of Reclamation
Provo Area Office
302 East 1860 South
Provo UT 84606-7317
Fax: (801) 379-1159

Each party may designate a successor authorized technical representative upon written notice to the other parties, or as designated in each task order.

10. MISCELLANEOUS PROVISIONS

10.1. Assignment. This Agreement shall not be assignable by any party without the prior written consent of the other parties. Subject to this limitation on assignment, this Agreement shall be binding upon and shall inure to the benefit of the parties' respective successors, agents and assignees.

10.2. Severability. The provisions of this Agreement are severable, and the invalidity or unenforceability of any provision of this Agreement shall not affect the validity or enforceability of the remaining provisions.

10.3. Authority. Each party warrants that the person signing this Agreement on its behalf has been duly authorized to execute this Agreement on its behalf.

SIGNATORY PAGE

For the Company:

Boyd K Snow 6-14-00

President, Burns Bench Irrigation Company Date

For the District:

Scott Ruppe 6-13-00

Manager, Uintah Water Conservancy District Date

For Reclamation: Approved:

Bruce C Barrett 6/22/00 Christopher B Rich

Bureau of Reclamation Date Office of the Field Solicitor Date