VOLUME 1

FINAL ENVIRONMENTAL IMPACT STATEMENT
Weber Dam Repair and Modification Project

Prepared for:

Bureau of Indian Affairs
Western Regional Office
Phoenix, Arizona

On behalf of:

Walker River Paiute Tribe
Schurz, Nevada

Prepared by:

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INC.

Abstract

The Walker River Paiute Tribe (Tribe) and Bureau of Indian Affairs (BIA) propose to repair and modify Weber Dam (Dam) in accordance with federal safety requirements for the structure. Weber Dam is a BIA facility which BIA operates for the benefit of the Tribe, and which BIA must repair and modify under the requirements of the Indian Dams Safety Act. The repair would allow operation of Weber Reservoir (Reservoir) at the current full capacity of 10,700 acre-feet (af). The Tribe is a cooperating agency for the proposed project. BIA has a trust responsibility over Indian lands. The Dam repair project is a major federal action and the preparation of an environmental impact statement under the National Environmental Policy Act of 1969 (NEPA) is required to evaluate potential impacts and alternatives for project planning and environmental protection. The Tribe and BIA have jointly reviewed and approved the information and analyses set forth in this Final Environmental Impact Statement (FEIS). This FEIS describes the alternatives that were evaluated and those considered but eliminated from further analyses. This FEIS also documents the existing environmental setting, and provides the results of the analysis of the two alternatives that were considered, Proposed Action and No Action. The following resources and issues were evaluated: geology, soils, surface water hydrology, ground water resources, biological resources, transportation, air quality, visual resources, noise, land use, cultural resources, paleontologic resources, socioeconomics, environmental justice, Indian trust assets, cumulative impacts, and indirect effects.

No significant impacts to resources from construction activities are anticipated because all identified mitigation measures would be implemented. If No Action were selected, the purpose and need of the proposed project would not be met, the Safety of Dams issue would not be resolved, and there would be no economic benefit to the Tribe.

Disclaimer Statement

National Environmental Policy Act Disclosure Statement
Bureau of Indian Affairs Environmental Impact Statement
Weber Dam Repair and Modification

The President's Council on Economic Quality regulations at 40 C.F.R. 1506.5(c) require that consultants preparing an environmental impact statement execute a disclosure specifying they have no financial or other interest in the outcome of the project. The term "financial interest or other interest in the outcome of the project" for purposes of this disclosure is defined in the March 23, 1981, guidance entitled "Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations," 46 Fed. Reg. 18026-18038 at Questions 17a. and b.

"Financial or other interest in the outcome of the project" includes "any financial benefit such as a promise of future construction or design work in the project, as well as indirect benefits the contractor is aware of (e.g. if the project would aid proposals sponsored by the firm's other clients) 46 Fed. Reg. 18026-18038 at 18031.

In accordance with these requirements, Miller Ecological Consultants, Inc. has prepared this Environmental Impact Statement on behalf of the Bureau of Indian Affairs and Walker River Paiute Tribe and declares no financial or other interest in the outcome of the proposed project.

Certified by:

William J. Miller (signature) — April 25, 2005

William J. Miller, President
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Date: April 25, 2005

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Executive Summary

Introduction

The Department of the Interior, through BIA and in cooperation with the Tribe has prepared this FEIS. This FEIS is prepared under provisions of Public Law Number 93-638, entitled the Indian Self Determination and Education Assistance Act, and NEPA.

Background

Weber Dam (Dam) is a small earthen dam on the Walker River Paiute Indian Reservation (Reservation) in western Nevada that impounds waters of the Walker River, a stream which originates in the Sierra Nevada Mountains and terminates at Walker Lake. The Dam is operated by BIA to provide irrigation water to the Reservation. The Dam, its reservoir, and lands it serves lie wholly within the boundaries of the Reservation.

The major portion of the Dam was built during 1933 through 1935 and completed in June 1937 when the spillway gates were installed. The Reservoir had a maximum surface area of about 960 acres and a storage capacity at the top of the spillway gates of 13,000 acre-ft (af) at the time of completion. Deposition of sediments has reduced the capacity to 10,700 af.

The initial proposal for repair and modification of the Dam was a result of the safety analysis conducted by BIA under BIA's Dam Safety Maintenance and Repair Program (DSMRP). That program was created as part of the Indian Dams Safety Act. Under DSMRP, BIA must perform such rehabilitation work as necessary to bring all dams located in Indian country and identified as unsafe to a satisfactory condition.

Public scoping meetings were held to explain the NEPA process, describe the proposed project and the issues to be discussed in the EIS in Schurz and Yerington, Nevada, and to solicit public comments, views and suggestions. Issues raised during the scoping process included water storage capacity of Weber Reservoir, the need for Dam modification to allow full capacity of water storage in Weber Reservoir (10,700 af), and passage for Lahontan cutthroat trout (LCT), a threatened species.

Purpose and Need for the Proposed Project

The Proposed Action is the repair and modification of Weber Dam. As a result of safety of dams investigations conducted in the early to mid 1980s, the Dam was given a high hazard rating and poor overall safety rating. The hazard rating means that more than six lives could be lost should the Dam fail. The safety rating means the overall risk of overtopping by floods or structural failure during an earthquake is relatively high. The purpose of the Proposed Action is to reduce both risks.

The proposed repair and modification of the existing Dam are needed to provide a secure source of irrigation water, recreation, fish and wildlife habitat, and undetermined future uses for tribal members and Reservation lands. Regulations governing the maintenance and operation of Indian irrigation projects are provided in 25 C.F.R. Part 171.

Alternatives Considered but Eliminated from Further Analysis

Several alternatives were considered but were eliminated because they did not meet the purpose and need, or because other alternatives better satisfied the proposed project objectives. The additional alternatives considered were:

- Construction of an off-channel Reservoir, and
- Development of a groundwater well field.

Summary of Alternatives Evaluated in This Final EIS

Two alternatives were evaluated, the No Action and Proposed Action. These are each summarized below and are described in detail in Chapter 2 of the FEIS.

Proposed Action Alternative

The Proposed Action is an integrated set of actions to ensure safe operation of the Dam while utilizing the maximum capacity of the Reservoir. The proposed repairs involve all major features of the Dam, realignment of the northern half of the embankment, repair of the outlet works and service spillway, enlargement of the emergency spillway, flattening of the upstream slope of the embankment, structural changes to the upstream and downstream foundations of the Dam to increase the dynamic stability of the Dam, emplacement of a geomembrane seepage barrier, and construction of a downstream stability berm. These features are described in detail in Chapter 2. Together these Dam modifications would help prevent failure during an earthquake and provide a level of protection from floods.

In addition to the Dam structural features, fish passage is incorporated into construction design. Fish passage for LCT would be provided by means of a rock ramp fishway built at the edge of the emergency spillway from Walker River up to the Reservoir pool. Fish passage would allow passage for LCT which currently migrate during high flows from Walker Lake.

No Action Alternative

Under this alternative, the repair and modification of Weber Dam would not be completed and the Reservoir would continue to be operated under the interim operating criteria (IOC) adopted by BIA for dam safety in February 2000. IOC limits the maximum Reservoir elevation to 4,200[1] feet above mean sea level (msl) and approximately 4,766 af capacityto reduce the probability of dam failure and uncontrolled reservoir releases during an earthquake. Operation at this level has adverse effects on the Tribe's economy including in adequate irrigation supply, loss of recreation, loss of fishery in Weber Reservoir and loss of wetlands and wildlife .

No Action would result in not undertaking actions to repair safety modifications to the Dam that would allow Weber Reservoir to be operated at full capacity. Current operation for

Weber Dam includes the storage of water for irrigation both within the 180-day irrigation season, during which this water is transferred through direct flow to the Reservation, and during peak flow periods that occur during the year. Water is released downstream for irrigation use during the 180-day irrigation season on the Reservation.

Summary of Effects

Table ES-1 summarizes the effects and mitigation identified for the Proposed Action. Significance criteria for each resource are presented in the environmental consequences section (Chapter 4) of the FEIS.

Table ES-1. Summary of Effects for the Proposed Action. Short-term impacts are those that occur during construction. Long-term impacts occur over the life of the project.

Resources	Effects
3.1.1 Geology and Soil Resources	
Short-term	Local areas of soil disturbance during construction. Disturbed ares would be revegetated and stabilized.
Long-term	Dam failure not anticipated after repair and modification.
3.1.2. Water Resources	
Short-term	Short-term impacts to water quality during construction minimized by mitigation measures for water quality control. Water quality control plan would be included in Proposed Action construction plan.
Long-term	None
3.1.3. Air Quality	
Short-term	Minimal wind erosion. Short-term emissions, exhaust from construction equipment. BMP would be used for exhaust and dust emission control.
Long-term during operation	None
3.1.4. Biological Resources	
Short-term	Vegetation resources: loss of less than 1 acre of wetland during construction. Reclamation activities as part of construction plan would replace wetland as specified in 404 permit. Wildlife: Temporary loss of habitat during construction. Reclamation activities would restore habitat.
Long-term	Warm water fish species would recolonize the Reservoir from upstream. Fish passage would allow migration of fish past Weber Dam and assist in recovery efforts for LCT.
3.1.5. Cultural Resources	
Short-term	None anticipated. Any unanticipated impact to cultural resources would halt construction, appropriate Tribal and BIA personnel would be notified and impact to the resource would be avoided.
Long-term	None.
3.1.6. Socioeconomic Conditions	
Short-term	Benefit to economy by construction.
Long-term	Benefit to tribal economy by full irrigation supply in most years.
3.1.7. Resource Use Patterns	
Short-term	Loss of access to Dam and Reservoir.
Long-term	Recreation enhanced by full capacity use of Weber Reservoir.
3.1.8. Other Values	
Short-term	Increase of local noise and transportation. BMP used during construction will minizie impacts.
Long-term	None.
3.1.9. Environmental Justice and Indian Trust Assets	
Short-term	None.
Long-term	Benefit Indian Trust Assets by reducing the potential for damage to the Reservation, irrigated lands and property and enhancing fish, wildlife, and recreation.

Acronyms and Abbreviations

AADT	Average annual daily traffic level
AIRFA	American Indian Religious Freedom Act, as amended
af	Acre-feet
ARPA	Archaeological Resources Protection Act, as amended
B.P.	Before present
BIA	U.S. Bureau of Indian Affairs
BLM	U.S. Bureau of Land Management
BMP	Best Management Practices
BOR	U.S. Bureau of Reclamation
ca	Approximately
CAA	Clean Air Act, as amended
CEQ	(President's) Council on Economic Quality
CFR	Code of Federal Regulations
cfs	Cubic feet per second
CO	Carbon monoxide
CO_2	Carbon dioxide
cu yd	Cubic yard
CWA	Clean Water Act, as amended
dB	Decibel
dBA	Decibels on the A-scale
dB(A)Leq	Noise levels over a period of minutes or hours
°F	Degrees Fahrenheit
°C	Degrees Celsius
DEIS	Draft Environmental Impact Statement
DOI	U.S. Department of the Interior
DVA	Deficiency verification analysis
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-to-know Act of 1986
ERP	Emergency Response Plan
ESA	Endangered Species Act, as amended
FEIS	Final Environmental Impact Statement
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FONSI	Finding Of No Significant Impact
FWS	U.S. Fish and Widlife Service
gpm	Gallons per minute
HMMP	Hazardous Materials Management Plan
IDSA	Indian Dam Safety Act as amended
ITA	Indian trust assets
ITC	Inter-Tribal Council
km	Kilometer
kg/ha/yr	Kilograms per hectare per year
LCT	Lahontan cutthroat trout

MBTA	Migratory Bird Treaty Act
MCE	Maximum credible earthquake
Mg	Magnesium
Mg-ca	Magnesium-calcium
mg/L	Milligrams per liter
msl	Mean sea level
N	Inorganic nitrogen
NAAQS	National Ambient Air Quality Standards
NAC	Nevada Administrative Code
NAGPRA	Native American Graves Protection and Repatriation Act of 1990, as amended
NCA	Noise Control Act of 1972, as amended
NDEP	Nevada Division of Environmental Protection
NDOT	Nevada Department of Transportation
NDWR	Nevada Division of Water Resources
NEPA	National Environmental Policy Act, as amended
NHPA	National Historic Preservation Act, as amended
NNHP	Nevada Natural Heritage Program
NO_x	Nitrogen oxides
NOA	Notice Of Availability
NOI	Notice of Intent
NPV	Net present value
NRCS	Natural Resource Conservation Service
NRHP	National Register of Historic Places
NRS	Nevada Revised Statute
NWS	National Weather Service
O_3	Ozone
OHV	Off-highway vehicle
OM&R	Operation, maintenance and repair
OSHA	Occupational Safety and Health Administration
Pb	Lead
PGA	Peak ground acceleration
PMF	Probable maximum flood
PPA	Pollution Prevention Act of 1990, as amended
ppm	Parts per million
PSD	Prevention of significant deterioration
psig	Pounds per square inch gauge
RCRA	Resource Conservation and Recovery Act, as amended
RMP	Resource Management Plan
SDWA	Safe Drinking Water Act, as amended
SEED	Safety Evaluation of Existing Dams
SHPO	State Historic Preservation Officer
SO_2	Sulfur dioxide
SPCCP	Spill Prevention Control and Countermeasures Plan
TCP	Traditional cultural property
TDS	Total dissolved solids
T&E	Threatened and Endangered

tpy	Tons per year
ug/m^3	Microgram per cubic meter
USC	United States Code
VRM	Visual Resources Management (Guidelines)

1 Chapter 1. Introduction: Background, Purpose and Need for the Action and Scoping Summary

1.1 Background

Weber Dam is an earthen dam on the Reservation in western Nevada that impounds waters of the Walker River, a stream which originates in the Sierra Nevada Mountains and terminates at Walker Lake. The Dam is owned and operated by BIA to provide irrigation water to the Reservation. The Dam, Reservoir, and the lands it serves lie wholly within the boundaries of the Reservation.

The Dam is located about 80 miles east of Lake Tahoe and 25 miles northwest of Walker Lake. It is about four miles upstream of the town of Schurz, Nevada, and seven miles upstream of the intersection of U.S. Highways 95 and 95A (Figure 1.1-1).

The major portion of the Dam was built during 1933-35 and completed in June 1937 when the spillway gates were installed (Johnson, 1975). The crest is 16 feet wide, 1,950 feet long, at an elevation of 4,217 feet above mean sea level (msl). The structural height of the Dam, which is the distance from the base of the foundation to the crest, is 50 feet. The hydraulic height, which is the distance from the lowest point in the original streambed at the dam axis to the top of the spillway gates at 4,208 ft msl, is 36 feet (Carter and Heyder, 1993). The Dam has a homogeneous silty sand core with riprap protection on the upstream face, and a thin rock shell on the downstream face.

The Reservoir had a maximum surface area of about 960 acres and a storage capacity at the top of the spillway gates of 13,000 acre-feet (af) at completion (Kronquist 1939). Current capacity is about 10,700 af (Katzer & Harmsen, 1973). IOC for the Dam limits the maximum Reservoir elevation to 4,200[1] ft msl which provides approximately 4,766 af of storage. Annual river volume has varied greatly from year to year, ranging from 6,664 af to 601,218 af for the period 1903 through 2002.

The initial proposal for repair and modification of the Dam was the result of the safety analysis conducted in 1989 under the BIA Dam Safety Maintenance and Repair Program (DSMRP), created as part of the Indian Dams Safety Act (IDSA) Under DSMRP, BIA must perform such rehabilitation work as is necessary to bring the dams identified as unsafe to a satisfactory condition, and each dam located on Indian lands shall be regularly maintained by BIA. IDSA requires that work authorized shall be for the purpose of dam safety maintenance and structural repair.

Various repairs to the Dam are needed. The principal problems to be corrected are unsatisfactory static stability, potentially liquefiable materials in the lower portion of the embankment, and unsatisfactory properties with respect to seepage and rapid drawdown of

[1] On an annual basis, the Tribe can request BIA to modify the Interim Operating Criteria to allow water to be stored behind Weber Dam up to an elevation of 4,202 feet or 6,083 acre-feet for a period not to exceed 30 days. After 30 days at elevation 4,202 releases must be made to return the water surface to 4,200 feet.

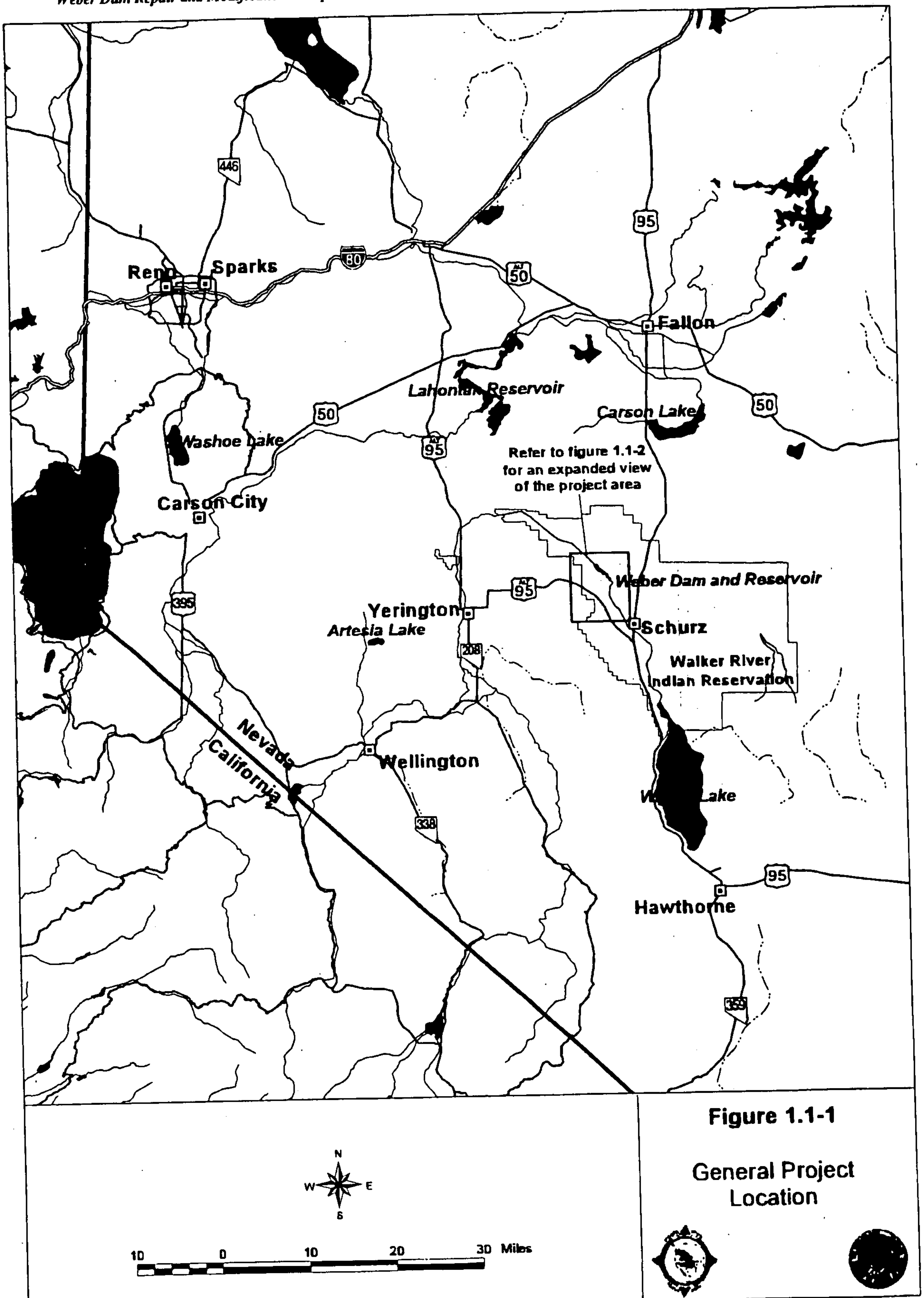


Figure 1.1-1

General Project Location

the Reservoir (USBR, 1993). The proposed modifications and repairs covered by this EIS would be funded by BIA.

1.1.1 Previous NEPA Activities

In 1994, the Bureau of Reclamation (BOR) under contract with the Tribe prepared an Environmental Assessment (EA) for BIA that analyzed safety modifications to Weber Dam. BIA signed a Finding of No Significant Impact (FONSI) for the project in September 1994. The purpose of the modifications analyzed in the 1994 EA was to repair all major features of the Dam to prevent earthquake-induced Dam failure and increase flood protection from approximately 7 percent of the Probable Maximum Flood (PMF) up to approximately 13.8 percent of the PMF.

During final design activities, BOR discovered that the proposed action described in the EA would not eliminate all safety concerns. BOR's deficiency verification analysis identified two additional Safety of Dams deficiencies:

- Seepage instability caused by cracking of the Dam embankment and foundation materials due to movement during a Maximum Credible Earthquake (MCE) along an existing secondary earthquake fault which is located beneath the embankment.
- Seepage instability caused by rupture of the outlet works conduit due to movement during an MCE along an existing secondary earthquake fault which is located beneath the outlet works conduit.

BOR prepared a supplemental EA in 1998 to address the following additional Dams Safety deficiencies and modifications to the action proposed in the 1994 EA:

- Removal of a portion of the existing embankment and construction of a new portion of embankment downstream of the existing embankment.
- Widening the existing embankment at the outlet works and extension of the outlet works tunnel by approximately 105 feet.
- Revision and enlargement of the emergency spillway.
- Roadway reconstruction.
- Additional quarry material for embankment slope protection.

An expanded view of the study area and locations of selected project components are shown in Figure 1.1-2. Prior to initiation of construction, BIA and the Tribe decided to prepare an EIS for the project. This decision was based on a concern that the modification project may affect Lahontan cutthroat trout (LCT), a threatened species in the project area.

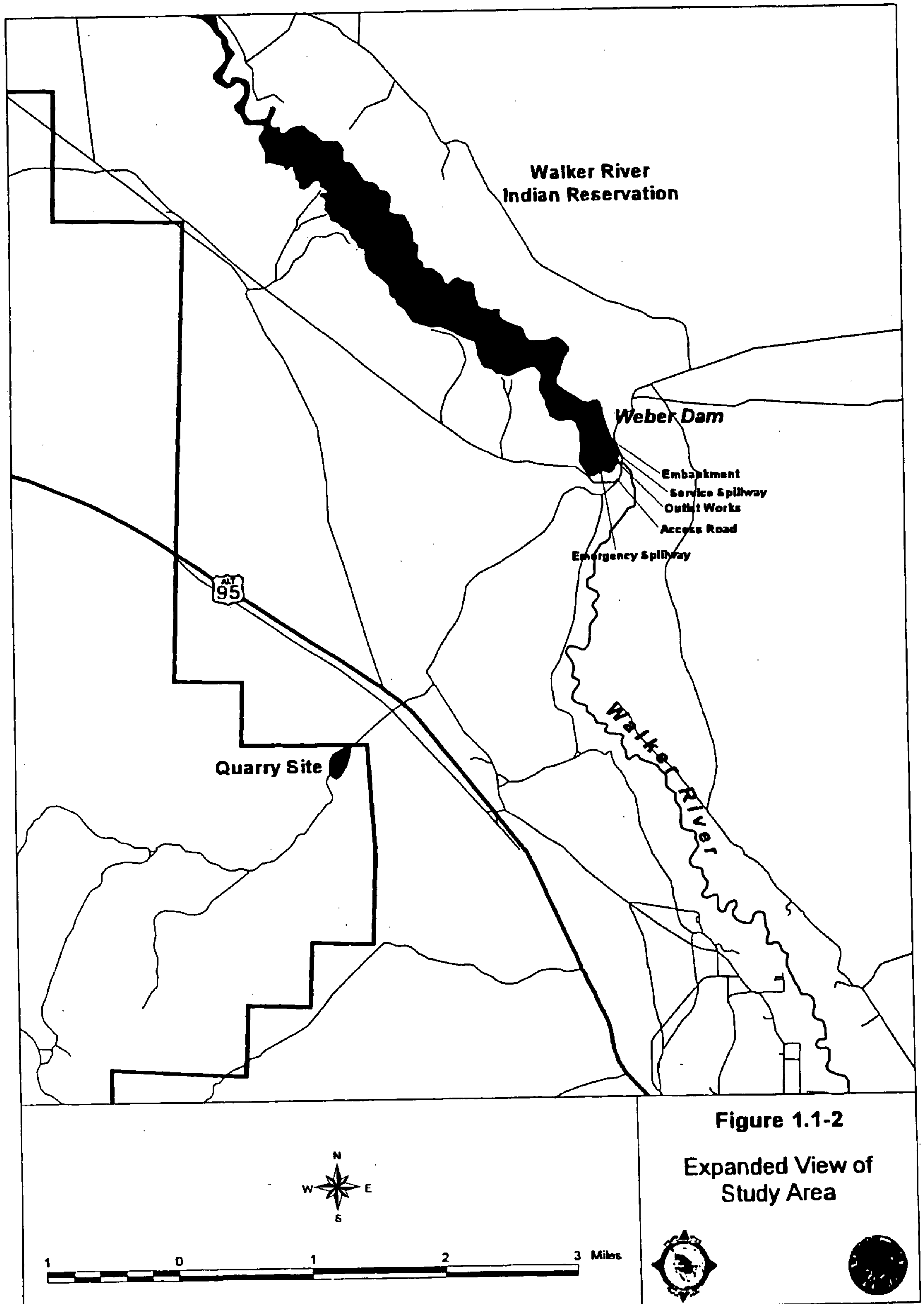


Figure 1.1-2

Expanded View of Study Area

1.2 Purpose and Need for Action

The Tribe and BIA propose to repair and modify the Dam pursuant to the IDSA, 25 U.S.C. §§ 3801-04 (Act), to reduce both risks. Funding secured under the Act is authorized only for repair and modification of existing dams on Indian lands and construction of new dams is not authorized by the Act. Therefore, the repair and modification of the Dam on the Reservation is the federal action. The Proposed Action is the repair and modification of Weber Dam owned and operated by BIA, which is an earthen Dam on the Walker River four miles upstream of Schurz, Nevada on the Walker River Paiute Indian Reservation in Nevada. As a result of Dam safety investigations conducted in 1989, the Dam was given a high hazard rating and poor overall safety rating. The hazard rating means more than six lives could be lost should the Dam fail, and the safety rating means the overall risk of overtopping by floods or structural failure during an earthquake is relatively high (USBR 1993a).

The Dam was constructed as part of the Walker River Indian Irrigation Project in the mid 1930s. Its primary use is to maintain a water supply for the irrigation of Reservation lands. It also provides other benefits including flood protection, recreation, a fishery, and historical and cultural values. Additionally, a need has been identified in the Walker River Basin to use Weber Dam and Reservoir to store dedicated water from Walker River water users and deliver such water in large blocks to Walker Lake to enhance the lake ecosystem.

With the Reservoir at full capacity in its current condition, movement along the existing fault could cause the outlet works to rupture. This would allow seepage to remove foundation and embankment materials. The material could pass into and through the ruptured conduit, which could lead to a breach of the embankment with a possible sudden uncontrolled release of the Reservoir. This breach could result in flooding of areas downstream from the Dam.

The proposed repair and modification of the existing Dam are needed to provide a secure source of irrigation water, recreation, fish and wildlife habitat, and undetermined future uses for tribal members and Reservation lands. This action would include realigning the north side Dam embankment, widening the existing embankment at the outlet works, rehabilitating the outlet works and service spillway, extending the outlet works tunnel, enlarging the emergency spillway, and constructing access roadways. The repair and modification would reduce the safety and hazard risks associated with the Dam in its present condition.

Regulations governing the operation and maintenance of Indian Irrigation Projects are provided in 25 C.F.R. Part 171. BIA Manual Part 55 Chapter 1 states that it is BIA policy to construct, operate, and maintain irrigation projects in accordance with applicable technical and safety standards. IDSA requires that such repair and modification work will be completed as necessary to bring the Dams identified as unsafe to a satisfactory condition.

DSMRP has ranked the Dam as number one since 1989. This ranking means that the Dam is the most unsafe BIA dam in operation. Rating factors that contribute to this ranking include seepage, hydrology, static stability, liquefaction, and dynamic stability. The potential for loss of life due to flooding and secondary faults within the foundation of the Dam results in a high hazard ranking.

1.3 Public Involvement

1.3.1 Scoping

Scoping is the process by which the action agency can ascertain the concerns of individuals, groups, and other agencies about a proposed project. Scoping is an integral part of the National Environmental Policy Act (NEPA) review process because it allows interested parties to participate in developing a list of issues that will be evaluated in an Environmental Impact Statement (EIS).

1.3.1.1 Notice of Intent

A Notice of Intent (NOI) to prepare an EIS was published in the Federal Register on May 16, 2001. Public notices were also published in the Reno Gazette Journal on May 23-25, 2001; Lahontan Valley News/Fallon Eagle Standard on May 24-26, 2001; Nevada Appeal on May 25-27, 2001; Mineral County Independent News on May 24 and 31, 2001; and Mason Valley News on May 25 and June 1, 2001. Publication of the NOI was followed by a 30-day scoping period during which the public could comment on the proposed project and NEPA process. During the scoping period, comments could be sent to BIA or could be submitted during the public informational meetings.

In addition to publishing the NOIs, letters were sent out on May 24, 2001, to an extensive mailing list of federal, state, local, tribal, environmental and other interested parties.

1.3.1.2 Public Information Meetings

Public Informational Meetings were held Tuesday June 5, 2001 at the Walker River Paiute Tribal Hall, #1 Hospital Road, Schurz, Nevada and Wednesday June 6, 2001 at the Casino West Convention Center, 11 North Main Street, Yerington, Nevada. The meetings were announced in the newspapers and mailing lists. Notices also were posted at the Reservation. The purpose of the meetings was to solicit public comments, views, and suggestions to be addressed in the EIS. Meetings were held in an "open format" style with a short formal presentation to provide the public with ample project information and opportunity to speak with project representatives.

Handouts provided information about the project, the Tribe and the BIA. During the formal presentation display boards and a computer projector were used as visual aids. The display boards included the following information:

- Description of the Proposed Action
- Engineering Drawing of Proposed Modification to Weber Dam
- Map of the Watershed Showing Location of Proposed Action
- Topographic map of the Proposed Action Site

Formal presentations were made by representatives of the Tribe, BIA, and Miller Ecological Consultants, Inc. A brief description of the role of each representative during the presentation is provided below:

- Walker River Paiute Tribe – BIA Contractor for the preparation of the EIS.
- BIA (Western Nevada Agency, Carson City NV) – Described the role of the Western Nevada Agency in the process and provided local liaison between the Tribe and BIA.
- BIA (Phoenix-Western Regional Office) – Described the NEPA process and the role of BIA as lead federal agency.
- Miller Ecological Consultants Inc. – Subcontractor to the Tribe to prepare the EIS, provided an overview of the proposed project and acted as moderator during the meetings.

At both public information meetings a certified court reporter was available to transcribe oral comments. A summary of these comments is provided in Table 1.3-1.

A comment form was available at the sign-in table. Those comment forms could be completed and either handed in during the public informational meetings or mailed to the appropriate recipients anytime during the scoping period. The comments received on comment forms are summarized in Table 1.3-2.

1.3.1.3 Other Comments

In response to the notices mailed out to the mailing list, several written comments were received during the scoping period. These comments are in Table 1.3-3.

Table 1.3-1. Summary of oral comments received during scoping meetings.

Date	Originator	Summary of Scoping Comments
June 5, 2001	David Haight Dynamic Action on Wells Group P. O. Box 201 Yerington, Nevada 89447	1. Concerned about changes in the water storage capacity of Weber Reservoir when Dam is rebuilt. 2. Questions regarding the upstream passage for LCT, and inclusion of that issue in the EIS.
June 6, 2001	Priscilla Carrera Council Member, Walker River Paiute Tribe P. O. Box 220 Schurz, Nevada 89427	3. Discussed the need for Dam modification allowing full capacity water storage in Weber Reservoir. Feels that this is needed for the agricultural economic base for the Walker River and the people of Schurz.
June 6, 2001	Elwood L. Emm Chairman, Yerington Paiute Tribe 171 Campbell Lane Yerington, Nevada 89447	4. Discussed water storage and fisheries issues along the Walker River. 5. Expressed support for prompt repairs to be made to Weber Dam. 6. Question regarding the content/extent and timing of the EIS process and the final EIS.
June 6, 2001	Priscilla Carrera Council Member, Walker River Paiute Tribe P. O. Box 220 Schurz, Nevada 89427	7. Comments that the Weber Dam modifications are greatly needed for the agricultural economic base. 8. Comments that the Dam provides habitat for fish and plant life; broad public recreation opportunities; site for religious ceremonies; and water used for livestock watering. 9. Comments that some people believe the wetland created by Dam leakage is really a natural spring.

Table 1.3-2. Summary of comment forms received.

Date	Originator	Written Comments
June 6, 2001	Priscilla Carrera Walker River Tribe P. O. Box 295 Schurz, Nevada 89427 (775) 773-2301	• Concerned about loss of agricultural livelihood. • Concerned about fish, wildlife and recreation associated with Reservoir. • Concerned about cultural use of the Reservoir and river.

Table 1.3-3. Summary of scoping comments received in letter and email form.

Date	Originator	Summary of Scoping Comments
June 1, 2001	Michael J. Anderson, P. E. Nevada Division of Water Resources 123 West Nye Lane, Suite 246 Carson City, Nevada 89706-0818 (mjambg@hotmail.com)	1. Commented on the NOI wording and explanation of Weber Dam as a high hazard dam (due to presence of residences downstream), and unsafe (due to structural and geologic conditions). 2. Commented that a safety of dams permit will be required if neither the USDI Bureau of Reclamation nor the US Army Corps of Engineers are in charge (i.e. design and contract/construction oversight).
June 5, 2001	Susan Lynn Executive Director Public Resource Associates 1755 East Plumb Lane, #170 Reno, Nevada 89502 775-786-9955 (sbl@gbis.com)	6. Discussed Tribe's consideration of No Action alternative; relocating section of the Dam away from the earthquake fault; renovating outlet works; reestablishing wetlands; and removing impediments to passage for LCT. 7. Questioned if relocating the Dam off stream or to underground storage would eliminate the need for flood safety protection and allow for electricity generation. Questions the function/purpose of the Reservoir, and asks that be defined in EIS. 8. Questioned whether entire Dam or a portion of the Dam will be moved, and sees the No Action Alternative as not feasible. 9. Concerned about fish passage accommodating temperature, TDS, reproduction, and water level issues, and a possible fish hatchery. 10. Concerned about containment of sediments behind Weber Dam during construction. Concerned about water quality of Walker River and Lake.
June 18, 2001	Rose Strickland Chair, Public Lands Committee Toiyabe Chapter of the Sierra Club and Dennis Ghiglieri, Chair, Great Basin Group Conservation Toiyabe Chapter of the Sierra Club (dgnevada@gbis.com)	11. Questioned whether the Dam will be repaired or substantially replaced, and under what federal authority these actions are taken. 12. Concerned about the location of Weber Dam due to evaporative losses, geographic location, and safety of underlying foundation materials. 13. Commented that the EIS should define the No Action alternative. 14. Commented that the EIS should define "restoring a wetlands area". 15. Concerned about impacts on LCT recovery, e.g. fish passage and spawning. 16. Concerned about impacts on water quality, especially TDS in Walker Lake. 17. Concerned about impacts on the Walker Lake fishery. 18. Recommended study of alternatives including a smaller, off-river Reservoir; purchase of upriver storage rights; developing a well field providing pumped groundwater; and developing groundwater storage for agricultural irrigation. 19. Recommended cost-benefit analysis of all alternatives.
June 18, 2001	Robert D. Williams United States Fish &Wildlife Service Nevada Fish & Wildlife Office 1340 Financial Boulevard, Suite 234 Reno, Nevada 89502-7147 (775-861-6300 – Marcy Haworth)	20. Sent a list of threatened species and other species of concern fulfilling requirements of section 7(c) of the Endangered Species Act. Recommended contacting Nevada Natural Heritage Program and other agencies. 21. Concerned about Weber Dam and Reservoir impacts on LCT recovery be considered in EIS, and recommend further section 7 consultation with USFWS. 22. Concerned about impacts to wildlife and their habitat. 23. Concerned about impacts to wetlands and waters, and recommend contact with the Reno Field Office of the U.S. Army Corps of Engineers. 24. Concerned about impacts to water quality. 25. Concerned about impacts of noise from construction activities. 26. Concerned about impacts to soil quality. 27. Concerned about cumulative impacts, including past, present and reasonably foreseeable future actions. 28. Concerned about the development and documentation of mitigation measures.

1.3.2 DEIS Public Meetings and Notice of Availability

1.3.2.1 Notice of Availability

A Notice of Availability (NOA) of the Draft Environmental Impact Statement (DEIS) was published in the Federal Register on June 4, 2004. Public notices were also published in the Reno Gazette Journal on June 10-24, 2004; Lahontan Valley News/Fallon Eagle Standard on June 14, 21, and 28, 2004; Nevada Appeal on June 9, 16, and 23, 2004; Mineral County Independent News on June 17 and 24, 2004; and Mason Valley News on June 18 and 25, 2004. Publication of the NOA was followed by a 60-day comment period during which the public could comment on the DEIS. During the comment period, comments could be sent to BIA or could be submitted during the public informational meetings.

In addition to publishing the NOA and other public notices, letters were sent out on May 26, 2004, to an extensive mailing list of federal, state, local, tribal, environmental and other interested parties.

1.3.2.2 Public Information Meetings

Public Informational Meetings were held Tuesday June 29, 2004 at the Walker River Paiute Tribal Hall, #1 Hospital Road, Schurz, Nevada and Wednesday June 30, 2004 at the Convention Center, 11 North Main Street, Yerington, Nevada. The meetings were announced in the newspapers and mailing lists. Notices also were posted at the Reservation. The purpose of the meetings was to solicit public comments and views on the DEIS. Meetings were held in an "open format" style with a short formal presentation to provide the public with ample project information and opportunity to speak with project representatives. During the formal presentation display boards and a computer projector were used as visual aids. The display boards included the following information:

- Description of the Proposed Action
- Engineering Drawing of Proposed Modification to Weber Dam
- Map of the Watershed Showing Location of Proposed Action
- Topographic map of the Proposed Action Site

Formal presentations were made by representatives of the BIA, and Miller Ecological Consultants, Inc. A brief description of the role of each representative during the presentation is provided below:

- Walker River Paiute Tribe – BIA Contractor for the preparation of the EIS.

- BIA (Western Nevada Agency, Carson City NV) – Described the role of the Western Nevada Agency in the process and provided local liaison between the Tribe and BIA.

- BIA (Phoenix-Western Regional Office) – Described the NEPA process and the role of BIA as lead federal agency.

- Miller Ecological Consultants Inc. – Subcontractor to the Tribe to prepare the EIS, provided an overview of the proposed project and acted as moderator during the meetings.

At both public information meetings a certified court reporter was available to transcribe oral comments. One person commented. A summary of these comments is provided in Appendix F.

1.3.2.3 Other Comments

In response to a public mailing of the DEIS, eight comment letters were received. The majority of the comments received were requests for clarification of specific sections of the DEIS. The sections included; description of the proposed action, affected environment, and environmental consequences. The DEIS was revised, as appropriate, to provide additional detail on the material in these sections. In addition, a 404 (b) (1) evaluation was completed to disclose impacts to wetlands and waters of the United States from the proposed action. Several commenters recommended additional analysis for issues that were not part of the proposed action or alternatives. These issues were noted as not part of the NEPA process for this project. The comment letters and responses are in Volume 2 Appendix F.

1.4 Applicable Laws, Regulations, Permits, and Approvals

1.4.1 Laws and Regulations

The Proposed Action may be subject to some or all of the laws and regulations shown in Table 1.4-1.

Table 1.4-1. Environmental laws and regulations.

Law	Record
National Environmental Policy Act (NEPA)	42 U.S.C. §§ 4321-4370f 40 C.F.R. pts. 1500-1508 Exec. Order No. 11,512, 35 Fed. Reg. 3,979 (Feb. 27, 1970)
National Historic Preservation Act (NHPA)	16 U.S.C. §§ 470 to 470x-6 36 C.F.R. pt. 800
Antiquities Act of 1906	16 U.S.C. §§ 431 to 450ss-7 43 C.F.R. pt. 3
American Indian Religious Freedom Act (AIRFA)	42 U.S.C. §§ 1996-1996a 21 C.F.R. § 1307.31; 50 C.F.R. pt. 22
Archeological Resources Protection Act (ARPA)	16 U.S.C. §§ 470aa –470mm 18 C.F.R. pt. 1312; 32 C.F.R. pt. 229; 36 C.F.R. pt. 296; 43 C.F.R. pt. 7
Native American Graves Protection and Repatriation Act of 1990 (NAGPRA)	25 U.S.C. §§ 3001-3013 43 C.F.R. pt. 10
Clean Air Act (CAA)	42 U.S.C. §§ 7401-7671q 40 C.F.R. pts. 50-99
Clean Water Act (CWA)	33 U.S.C. §§ 1251-1387 33 C.F.R. pts. 323-338; 40 C.F.R. pts. 100-136
Endangered Species Act (ESA)	16 U.S.C. §§ 1531-1544 50 C.F.R. pts. 17, 402-453
Noise Control Act of 1972 (NCA)	42 U.S.C. §§ 4901-4918 14 C.F.R. pt. 36; 40 C.F.R. pts. 201-211; 49 C.F.R. pt. 210
Occupational Safety and Health Act (OSHA)	29 U.S.C. §§ 651-678 29 C.F.R. pts. 1900-2400
Pollution Prevention Act of 1990 (PPA)	42 U.S.C. §§ 13101-13109
Safe Drinking Water Act (SDWA)	42 U.S.C. §§ 300f to 300j-26 40 C.F.R. § 2.305, pts. 141-149
Migratory Bird Treaty Act (Migratory Bird Guidance)	16 U.S.C. §§ 703-712 50 C.F.R. § 10.13, pts. 20-21 Exec. Order No. 13,186, 66 Fed. Reg. 3,853 (Jan. 1, 2001)
National Historic Preservation	Exec. Order No. 11,593, 36 Fed. Reg. 8,921 (May 13, 1971)
Floodplain Management	Exec. Order No. 11,988, 42 Fed. Reg. 26,951 (May 24, 1977)
Protection of Wetlands	Exec. Order No. 11,990, 42 Fed. Reg. 26,961 (May 24, 1977)
Federal Compliance with Pollution Control Standards	Exec. Order No. 12,088, 43 Fed. Reg. 47,707 (Oct. 13, 1978)
Environmental Justice	Exec. Order No. 12,898, 59 Fed. Reg. 7,629 (Feb. 11, 1994)

Table 1.4-1 continued

Law	Record
Indian Sacred Sites	Exec. Order No. 13,007, 61 Fed. Reg. 26,771 (May 24, 1996)
Consultation and Coordination with Indian Tribal Governments	Exec. Order No. 13,084, 63 Fed. Reg. 72,655 (May 14, 1998); Exec. Order No. 13,175, 65 Fed. Reg. 67,249 (Nov. 6, 2000)
Invasive Species	Exec. Order No. 13,112, 64 Fed. Reg. 6,183 (Feb. 3, 1999)
Government-to-Government Relations with Native American Tribal Governments	59 Fed. Reg. 22,951 (Apr. 29, 1994)
American Indian Tribal Rights, Federal-Tribal Trust Responsibilities, and the Endangered Species Act	Secretarial Order No. 3,206 (June 5, 1997), available at http://www.doi.gov/oait/docs/policies.htm
Department of the Interior's (DOI) NEPA Revised Implementing Procedures	65 Fed. Reg. 52,212-41 (Aug. 28, 2000)
Bureau of Indian Affairs (BIA) NEPA Handbook	30 Bureau of Indian Affairs Manual (BIAM) Supplement 1 (1993)
BIA Environmental Management	59 Indian Affairs Manual (Chapters 1, 2, and 3)
Law and Order Code of the Walker River Paiute Tribe	Title 2, Civil Procedure
Law and Order Code of the Walker River Paiute Tribe	Title 3, Civil Causes for Action
Law and Order Code of the Walker River Paiute Tribe	Title 7, Vehicles
Law and Order Code of the Walker River Paiute Tribe	Title 11, Land Use
Law and Order Code of the Walker River Paiute Tribe	Title 17, Business License
Hazardous Materials Response Plan of the Walker River Paiute Tribe (Dec. 1991)	
All environmental ordinances that may be enacted by the Walker River Paiute Tribal Council from time to time, pursuant to its authority under the Constitution and Bylaws of the Walker River Paiute Tribe.	

1.4.2 Permits and Approvals

Table 1.4-2 lists permits and approvals, identified at this time, that may be needed before construction of the Proposed Action.

Table 1.4-2. Regulatory permits and reviews that may be required for Proposed Action.

Agency	Permit/Approval
Federal	
Bureau of Indian Affairs	NEPA Record of Decision ESA Section 7 consultation, approval of land lease and water use; -temporary borrow pit permit; temporary construction area permit; road right-of-way grant for tribal lands; temporary easements.
Bureau of Land Management	BLM Right-of-Way Grants/Amendments; Temporary Use Permit other ancillary approvals
U.S. Fish and Wildlife Service	Section 7 Consultation and Biological Opinion
U.S. Army Corps of Engineers	Section 404
U.S. Environmental Protection Agency, Region IX	401 Water Quality Certification 402 National Pollutant Discharge Elimination System General Stormwater Permit for Construction Activities Prevention of Significant Deterioration Program Major Source Permit Acid Rain (Title IV CAA) Permit Title V (CAA) Operating Permit
State	
State of Nevada Historic Preservation Office	Section 106 review and concurrence: National Historic Preservation Act for Tribal lands
Tribal	
Tribal Council	Approval of land lease for Tribal lands

2 Chapter 2. Description of Proposed Action and Alternatives

2.1 Introduction

This chapter describes the Proposed Action, No Action, and other alternatives that were considered but eliminated from further analysis, because they did not meet the purpose and need for the project, or there were technical or operational constraints.

2.2 Development of Alternatives

BIA and the Tribe issued a NOI to prepare an EIS for the proposed repair and modification of Weber Dam. The NOI provided a description of the proposed action, the scoping process, and the major issues that at a minimum would be addressed during the scoping process. These included biological resources, archaeological and cultural resources, surface water and groundwater resources, geology and soils, socioeconomic conditions, environmental justice, and Indian Trust Assets. The NOI requested comment on the Proposed Action and announced the date, time and location of the public meetings to discuss the scope of the EIS. Alternatives in addition to the Proposed Action under consideration were developed as a result of the public scoping process.

2.2.1 Screening Criteria

The alternatives presented in this chapter were developed through a public and agency process combined with environmental and technical analyses. BIA and the Tribe began the alternative selection process based on the following screening criteria:

- Satisfy the statutory authorization, purpose, and need.
- Meet cost and construction time considerations.
- Deliver the same volume and quality of water to the Tribe for irrigation and with the same priority as would the present Weber Reservoir at full capacity, consistent with the claims of the Tribe and the United States in *United States v. Walker River Irrigtion Dist.*, No. C-125-B (D. Nev.).
- Comply with all applicable laws and regulations.

2.2.2 No Action

25 C.F.R. § 1502.14(d) of the NEPA regulations requires the alternatives analysis in the EIS to "include the Alternative of No Action." Under this alternative, the approval of the expenditure of federal funds for the repair and modification of Weber Dam would not occur and the Reservoir IOC implemented by BIA for dam safety (BIA 2002) would continue.

IOC limits the maximum Reservoir elevation to 4,200[2] ft msl and 4,766 af capacity. These criteria would reduce or eliminate the likelihood of loss of life in the event that Weber Dam failed due to MCE.

In the absence of major safety modifications to Weber Dam, the continued application of IOC would limit storage to 4,766 af and would restrict the use of the Reservoir and limit the benefit to the Walker River Indian Irrigation Project (WRIIP). BIA manages irrigation deliveries to maximize use of the available storage under these conditions (BIA 2002). The continued application of IOC would limit the amount of water available to WRIIP.

Under No Action, WRIIP would continue to receive the annual water entitlement under the Walker Decree, which is a direct flow right of 26.25 cfs during a 180-day irrigation season (approximately April 15-October 15). BIA would continue to manage this direct flow right in conjunction with available storage in Weber Reservoir under IOC to maximize irrigation deliveries during the 180-day irrigation season.

For efficient operation of the Tribal irrigation project, approximately 80 cfs is required at the diversion dam downstream from Weber Dam (i.e., Little Dam) in order to divert 40 cfs into each of the delivery canals. In practice, the gage records indicate that an average of approximately 50 cfs has been available for delivery at the diversion dam in order to divert an average of 20 cfs into canal number one and 30 cfs into canal number two. The canals typically operate for a period of two to three weeks depending on delivery needs.

Operations under No Action would provide a greater amount of flood protection (flood flow storage) than under the Proposed Action. During floods, to the extent possible, Reservoir releases would match inflows until the inflows were greater than the safe downstream capacity of the Walker River, or about 3,000 cfs. Once this occurred, releases in excess of the safe channel capacity would not be allowed until the Reservoir was filled to its maximum capacity. Once the Reservoir was full, releases would be made to prevent structural damage to Weber Dam. Once flow diminished, releases from Weber Dam would continue until the water surface elevation returned to 4,200 ft msl or the maximum allowed under IOC.

Under No Action, the operation of the Reservoir is not conducive to maintenance of a warm water fishery. In 2000, drawdown from the Reservoir under IOC resulted in a major fish kill in the Reservoir. Re-establishment of a warm water fishery in the Reservoir is not expected under continued implementation of IOC. In addition, under No Action, Weber Dam would remain in place without fish passage for LCT.

Also, public safety restrictions have been imposed on Reservoir recreation in recent years during extreme low water conditions because of potential entrainment near the Reservoir outlet.

[2] On an annual basis, the Tribe can request BIA to modify the Interim operating Criteria to allow water to be stored behind Weber Dam up to an elevation of 4,202 feet or 6,083 acre-feet for a period not to exceed 30 days. After 30 days at elevation 4,202 releases must be made to return the water surface to 4,200 feet.

2.2.3 Proposed Action

The Proposed Action is an integrated set of actions to ensure safe operation of the Dam while utilizing the maximum capacity of the Reservoir. The proposed repairs involve all major features of the Dam: rehabilitating the outlet works and service spillway, modifying a portion of the existing embankment, widening a portion of the existing embankment, enlargement of the emergency spillway (Carter and Heyder, 1993), and construction of a fishway (Anderson 2002). These are described in detail below. Together, these Dam modifications would reduce the likelihood of failure during an earthquake and provide a level of protection from floods. Modifications and repairs would require approximately 12 months to complete (Table 2.2-1). Figure 2.2-1 shows the relative locations of the service spillway, outlet works, and outlet works control house and the areas subject to modification by the Proposed Action.

Table 2.2-1. Proposed schedule for Weber Dam Modification activities.

Activity	Early Start Date	Expected Completion Date	Duration
Notice to proceed	Mid April Year 1		
Mobilization	Mid April Year 1	Mid May Year 1	1 month
On ground activities	Mid May Year 1	Mid January Year 1	9 months
Major earthwork	June Year 1	Mid December Year 1	6 months
Cleanup and revegetation	January Year 2	April Year 2	4 months

2.2.3.1 Rehabilate the Outlet Works

Deteriorated concrete would be repaired, the slide gates and operators of the outlet works rehabilitated, and a new outlet works control house would be built on the gate tower. These repairs within the downstream, and possibly the upstream, conduits would require access from the outlet works discharge portal. The removal and reinstallation of the slide gates would be through the wet wells of the gate tower, and would require equipment, such as a small crane on the Dam crest or downstream face. This would also be the area used during construction of the new outlet works control house. Repairs of the conduit upstream of the gate would require a restricted Reservoir pool (4,180 ft msl).

2.2.3.2 Rehabilate the Service Spillway

Deteriorated concrete in the spillway would be replaced; the radial spillway gates would be rehabilitated. Much of the service spillway work would be within the confines of the spillway walls, but vehicle access would be required on both sides of the spillway chute and the spillway upstream approach area.

It is unknown how much of the spillway gate mechanism would be removed from the gate area during the rehabilitation, but an area large enough to work on one or both gates might be required. Large areas are available to either side of the spillway; the parking area on the south side of the spillway alone might be adequate, allowing work to be confined to one side of the spillway.

2.2.3.3 Modify a Portion of the Existing Embankment

Movement along the existing fault under the embankment potentially could cause the foundation and embankment to crack near the fault. The crack would provide an uncontrolled seepage path from the Reservoir. Excessive seepage could result in the movement of foundation and embankment materials and the subsequent breach of the embankment.

To eliminate the effects of foundation movement along the embankment, approximately 400 feet of the embankment would be relocated approximately 300 feet downstream from the current location. With this new embankment location, movement along the fault would not provide a seepage path through the embankment or the foundation. This would require removal of the existing embankment portion and removal of the liquefiable foundation materials at the downstream site.

2.2.3.4 Widen a Portion of the Existing Embankment at the Outlet Works and Extend the Outlet Works Tunnel

To prevent rupture of the outlet works and breach of the embankment during an earthquake, the downstream portion of the embankment at the outlet works conduit would be enlarged. This portion of the embankment would remain in place and prevent a sudden Reservoir release even with movement along the fault or failure of the upstream portion of embankment. To provide room for this overbuilt embankment, the outlet works conduit would be extended about 105 feet. In addition, the downstream portion of the embankment would have internal filters capable of accommodating embankment cracking that may occur during MCE. Water would be released from the reservoir to lower the elevation to 4,177 ft msl during repairs of the conduit.

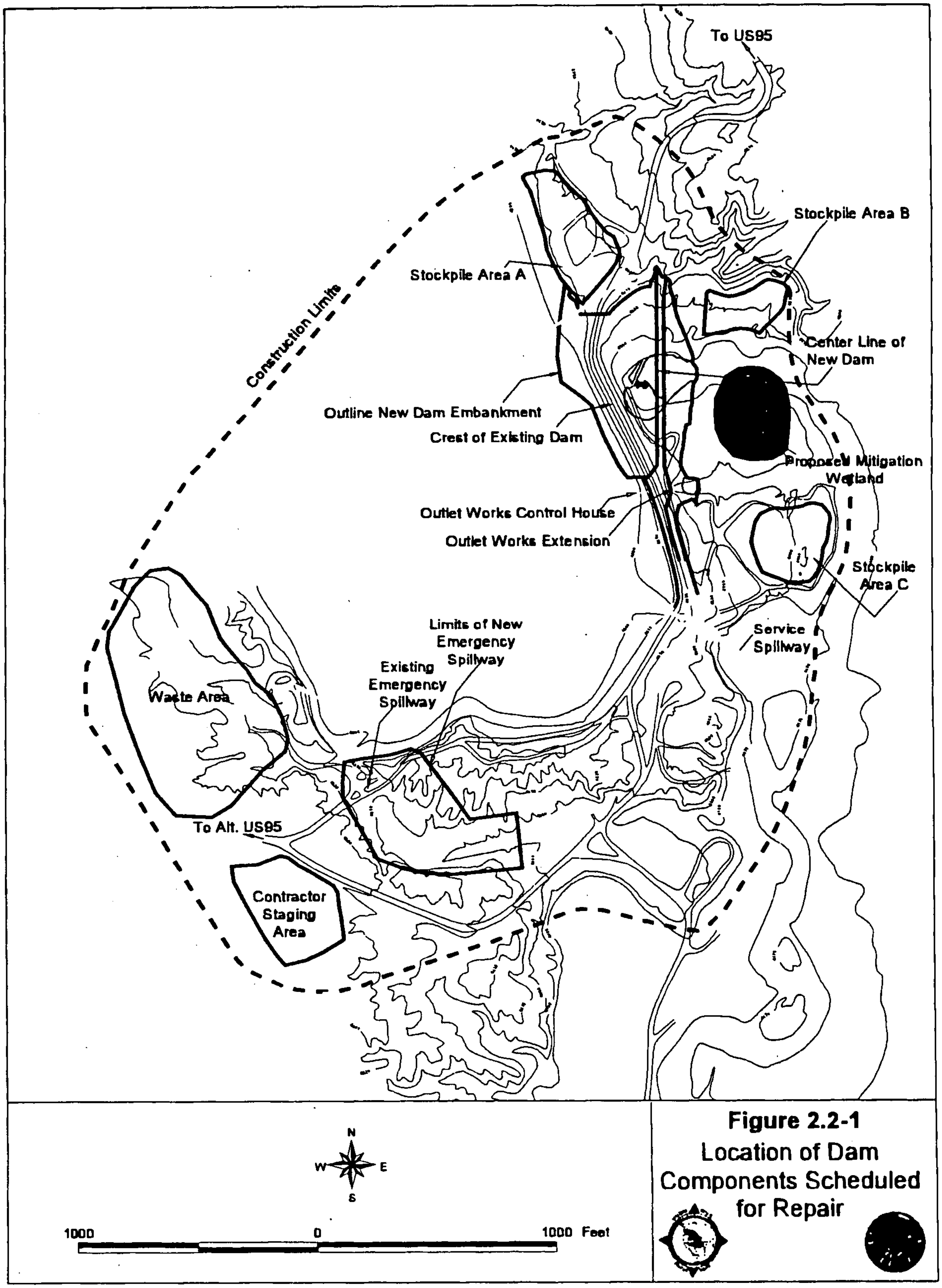


Figure 2.2-1
Location of Dam Components Scheduled for Repair

2.2.3.5 Enlargement of the Emergency Spillway

The present emergency spillway, which is a naturally formed channel, would remain, and the crest of the emergency spillway would be enlarged. The 200-foot segment of roadway, which now acts as a fuse plug would be replaced by a new, longer fuse plug. A fuse plug is an easily eroded segment of the embankment designed to fail in a controlled manner to protect a dam during floods that would otherwise overtop a dam.

The new fuse plug would have a sill elevation of 4,208 ft msl, which is the top of the active conservation pool. It would have a crest elevation of 4,215 ft msl, and a crest length of 420 feet. Three pilot channels to initiate breaching of the fuse plug would be at 4,214 ft msl. The existing natural channel downstream from the fuse plug would be slightly reshaped to increase the discharge efficiency, but most of it would be undisturbed.

The enlargement of the emergency spillway would excavate approximately 109,000 cubic yards of material, which would be used as borrow material for construction of the new portion of embankment. It is possible that some portion of the excavated material would be in excess of the quantity needed for the embankment and be disposed of in the borrow area.

Construction would require removal of a substantial portion of a low ridge between the present fuse plug and the service spillway to widen and lower the base of the fuse plug. A soil-cement sill would then be built across the crest of the emergency spillway, that is, near the toe of the fuse plug. The new fuse plug would then be installed.

Material would also be removed, as required, from the emergency spillway channel downstream from the fuse plug to insure flows would be unobstructed. Little work would be required outside the area of the fuse plug, but the area within which borrow pits may be located are shown on Figure 2.2-2. The specific area to be used has not yet been identified. Use of heavy equipment would be confined largely to the area immediately surrounding the spillway crest.

2.2.3.6 Improvement of Seepage Control

A toe-drain seepage collection system consisting primarily of a bed of permeable material would be installed under the new berm on the downstream side of the Dam. Gravel for the drain, like the rock for new riprap, would be trucked in from local commercial sources. Approximately, 12,000 cubic yards (cu yd) of new gravel (480 truckloads) would be needed.

2.2.3.7 Roadway Reconstruction

The gravel surfaced roadway crossing on the existing Dam crest would be reconstructed to cross on the new embankment crest. Realignment of the road approach on the left abutment would begin approximately 700 feet north of the left end of the new Dam embankment. To accommodate an improved road alignment and a wider roadway, the existing Dam crest to the south of the outlet works would be widened along the downstream side by approximately 8 to 15 feet. The right abutment road approach realignment would end approximately 550 feet south of the service spillway. The total length of the reconstructed road would be approximately 2,800 feet. Gravel surfacing would be placed on the entire length to a 6-inch thickness. All existing cable barrier rail would be removed and a W-beam guardrail would be erected where required.

2.2.3.8 Embankment Slope Protection Source

A five-acre area located approximately four miles southwest of the Dam at the base of White Mountain on Bureau of Land Management (BLM) administered lands would be used as a source of rock for riprap and downstream slope protection. BLM permits would be required to access the quarry and remove material. The area has been previously disturbed. This area probably was the location of the source for riprap for the original Dam construction. Development of the source and production of the riprap and downstream slope protection would require clearing, blasting, and sorting operations. Transportation of the materials to the Dam would be over an unimproved road for approximately one mile then over a gravel road for approximately three miles to the Dam as shown on Figure 1.1-2. Approximately 6,000 cu yd of rock for riprap and approximately 5,000 cu yd of downstream slope protection would be needed to construct the Dam modifications.

2.2.3.9 Contractors' Staging Area

There are four potential staging areas (Figure 2.2-1):

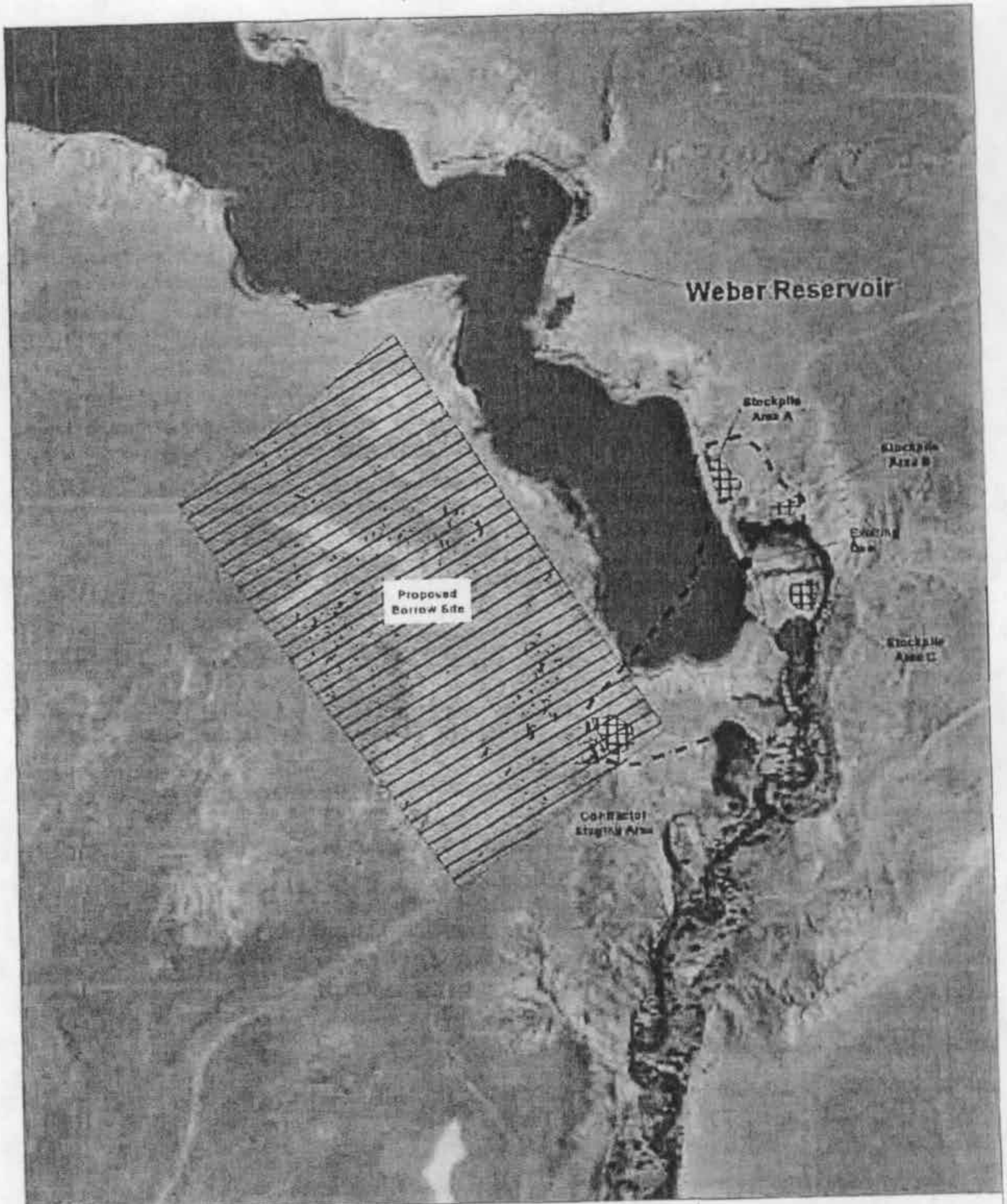
- The flat area southeast of the waste area.
- The area immediately north of the proposed area for the constructed wetland.
- The flat area between the spillway and the river outlet works.
- The area above theleft abutment immediately north of the existing embankment.

2.2.3.10 Borrow Pits and Stockpile Areas

An area of previously disturbed terrain southwest of the Dam could be used as a source of material for the embankment, if needed. Material removed from the Dam, but intended for reuse, would either be stockpiled on the slopes of the Dam itself, in one of the stockpile areas (Figure 2.2-1), or in unused portions of the borrow areas.

2.2.3.11 Safety

Traffic on the road across the Dam is very light, and could be readily accommodated during construction. If necessary, traffic could be controlled by flagmen and warning signs, or the road could be temporarily closed. The existing Dam would serve to keep boaters out of the construction area.



N
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Figure 2.2-2

Potential Borrow Site and Stockpile Areas.

2.2.3.12 Fish Passage

As part of the EIS, alternatives to the modification and repair of Weber Dam were developed and evaluated during the Alternative Screening Analysis. An assessment of impacts to LCT included the evaluation of fish passage. The fish passage structure (i.e., fishway) presented here is intended to remove the impact of the existing dam, restore connectivity in the lower river, and allow LCT migration. The full documentation of the fishway evaluation is presented in Anderson (2002). (See Appendix C.)

A fishway would be constructed along the emergency spillway west of Weber Dam as part of the Proposed Action and operated to allow upstream and downstream movement of local fish species, particularly LCT. The structure would be a boulder weir-rocked lined fishway similar to the fishway recently constructed by BOR at Derby Dam on the Truckee River. Figure 5 illustrates the proposed location and alignment of the structure. Figure 6 shows a cross-section of the channel with the boulder alignment. The fishway is separated from the spillway to achieve the design criteria for fish passage. While final design has not been completed, FWS would be invited to comment on design drawings as they become available to optimize the design for LCT passage.

The fishway is designed to provide velocity of approximately 4 feet per second through a range of operational flows (between 25 cfs and 200 cfs) and operate at a Reservoir elevation range of 4,200 to 4,208 feet msl. A manually-operated control gate at the upper end of the passage would regulate flow. Design specifications are as follows:

- Length of channel – 2,100 feet
- Bottom width of channel – 4 feet
- Water depth – 3 to 6.5 feet
- Vertical drop – 32 feet (elevation 4,198 feet msl to 4,166 feet msl)
- Slope – varies from 0.013 to 0.018 feet per feet
- Distance between boulder weirs – 25 to 34 feet
- Maximum height of boulders above channel bed – 3 feet
- Width between boulders – 1.25 to 1.5 feet

The rock fishway entrance from Walker River includes a small area of cobbles and large gravel that would be placed in the river for protection of the river bottom and bank. On the river, upstream of the fishway entrance, a large cobble and small boulder structure would be placed to direct fish to the fishway instead of to the spillway pool. This structure would be designed to deter fish from going to the spillway pool and direct them to the fishway when it is operating. The fishway would allow passage of fish both in the upstream and downstream direction. BIA and the Tribe would work with FWS to ensure that the fishway construction adequately addresses LCT conservation needs.

Fishway Operation. The operation of the fishway would be determined in coordination with FWS and the recovery efforts for LCT. The gate at the top of the fish passage allows the fish passage to be operated in coordination with the spillway on Weber Reservoir. Operational range for the fish passage to meet the design criteria is in the range of 25 to 200 cfs. Any releases that are made from Weber Reservoir within that discharge range could be made through the fish passage instead of the spillway. The timing of fish passage releases would be determined in coordination with FWS, the Tribe, and the recovery efforts for LCT to best benefit the species. The fishway would be operational as needed when LCT are migrating, provided sufficient water is available for release.

The fishway is not anticipated to operate during the first years after its construction due to the lack of water available for use in the fishway before the irrigation season. At some point, BOR's Desert Terminal Lakes Program and/or other activities may provide transfers of water that could be used in the fishway. In 2004, BIA and the Tribe worked with BOR and NDOW to facilitate the transfer of water from the Mason Valley Wildlife Area to Walker Lake by retaining water behind Weber Dam until sufficient quantities had been collected to support a pulse of water that would flow all the way to Walker Lake. While this transfer occurred in the summer, future transfers may allow timing of releases to support LCT migration. Once the fishway is completed, BIA and the Tribe would continue to facilitate such short-term or long-term transfers through use of Weber Dam and the fishway.

The fishway would eliminate the critical first barrier to upstream LCT migration. Structures upstream of Weber Reservoir, however, would continue to block migration to spawning areas. Ultimate success of the fishway would depend on activities of other – particularly upstream – parties, which are beyond the scope of this project and outside the jurisdiction of BIA and the Tribe.

To determine when and how the fishway operates, FWS, BIA and the Tribe propose holding a meeting in January of each year. Invitees would include the Nevada Department of Wildlife (NDOW), and other agency fishery biologists as part of LCT recovery efforts in the Walker River basin. The issues for discussion may include LCT status at Walker Lake, hydrological conditions, availability of water for use in the fishway, irrigation season coordination, and upstream conditions (e.g. access to spawning areas). BIA and the Tribe, however, would retain the authority to decide how best to operate Weber Reservoir and the fishway, considering the Tribe's needs for irrigation water and its interest in supporting LCT recovery.

To minimize any take of LCT, measures would be taken to minimize mortality, injury, harm, and harassment of LCT upstream, within, and downstream of the fish passage structure at Weber Dam. BIA and the Tribe would minimize such potential take by implementing the following actions:

Consistent with the annual discussions with FWS, NDOW and certain other biologists, the fish passage shall operate at various river flows. It shall remain open as much as possible during periods designated during the annual discussions, provided that water is available, either through transfers to Walker Lake or excess flows. Should the fish passage require closing during a designated period, BIA or the Tribe would contact FWS and allow salvage of any fish in the fishway before any closure occurs.

The anticipated fishway design would create a boulder weir rock-lined structure, which would produce a drop in water surface of about 32 feet, with a slope varying between 0.013

and 0.018 feet per feet. Flow depth would vary between 3 and 6.5 feet. Velocity within the fishway would be between 2 and 6 feet per second and not exceed 8 feet per second.

Velocities and flow patterns in the fish passage shall be determined under various discharges to determine the range of operational conditions. This assessment shall be done jointly with FWS through the annual discussions.

BIA shall be responsible for the maintenance, inspection, and repair of the fish passage structure. All maintenance shall be completed by February of each year. The fishway would be operated as scheduled unless catastrophic natural events occur, beyond BIA's control, that delay the maintenance schedule.

Should the proposed fish passage not operate as designed, BIA shall initiate corrective actions immediately for any and all problems until the structure functions as intended. When the fishway is operated, the following measures would be used to minimize stranding of LCT at the end of the annual operation period:

- The control gate would be set at the minimum operating discharge.
- A block net would be placed across the downstream entrance to the fishway.
- The fishway would be inspected for LCT in the structure and any LCT remaining would be captured and removed from the fishway. LCT would be transferred to Walker River or Walker Lake depending on the hydrologic conditions at the time of fishway closure.
- The control gate would be completely closed.
- When the fishway is dewatered, the blocknet would be removed.
- Upon locating dead, injured, or sick LCT, BIA would have the responsibility to ensure that information relative to the date, time, and location of the listed species when found and possible cause of injury or death of each individual be recorded and provided to FWS.

2.2.3.13 River Diversions During Construction

During construction the original dam would be used as the coffer dam and river flows would be stored behind it in accordance with the Interim Operating Criteria. During this time releases would be made through either the service spillway or existing outlet works depending on the reservoir level. However, there would be times when the crest of both, new and old, embankments would be below the original crest elevation of 4,217. In addition, a cofferdam would be constructed around the inlet to the existing outlet works and have a crest elevation of 4,201. Diversion of flood protection was determined to be a 25-year event and this size flood was used to determine the crest elevation of the cofferdam. When possible all releases would be made through the service spillway and the outlet works. If irrigation releases are required, and the reservoir level is not high enough to allow the releases to be made through the service spillway, the existing outlet would be used and the flows would be diverted around the new conduit sections. To the extent possible the reservoir would be operated as it has been during recent irrigation seasons under IOC.

To protect the work during periods of high flow, early releases would be made to evacuate the reservoir thereby allowing peak flows to be stored and prevent damage to the construction in progress. The timing of these evacuation releases (primarily in January) would avoid periods when LCT may try to migrate upstream. The river downstream from the Dam would be monitored to determine that LCT are not attracted upstream during the construction period. During these times the reservoir would be operated to minimize damage to the construction and downstream areas.

2.2.3.14 Environmental Commitments for the Proposed Action

2.2.3.14.1 Water Quality and Fish Protection

A water quality control plan would be implemented. The contractors would employ construction methods that would prevent accidental spillage of solid matter, contaminants, debris or other pollutants into flowing streams, dry watercourses, or Weber Reservoir. Excavated materials would not be stockpiled or deposited on or near streambanks, or in other locations where the material could be washed away by high water or storm runoff.

The contractor would be required to comply with applicable Federal and Tribal laws, permits, orders, regulations, and water-quality standards concerning the control and abatement of water pollution to protect water quality and fish resources. The contractor's methods of dewatering, unwatering, excavating, or stockpiling of earth and rock materials would include appropriate measures to control siltation. Wastewater from general construction activities, such as drainwater collection, drilling, grouting, or other construction operations would not be permitted to enter watercourses without the use of approved turbidity control methods. These methods may include, but are not restricted to, interception ditches, settling ponds, gravel-filter entrapment dikes, flocculating processes, recirculation, or combinations thereof.

Figure 2.2-3. Location Map of Fish Passage Structure.

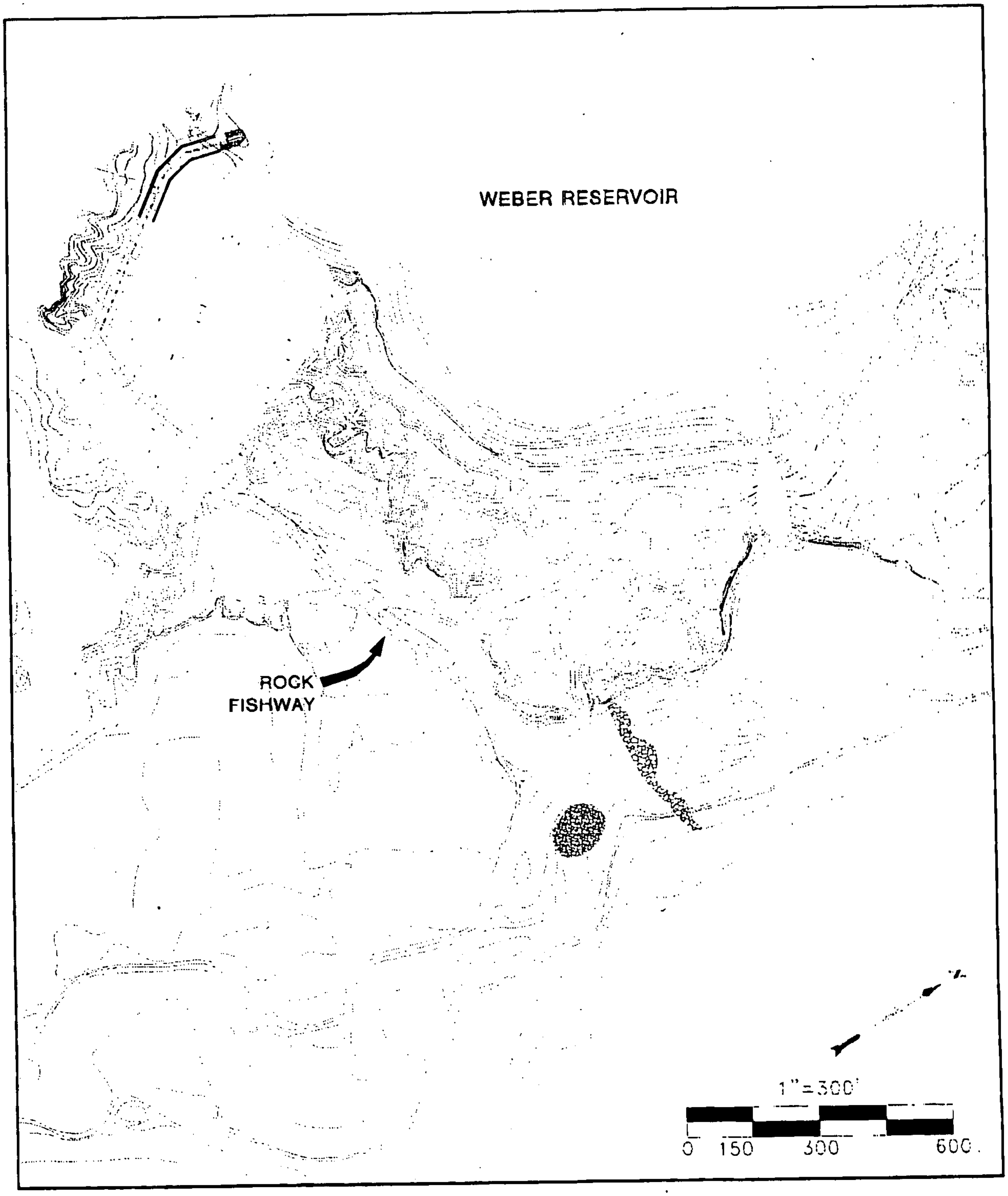
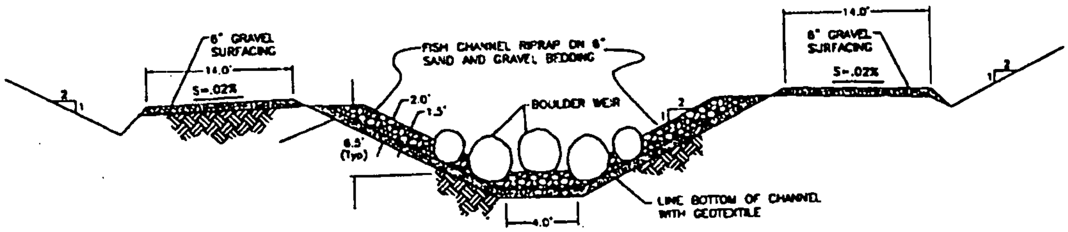


Figure 2.2-4. Cross Section of Fish Passage Channel.



2.2.3.14.2 Upland and Riparian Vegetation/Wildlife Protection and Mitigation

Where possible, construction activities including staging, storage, excavation, and movement of borrow material would be in areas of previous disturbance.

Willows and other riparian native vegetation would be replanted to replace vegetation lost due to modification of the toe drainage channel area located on the southern side of the downstream parking area.

Where disturbance of the seep area near the Dam is unavoidable, the loss would be compensated by creating a wetland area near the river. The loss of existing wetlands and waters of the United States would be 1.6 acres and would be replaced as specified by U.S. Army Corps of Engineers 404 permit. The draft wetland design specifies construction of a two-acre wetland as mitigation. A detailed riparian restoration plan would be prepared. The plan would include the restoration of grades, and the reestablishment of native vegetation consistent with the specific community type. Containerized plants and seeding could be used to replace shrubs in riparian habitats, and perhaps in all habitats. Seeding may be used to restore grasses and other herbaceous plants.

The project would comply with the Migratory Bird Treaty Act. Construction would avoid destroying active nests of birds breeding in the area. If construction is planned during the summer, a biologist would survey for active bird nests in the area to be disturbed. If nesting birds are present in these areas, the work would not begin until two weeks after young birds have fledged.

2.2.4 Alternatives Considered But Eliminated From Further Consideration

This section describes two alternatives that were considered but eliminated from further analysis, and the reasons for their elimination. These alternatives were developed from the scoping process for this DEIS. One involved construction of an off-channel Reservoir of sufficient size to provide water in the same quantity and quality as the current Weber Dam at full capacity for irrigation on the Reservation. The other involved development of ground water wells to supply water in the same quantity and quality as current Weber Reservoir at full capacity. Common to both proposals was removal of Weber Dam for passage of LCT.

2.2.4.1 Construction of an Off-channel Reservoir

During scoping, constructing and storing water in an off-stream site was proposed. An off-channel reservoir to provide a capacity of 10,700 af, the current capacity of Weber Reservoir, at several sites was evaluated. Service to any such site by either a gravity diversion or pumping station would be considered acceptable so the site could be considered for study. No such natural site was found to be available.

As the river crosses the Reservation boundary near the Wabuska stream gage site it enters a shallow valley. There are no cross-drainages or deep ravines close to the river where a Dam could be built that could develop a Reservoir capacity of 10,000 af. One area located on the northeast portion of the Reservation presents some potential for a storage site, but it is located more than seven miles from the river and is more than 450 feet higher. This distance and pumping lift would require both high capital and operating costs thus making it uneconomical to develop.

A constructed lined reservoir in the area north of Weber Reservoir was evaluated as an alternative to a natural reservoir site. The reservoir size evaluated was 5,000 to 6,000 af of storage. Assumptions for this alternative include: 1) the quantity of water was the minimum that could be stored in the reservoir that, when combined with direct flow, would supply full irrigation during the growing season; and 2) water would only be diverted to storage during high flow periods, primarily spring runoff.

The off-channel reservoir alternative would include a diversion structure and off-channel reservoir for storage of approximately 6,000 acre-feet of water that would operate in conjunction with direct flow delivery from the Walker River to satisfy the current irrigation demands, and a delivery system to provide water upstream of Little Dam. This alternative would require removal of Weber Dam .

The alternative was developed in response to concerns raised during scoping regarding the lack of fish passage at Weber Dam. However, BIA has determined based on the following factors/reasons that the off-channel reservoir alternative should be eliminated from further analysis and this alternative does not meet all the purpose and needs of the existing Weber Dam. Specifically, this alternative does not provide any flood protection to the town of Schurz, there is no potential for bundling upstream water releases for Walker Lake, there is no ability to develop additional Tribal water sources, and the Tribe loses its cultural and historic values provided by Weber Dam.

Water Resources - The Tribe currently has three water sources available for on-Reservation domestic, irrigation, municipal, commercial, and industrial development purposes: Decree C-125 water in the amount of 26.25 cfs of direct flow from the Walker River for a continuous 180-day irrigation season; local groundwater (currently unquantified); and surface water stored in Weber Reservoir (up to 10,700 af). The first two sources will always be available to the Tribe. If the off-channel Reservoir were developed and Weber Dam removed, stored surface water would have to be pumped from Walker River to the off-channel location. Due to construction and operation costs, the size of the off-channel reservoir would be approximately half the size of the current Weber Reservoir. This would restrict the Tribe's development potential, which BIA considers to be an Indian trust asset. For example, 5,300 acre-feet could irrigate approximately 500-850 acres as compared to 2,100 acres irrigated by the 10,700 af when Weber Reservoir is at full capacity (depending on efficiencies) on the Reservation, or could provide a domestic and municipal water supply to additional households on the Reservation.

During evaluation of water delivery and pumping capabilities for the proposed off-channel reservoir, it was determined that, in most years, the reservoir would not fill due to the inability to pump sufficient flow during times of high flow. The maximum pumping capacity is the limit for fill of the proposed off-channel reservoir and this directly impacts cost. At a pumping capacity of approximately 50 cfs the facility could not fill during the period allowed. Higher pumping rates greatly increase the cost of the project.

In addition, storage rights in Weber Reservoir are presently the subject of claims asserted in litigation by the Tribe and the United States on the Tribe's behalf. Because construction of Weber Dam was completed in 1937, the storage rights, once adjudicated or resolved by settlement, would likely have a priority date circa 1937. The interstate compact between the State of Nevada and State of California, although never ratified by the United States Senate, recognizes a priority date for storage in Weber Reservoir of 1933. Nev. Rev. Stat. § 538.600, art. VIII, § A(4)(b); Cal. Water Code § 5976 art. VIII, § A(4)(b). It is not clear whether off-channel storage would have a different priority date.

Biological Resources - The primary purpose of the off-channel reservoir alternative was to remove the fish passage impediment for LCT caused by Weber Dam. However, structural fish passage would be required at the diversion and pumping facility for an off-channel reservoir. Structural fish passage can be provided in conjunction with the safety modification of Weber Dam, and is included in the Proposed Action. Structural fish passage would satisfy the same fish passage purpose as the off-channel reservoir alternative, with fewer adverse consequences to Indian trust assets (see discussion above) and the environment (see discussion below concerning wetlands). Further, removal of Weber Dam would not ensure recovery of LCT. Even with Dam removal, fish passage (primarily LCT) to the headwaters of the Walker River would not occur since there are numerous diversion structures upstream of Weber Dam that would continue to block access to potential upstream spawning areas. Also, there is no LCT spawning habitat in the Reservation portion of Walker River in large part because of a naturally occurring high water temperature, and Dam removal would further increase water temperature in the reach of the Walker River between Weber Dam and Walker Lake. Additionally, removal of Weber Dam would not ensure sufficient water in the river to promote year-round LCT movement upstream or downstream. Walker River flow is managed to serve adjudicated water rights. During normal water years, summer (June through September) flow upstream of the Yerington Weir is generally 100-200 cfs and is less than 60 cfs downstream from the Weir. USGS gage data document days when flow downstream from Yerington Weir was less than 5 cfs; such flows in late summer and fall would generally preclude LCT migration (Miller Ecological Consultants, Inc. 2002).

The off-channel reservoir alternative would also eliminate approximately 450 acres of jurisdictional wetlands along the lower Walker River for which mitigation would be required (JBR Environmental Consultants, 1994). Potential wetlands mitigation ratios are based on prior experience with similar projects and the direction provided by the U.S. Army Corps of Engineers Regulatory Guidance Letter No. 02-2 (USACE, 2002). That letter clarifies the policy of no overall net loss of wetlands. In addition to the amount of area affected by an action, the function of the affected wetland must be considered when determining impacts. It was assumed that potential mitigation would create wetlands with the same function as those lost from any action or alternative. In addition to acquiring 450 acres of replacement land, a water supply, estimated to be about 7,000 af/year, would be required to sustain the wetlands. (Miller Ecological Consultants, Inc. 2002). It is unknown whether willing sellers of water exist in the basin so that additional water could be acquired; also, any water allocated to the wetlands would reduce the water available for Walker Lake. Additionally, even if the water were acquired, a delivery system would need to be constructed. The project would likely require some type of diversion structure in the Walker River and associated distribution system (canals and/or pipelines). The costs of such a mitigation project would be extensive and are estimated below.

Flood Protection - The off-channel reservoir alternative would not provide any type of flood protection to the Reservation and the town and residents of Schurz, Nevada.

Costs, Authority, and Funding - The capital cost for the off-channel reservoir alternative is estimated to be $50 million, which includes the cost to remove Weber Dam, but does not include the cost to mitigate for replacement wetlands associated with this alternative (Miller Ecological Consultants, Inc.,). This compares to a capital cost of approximately $10 million for Weber Dam modification, not including the structural fish passage costs (approximately $2 million) which is included as part of Dam modification. The off-channel reservoir alternative would require the acquisition of land and water to construct, operate, and maintain the replacement wetlands (Miller Ecological Consultants, Inc. 2002). The cost to construct, operate and maintain replacement wetlands, excluding the water acquisition costs, is approximately $3.2 million. The water acquisition cost is difficult to determine since it is unknown whether any willing sellers of surface water rights exist in the basin. However, the cost to purchase water rights in the Truckee-Carson basin currently ranges from $600 to $3,500 per acre-foot (Truckee River Water Quality Settlement Agreement - Federal Water Rights Acquisition Program, Final Environmental Impact Statement, October 2002). Assuming wetland mitigation would require the acquisition of 7,000 af, the cost to purchase water for the wetlands results in an additional capital cost of $4.2 million to $24.5 million.

Authority exists under the Snyder Act, 25 U.S.C. §13, to implement an off-channel reservoir alternative. However, there is currently no likely funding within BIA's foreseeable annual budgets to implement the alternative. Federal budget planning operates approximately two years in advance. Unless a write-in is made, the earliest that funding could be made available for an off-channel alternative is fiscal year 2006, whereas funding for the proposed action is available today. Within the context of annual Federal budget planning, BIA has had no success including large (multi-million dollar) discretionary spending requests in annual BIA budget requests. For instance, attempts to budget for unmet Indian irrigation system needs have been unsuccessful, and BIA has been successful including only mandatory (court or legislative mandates) irrigation operation and maintenance funds in its annual budgets. Also, budget requests for large water development projects have been funded in the last 15 years only in conjunction with Indian water rights settlement acts, and not as part of any discretionary budget requests. Therefore, relying upon Federal appropriations to implement an off-channel reservoir alternative would not be prudent.

In addition, the annual operation, maintenance, and repair (OM&R) of the off channel reservoir alternative would be considerably higher than that associated with modifying Weber Dam (Miller Ecological Consultants, Inc. 2002).

Recreation - The Tribe would lose the economic benefits of the reservoir-related recreation with the removal of Weber Dam, approximately $3,500 per year. It is unknown if recreation could be developed at an off-channel reservoir.

Cultural Values - Below is an excerpt from "Walker River Paiutes, a Tribal History" by Edward C. Johnson (1975) that discusses the Tribal perspectives on Weber Dam and Reservoir:

> The People (Walker River Paiutes) also petitioned Congress asking for a reservoir in 1919. The People knew they had to have a storage dam. It is the cry of all these Indians and it is needed to save us. Now we have about 1,300 acres that has cost over $100 an acre, and water fails us in the early part of July, causing much loss. With the storage dam we have nearly 7,000 acres that could be irrigated and the total cost of all would be less than $50 per acre, and water two hay crops and our gardens and pastures. . . We Indians have waited, but without success; our crops dry up early in the summer and our stock suffers. . . Most of our Indians now have to go away to work to make the money to live, which is bad for them and their children. . . there are new irrigation projects above us that we fear will take our water if this dam is not built to hold our water rights; we are afraid that each season will see less and less water for us, until we may have to all go away to work in order to support our families. The People donated loads of hay in order to raise funds to send delegations to Washington D.C. A three man delegation carried the petition to the nation's capital several times.
>
> Planning for the irrigation reservoir had been going on for some time before actual construction began. Construction of the dam (at the Weber site) was commenced on September 21, 1933, and was practically completed in 1935, although the spillway gates were not installed until June 1937.
>
> The reservation had its own storage reservoir now. Weber reservoir cost $135,000 to build. The earthen dam held 13,000 acre feet of water. It was built by the CCC (Civilian Conservation Corps), the WRA (Walker River Agency) and the BIA.

Socioeconomic - Due to the current Dam safety deficiencies and the delay in completing safety repairs, BIA implemented Reservoir storage elevation restrictions on Weber Dam in 2000. If the off-channel Reservoir alternative were chosen, the associated socioeconomic impacts would continue in place indefinitely, until federal funding for the off-channel alternative materialized. Currently the Tribe has approximately 2,100 acres of land developed for irrigation and a peak diversion of about 80 cfs is required to fully irrigate these acres (Miller Ecological Consultants, Inc. 2002). USGS records show Walker River flows in late summer and early fall downstream of the Yerington Weir have been less than 5 cfs. Therefore, water must be stored in the early and late portion of the year for supplemental delivery during times when the river flows do not meet the irrigation demands. As an example, during the 1998 irrigation season the Tribe used 5,125 af from Weber Reservoir storage (USGS Water Resources Data, Nevada, Water Year 1998, Water-Data Report NV-98-1.). Based on the 1998 example and under the current Reservoir water restrictions, surface storage is insufficient to meet irrigation demands, resulting in a reduction in the number of acres planted and/or a reduction in crop output.

Summary - The off-channel Reservoir alternative has been eliminated from further consideration for the following reasons. First, it does not meet the purpose and need of the proposed federal action. Second, this alternative would eliminate the flood protection provided by Weber Dam. Third, environmental impacts associated with this alternative (elimination of wetlands due to removal of Weber Dam) may not be capable of being mitigated even if funds were provided for mitigation because there may not be willing sellers of water in the basin sufficient to provide for replacement wetlands. Fourth, there is stiff competition in the basin for water rights and any water rights acquired for replacement wetlands would compete with and/or reduce the water available for saving Walker Lake. Fifth, the use of Weber Reservoir for future uses would be lost. And finally, the primary fish passage benefit (removal of Weber Dam) proposed with this alternative would not be realized since the new diversion Dam would require structural fish passage.

2.2.4.2 Groundwater Development

The groundwater development alternative would include a system of groundwater wells to supply capacity equal to present Weber Dam at full capacity (10,700 af) and a collection and delivery system to provide water upstream of the canal inlets. The groundwater development alternative consists of a well field of ten wells pumping at an average rate of 2,400 gpm each to provide the water requirement for efficient irrigation deliveries at Little Dam. The well field location would be parallel to the existing Weber Reservoir approximately 0.5 to 1 mile away from either side of the Reservoir. This alternative would also include removal of Weber Dam to provide fish passage.

The groundwater development alternative was suggested because certain data sources indicate that there may be sufficient groundwater of suitable quality and appropriate technology to implement this alternative. However, BIA, based on the following factors and reasons, has eliminated this alternative from further consideration and this alternative does not meet all the purpose and needs of the existing Weber Dam. Specifically, this alternative does not provide any flood protection to the town of Schurz, there is no potential for bundling upstream water releases for Walker Lake, there is no ability to develop additional Tribal water sources, the alternative provides no potential recreation opportunities, and the Tribe loses its cultural and historic values provided by Weber Dam.

Water Resources - The Tribe currently has three water sources available for on-Reservation domestic, irrigation, municipal, commercial, and industrial development purposes: Decree C-125 water in the amount of 26.25 cfs of direct flow from the Walker River for a consecutive 180-day irrigation season; local groundwater (currently unquantified); and surface water stored in Weber Reservoir (up to 10,700 af). If the groundwater alternative was developed and Weber Dam removed, stored surface water would no longer be available for the Tribe's use. This would greatly restrict the Tribe's development potential, and permanently deprive the Tribe of a water supply (10,700 af of Weber surface water storage) which BIA considers to be an Indian trust asset. For example, 10,700 af could irrigate an additional 1,000-1,700 acres (depending on efficiencies) on the Reservation, or could provide a domestic and municipal water supply to additional households.

Biological Resources - The primary purpose of considering the groundwater development alternative was to remove the passage impediment for LCT caused by Weber Dam. Removal of Weber Dam would not ensure recovery of LCT because fish passage (primarily LCT) to the headwaters of Walker River would not occur since there are numerous diversion structures upstream of Weber Dam that would continue to block access to potential upstream spawning areas. Also, there is no LCT spawning habitat in the Reservation portion of Walker River in large part because of naturally occurring high water temperature, and Dam removal would increase water temperature in the reach of the Walker River between Weber Dam and Walker Lake. Additionally, removal of Weber Dam would not ensure sufficient water in the river to promote year-round LCT movement upstream as well as downstream. Walker River flow is managed to serve adjudicated water rights. During normal water years, summer (June through September) flow upstream of the Yerington Weir is generally 100-200 cfs and is less than 60 cfs downstream of the Weir. USGS gage data document days when flow downstream from Yerington Weir was less than 25 cfs and less than 0.1 cfs immediately upstream of Weber Reservoir; such flows in late summer and fall would generally preclude LCT migration and survival (Miller Ecological Consultants, Inc. 2002).

The groundwater development alternative would also eliminate approximately 450 acres of jurisdictional wetlands along the lower Walker River for which mitigation would be required. Potential wetlands mitigation ratios are based on prior experience with similar projects and the direction provided by the U.S. Army Corps of Engineers Regulatory Guidance Letter No. 02-2 (USACE, 2002). That letter clarifies the policy of no overall net loss of wetlands. In addition to the amount of area affected by an action, the function of the affected wetland must be considered when determining impacts. It was assumed that potential mitigation would create wetlands with the same function as those lost from any action or alternative. In addition to acquiring 450 acres of replacement land, a water supply, estimated to be about 7,000 af/year, would be required to sustain the wetlands (Miller Ecological Consultants, Inc. 2002). It is unknown at this time whether willing sellers of surface water exist in the basin; also, any water allocated to the wetlands would reduce the water available for Walker Lake. Additionally, a water delivery system would need to be constructed. The project would likely require some type of diversion structure in the Walker River and associated distribution system (canals and/or pipelines). The diversion may also require fish passage. The costs of such a mitigation project would be extensive and are estimated below.

<u>Flood Protection</u> - The groundwater development alternative would not provide any flood protection to the Reservation or the residents of Schurz, Nevada.

<u>Costs, Authority, and Funding</u> - The capital cost for the groundwater development alternative is estimated to be $16 million, which includes removal of Weber Dam, but does not include replacement of wetlands (Miller Ecological Consultants, Inc. 2002). This compares to a capital cost of approximately $10 million for Weber Dam modification, not including the structural fish passage costs (approximately $2 million) which is included as part of the Dam modification. The groundwater development alternative would require the acquisition of land and water to construct, operate, and maintain the replacement wetlands (Miller Ecological Consultants, Inc. 2002). The cost to construct, operate and maintain replacement wetlands, excluding the water acquisition costs, is approximately $3.2 million. The water acquisition cost is difficult to determine since it is unknown whether any willing sellers of surface water rights exist in the basin. However, the cost of water rights in the Truckee-Carson basin currently ranges from $600 to $3,500 per acre-foot (Truckee River Water Quality Settlement Agreement - Federal Water Rights Acquisition Program, Final Environmental Impact Statement, October 2002). Assuming wetland mitigation would require the acquisition of 7,000 acre-feet, the cost of water for the wetlands could result in an additional capital cost of $4.2 to $24.5 million.

Authority exists under the Snyder Act, 25 U.S.C. §13, to implement a groundwater development alternative. However, there is currently no likely funding within BIA's foreseeable annual budgets to implement this alternative. Federal budget planning operates approximately two years in advance. Unless a write-in is made, the earliest that funding could be made available for an off channel alternative is fiscal year 2006 whereas funding for the proposed action is available today. Within the context of annual Federal budget planning, BIA has had no success including large (multi-million dollar) discretionary spending requests in its annual budget requests. For instance, attempts to budget for unmet Indian irrigation system needs have been unsuccessful, and BIA has been successful including only mandatory (court or legislative mandates) irrigation operation and maintenance funds in its annual budgets. Also, budget requests for large water development projects have been funded in the last 15 years only in conjunction with Indian water rights settlement acts, and not as part of any discretionary budget requests. Therefore, relying on Federal appropriations to implement a groundwater development alternative would not be prudent or realistic.

In addition, the annual operation, maintenance, and repair (OM&R) of the groundwater development alternative would be considerably higher than that associated with modifying Weber Dam, $240,000 and $65,000, respectively (Miller Ecological Consultants, Inc. 2002).

Recreation - The Tribe would lose the economic benefits of the Reservoir-related recreation with the removal of Weber Dam, approximately $3,500 per year.

Cultural Values - Below is an excerpt from "Walker River Paiutes, a Tribal History" by Edward C. Johnson, (1975) that discusses the Tribal perspectives on Weber Dam and Reservoir:

> "The People (Walker River Paiutes) also petitioned Congress asking for a reservoir in 1919. The People knew they had to have a storage dam. It is the cry of all these Indians and it is needed to save us. Now we have about 1,300 acres that has cost over $100 an acre, and water fails us in the early part of July, causing much loss. With the storage dam we have nearly 7,000 acres that could be irrigated and the total cost of all would be less than $50 per acre, and water two hay crops and our gardens and pastures...We Indians have waited, but without success; our crops dry up early in the summer and our stock suffers...Most of our Indians now have to go away to work to make the money to live, which is bad for them and their children...there are new irrigation projects above us that we fear will take our water if this dam is not built to hold our water rights; we are afraid that each season will see less and less water for us, until we may have to all go away to work in order to support our families. The People donated loads of hay in order to raise funds to send delegations to Washington D.C. A three man delegation carried the petition to the nations capital several times.
> Planning for the irrigation reservoir had been going on for some time before actual construction began. Construction of the dam (at the Weber site) was commenced on September 21, 1933, and was practically completed in 1935, although the spillway gates were not installed until June 1937.
>
> The reservation had its own storage reservoir now. Weber Reservoir cost $135,000 to build. The earthen dam held 13,000 acre feet of water. It was built by the CCC (Civilian Conservation Corps), the WRA (Walker River Agency) and the BIA.

The Walker River Paiutes have historically relied upon Weber for survival. Otherwise they would have had to leave the reservation to find work elsewhere in order to take care of their families. In 2000, the last two local Paiute men, who worked on building Weber died.

Weber has and continues to be a place with great beauty in the desert. It is like an oasis where we have all grown up, as it was our only recreational site. You can sit at Weber and enjoy the weather, birds, wildlife, scenic views of the mountains reflecting on the water and warm summer breezes. The dam has also provided for an active wetland area that is enjoyed by hunters, fishermen and cattle."

Socioeconomic - Due to the current Dam safety deficiencies and the delay in completing safety repairs, BIA began imposing Reservoir storage elevation restrictions on Weber Dam in 2000. Initially the Reservoir storage elevation restriction was 4195.5 feet (1,500 af); subsequently, BIA determined that the Reservoir storage elevation restriction could be safely raised to 4200 feet (4,766 af). If the groundwater development alternative were chosen, these restrictions and the associated socioeconomic impacts would continue until federal funding for the groundwater alternative materialized. As indicated above, the prospects for such federal funding are unknown. Currently the Tribe has approximately 2,100 acres of land developed for irrigation and a peak diversion of about 80 cfs is required to fully irrigate these acres (Miller Ecological Consultants, Inc. 2002). USGS records show Walker River flows in late summer and early fall downstream from the Yerington Weir to be less than 25 cfs, and immediately upstream of Weber Reservoir to be 0.1 cfs. Therefore, water must be stored in the early and late portion of the year for supplemental delivery during times when the river flows do not meet the irrigation demands. As an example, during the 1998 irrigation season the Tribe used 5,125 af from Weber Reservoir storage (USGS Water Resources Data, Nevada, Water Year 1998, Water-Data Report NV-98-1). Based on the 1998 example and under the current Reservoir water restrictions, surface storage is insufficient to meet irrigation demands, resulting in a reduction of the number of acres planted and/or a reduction in crop output.

Summary - The groundwater development alternative has been eliminated from further consideration for a number of reasons. First, it does not meet the purpose and need of the proposed federal action. Second, this alternative would eliminate the flood protection provided by No Action and the Proposed Action. Third, the environmental impacts associated with this alternative (elimination of wetlands) may not be capable of being mitigated even if funds were provided because there may not be willing sellers of surface water in the basin sufficient to provide for replacement wetlands. Fourth, there is stiff competition in the basin for water rights and any water rights acquired for replacement wetlands competes with or reduces the water available for saving Walker Lake. And finally, the use of Weber Reservoir would be lost.

3 Chapter 3. Affected Environment

3.1 Introduction

Chapter 3 describes the existing setting and environment for the study area of Weber Dam and the proposed modifications. This section describes the resources that may be affected by modification and repair of Weber Dam or the alternatives. The effected environment discussion for each resource focuses on the baseline conditions prior to the Proposed Action. The environmental setting for each resource category is described at the beginning of each resource. The overall description of the study area for the Proposed Action and alternatives are given in Chapter 1.

3.2 Geology and Soil Resources

This section addresses the baseline conditions for geology, mineral, and soil resources associated with Weber Dam.

3.2.1 Geology

3.2.1.1 Topographic, Physiographic and Geologic Setting

The topography and physiographic features of the regional study area for geology and minerals are shown in Figure 3.2-1. Weber Dam is situated in the Walker River Valley. The segment of the Walker River Valley in which the Dam and Reservoir are located trends northwest-southeast and is bounded by the Wassuk Range on the southwest, the Terrill Mountains on the northeast, and the Desert Mountains on the north. The elevation ranges from approximately 4,174 feet at the river bed level at Weber Dam to 11,239 feet at Mt. Grant, located in the Wassuk Range.

The project area is located within the Great Basin region of the Basin and Range physiographic province and is characterized by a series of generally north- to northwest-trending fault block mountain ranges separated by broad basins. The Basin and Range physiography has developed from normal faulting that began approximately 17 million years ago and continues to the present (Stewart 1980). The extensional block faulting uplifted, and typically complexly folded bedrock in the mountain blocks. The basins (or valleys) formed by downdropped movement along the normal faults and are typically filled with unconsolidated and poorly consolidated sediments derived primarily from erosion off of the adjacent mountain ranges.

On the basis of topography, hydrology, morphology, and geologic structure, the Great Basin has been subdivided into subbasins. Weber Dam and Reservoir are situated within the Lahontan Basin (Hunt 1974) subdivision of the Great Basin. Lahontan basin is characterized by large alluvial flats and playas that include Walker Lake, Pyramid Lake, Lake Winnemucca, and the Carson Sink playa area. In the Pleistocene, the area included within the Lahontan Basin was covered by a very large lake referred to as ancestral Lake Lahontan. Walker Lake is a desiccating remnant of ancestral Lake Lahontan. The highest identified lake level of ancestral Lake

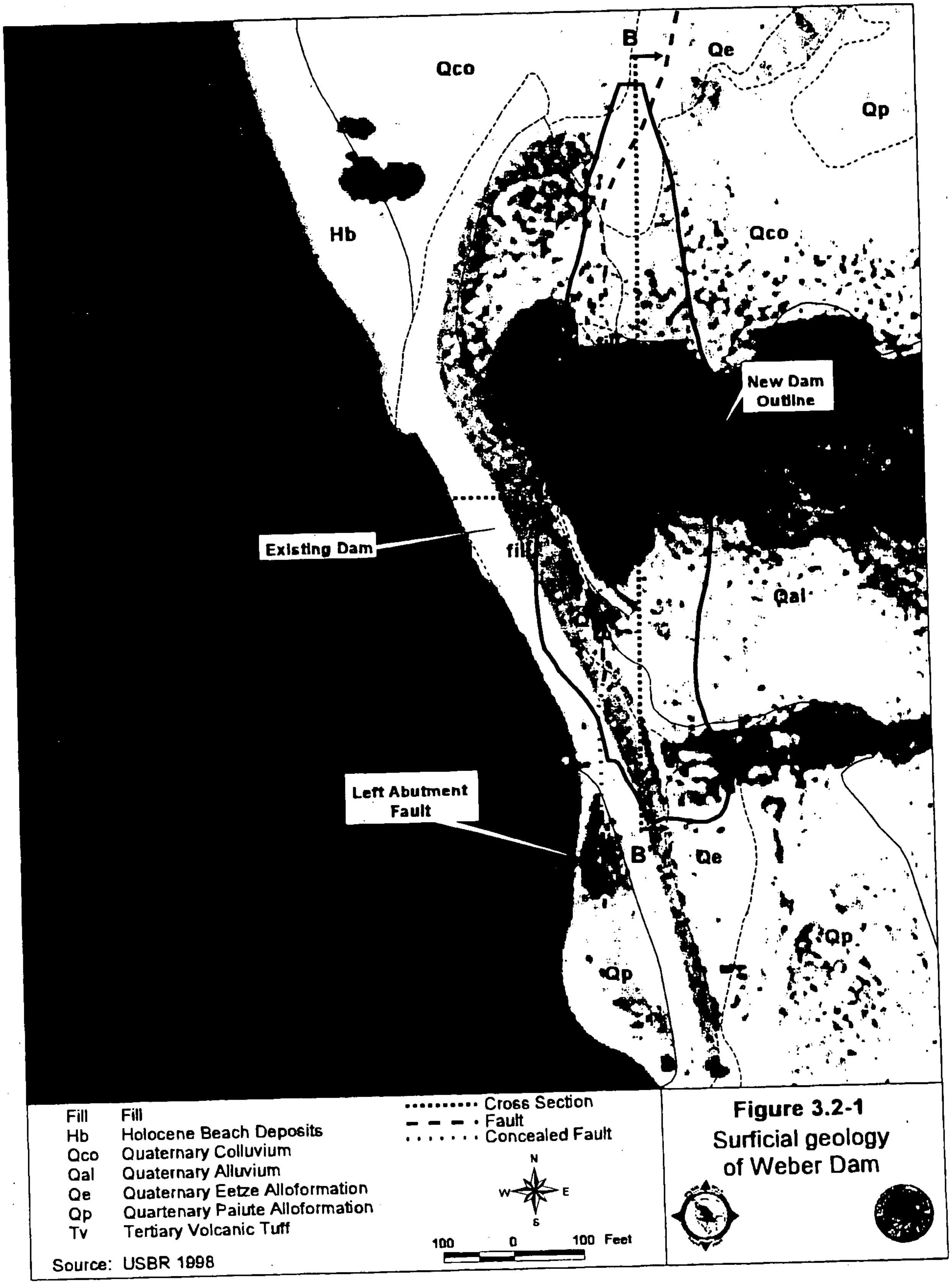


Figure 3.2-1
Surficial geology of Weber Dam

Lahontan is 4,380 feet, approximately 400 feet above the present surface of Walker Lake, and 200 feet above the river level at Weber Dam.

Weber Dam was constructed across the Walker River and lies in the Walker Lake portion of the Lahontan Basin. The Walker River is the principal drainage feature of this closed basin and drains into Walker Lake, located about 17 miles southeast of the Dam.

3.2.1.2 Regional Geologic Setting

Consolidated rocks ranging in age from Jurassic to Quaternary compose the mountain ranges and underlie valley fill deposits in the Walker River Valley. The Wassuk Range is composed of Jurassic to late Tertiary metavolcanic and metasedimentary rocks and Miocene to Pliocene interbedded sediments and volcanics. The Terrill Mountains consist of Cretaceous granitic rocks overlain by late Tertiary volcanics, including lava flows, flow breccias, and agglomerates. The Desert Mountains are composed of later Tertiary volcanics and Quaternary basalt flows.

In the vicinity of Weber Dam and Reservoir, the Walker River Valley is underlain by valley fill deposits that average about 1,000 feet in thickness (Schaefer 1980). The valley fill deposits consist of alluvial and lacustrine materials consisting of predominantly sand, silt and clay and gravel. These deposits include materials deposited as; (1) channel and floodplain deposits associated with the Walker River; (2) alluvial fan deposits that accumulated along the valley margins and base of the mountain fronts; (3) fine-grained lacustrine deposits that accumulated in ancestral Lake Lahontan; and (4) playa deposits that formed as localized lakes dried up in the region.

3.2.1.3 General Site Geology

BOR conducted a series of surface and subsurface investigations to define the geologic and geotechnical conditions in the vicinity of Weber Dam (USBR 1982, 1992 and 1993). These investigations included drilling and sampling borings, logging cone penetrometer holes and excavating trenches. The results were used to develop an interpretation of the geologic and geotechnical conditions at the existing Dam site, and to design the Dam modifications. A description of the stratigraphic sequence at the Dam site is presented in Table 3-2.1. The geology in the vicinity of the Dam is shown in Figure 3.2-1, and interpreted subsurface conditions are shown in cross-sectional Figure 3.2-2.

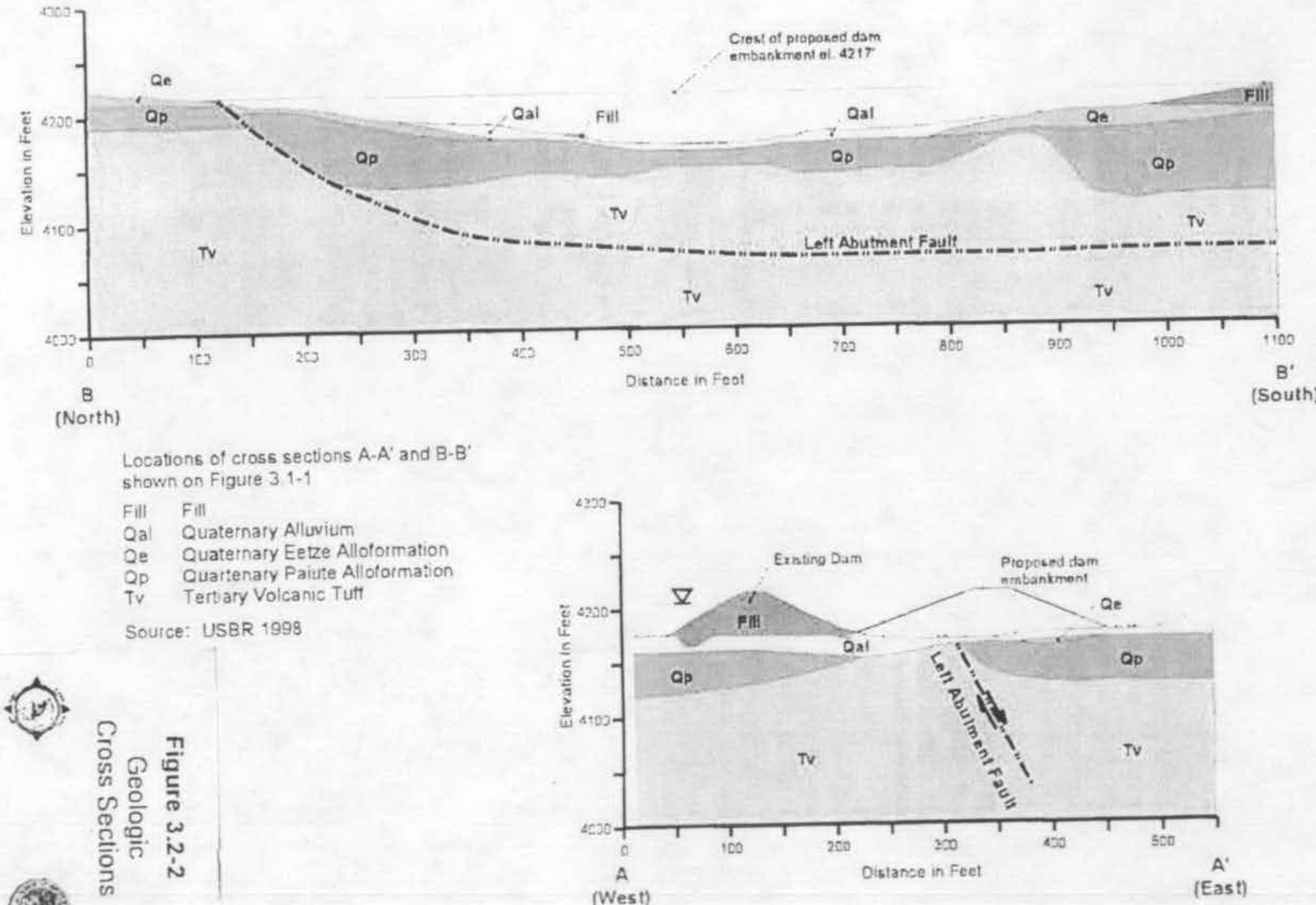
The oldest unit at the site is volcanic tuff located beneath the existing Dam, approximately 40-50 feet below the level of the Walker River channel. The top of the tuff is intensely weathered and described as soft. The tuff is overlain by Pleistocene lake sediments deposited in ancestral Lake Lahontan. These lake sediments are subdivided into two units: Paiute Alloformation and the Eetze Alloformation. The Paiute consists of partially cemented, relatively dense, interbedded, gravelly sands and silty sands. The Paiute is overlain by the Eetze Alloformation composed of laminated clay and claystone with interbedded sands and gravelly sands. Locally, the Eetze contains weak, low density, plastic clay. The Eetze is exposed near the downstream toe of the Dam but was apparently stripped from the Dam foundation during Dam construction (USBR 1992).

The Pleistocene lake beds are overlain by alluvial deposits associated with the Walker River. Exploration results indicate that the alluvium consists of sand, silty sands, and lean clays deposited in a channel eroded into the older lake bed deposits. Other geologic units mapped in the area include recent deposits of colluvial soil and beach deposits accumulated along the shoreline of the Reservoir.

Table 3.2-1. Stratigraphic column in vicinity of Weber Dam.

Age	Unit	Map Symbol	Description
	Fill	f	Man-made fill (Dam embankment).
Holocene	Beach Deposits	Hb	Composed of silty sand and sandy gravel developed along the shoreline around much of the Reservoir.
Quaternary	Colluvium	Qco	Occurs as soil and rock fragments that accumulated as thin lenses (generally <10 feet thick) transported by slopewash processes.
Quaternary	Alluvium	Qal	Alluvium deposited by the Walker River on eroded surface and channels cut into older lacustrine (lake) sediments. Material consists of lenticular and discontinuous beds of well-graded sands, silty sands, and lean clays.
Quaternary	Eetze Alloformation	Qe	Lacustrine sediments composed of unconsolidated sands, silts and clays with zones of very soft, lean to fat clay, and organic clays near base. Note: In the Dam foundation, much of the unit was stripped during Dam construction.
Quaternary	Paiute Alloformation	Qp	Lacustrine sediments consisting partially cemented gravelly sand with interbedded silty sands, thinly-thickly bedded (0.1 to 2.5 ft) that generally dip 8 to 12 degrees to the southwest (upstream). Typically 20 percent non-plastic fines, and 10 percent gravel with maximum size of gravel is 2".
Tertiary	Unnamed Volcanic Tuff	Tv	Non-welded, medium-grained, vitric tuff; upper 20-70 feet are intensely weathered and soft.

Source: USBR, 1992, 1993.



Locations of cross sections A-A' and B-B' shown on Figure 3.1-1

Fill	Fill
Qal	Quaternary Alluvium
Qe	Quaternary Eetze Alloformation
Qp	Quartenary Paiute Alloformation
Tv	Tertiary Volcanic Tuff

Source: USBR 1998

Figure 3.2-2
Geologic
Cross Sections

3.2.1.4 Faulting and Seismicity

Weber Dam and Reservoir are situated in the vicinity of three major seismic zones known as the central Nevada Seismic Belt, the Sierra Nevada frontal fault system, and the Walker Lane seismic belt, each characterized by periodic strong earthquakes associated with fault movement (Figure 3.2-3). The Nevada Seismic Belt consists of north-northeast trending normal faults, whereas, the Sierra Nevada frontal fault system consists of major northwest-trending frontal faults that bound the western margin of the Sierra Nevada range. These two fault systems are separated by the Walker Lane, a system of northwest trending, right lateral faults, that extends from Gabbs Valley, south of Walker Lake on the southeast, to Pyramid Lake on the northwest.

For the purposes of this evaluation, a fault is considered active if it exhibits evidence of movement during the Holocene (last 10,000 years), and is considered potentially active if it exhibits evidence of movement during the Quaternary (last 2 million years). Historically, surface displacement along faults occurred in Nevada during major earthquakes in 1869, 1903, 1915, 1932, and three events in 1954 (Stewart 1980). All of these events occurred along the Nevada Seismic Belt located northeast of the Dam. The location of the known active and potentially active faults located in the region surrounding the Weber Dam are shown in Figure 3.2-4. The closest recognized major active fault is the northern segment of the Wassuk Range fault zone located approximately two miles south of the site. Paleoseismic evidence indicates that the recurrence interval for movement on the Wassuk Range fault is 4,500-6,500 years. During the last event, movement on the Wassuk Range fault resulted in six to ten feet of vertical displacement.

Several secondary faults have also been identified in the footprint of the Dam and Reservoir (Morrison and Davis 1984, USBR 1990). These secondary faults are north trending, normal faults that can only be traced for short distances. One of these faults, a north trending structure traced for about 0.6 miles, was projected through the left abutment of the current Dam foundation by Morrison and Davis (1984). Based on offset beds, they estimated that approximately 16 feet of vertical displacement has occurred along this fault. This fault was reportedly encountered during construction of the outlet works. Trenches excavated across the projection of the fault detected anomalous geologic conditions. Although middle Pleistocene (about 140,000 years old) deposits are cut by the fault, late Quaternary and Holocene sediments do not appear to be disrupted (USBR 1998). The location of the trace of this fault in the Dam foundation is shown in Figure 3.2-1.

The project site is located in a region that has experienced considerable seismic activity in historic time. Figure 3.2-4 shows the approximate locations and estimated magnitudes of the recorded seismic events relative to Weber Dam (note that all seismic events do not appear on Figure 3.2-4 because several events occurred in the same location; only the largest event is shown). USGS (2002) earthquake records indicate that 14 earthquake events greater than or equal to 6 Richter Magnitude have occurred within a 60- mile radius of Weber Dam between 1860 and 2002 (Table 3.2-2). The largest recorded earthquakes to affect the region were 7.2 Richter Magnitude events that occurred in 1932 which was located approximately 50 miles

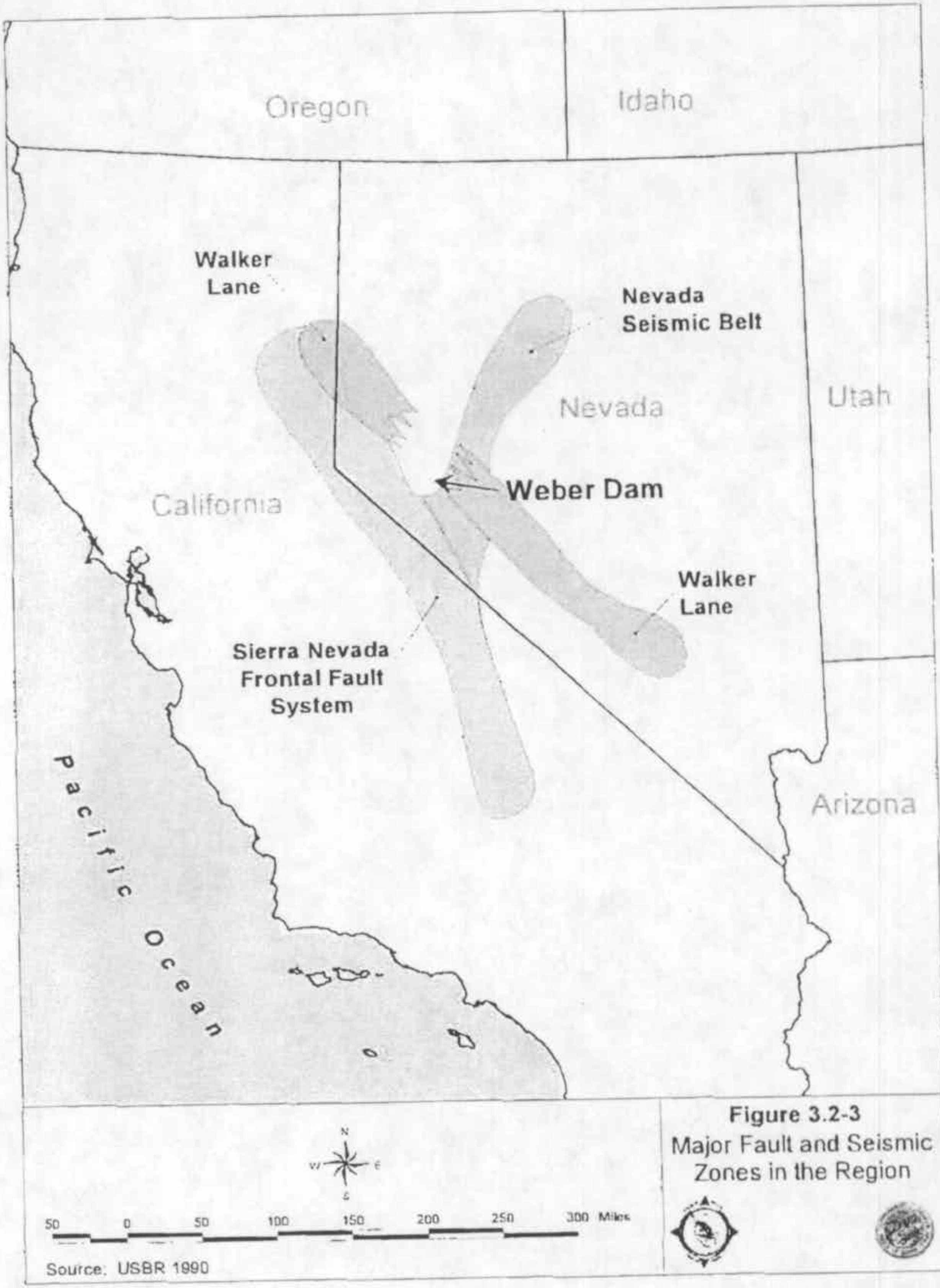


Figure 3.2-3
Major Fault and Seismic Zones in the Region

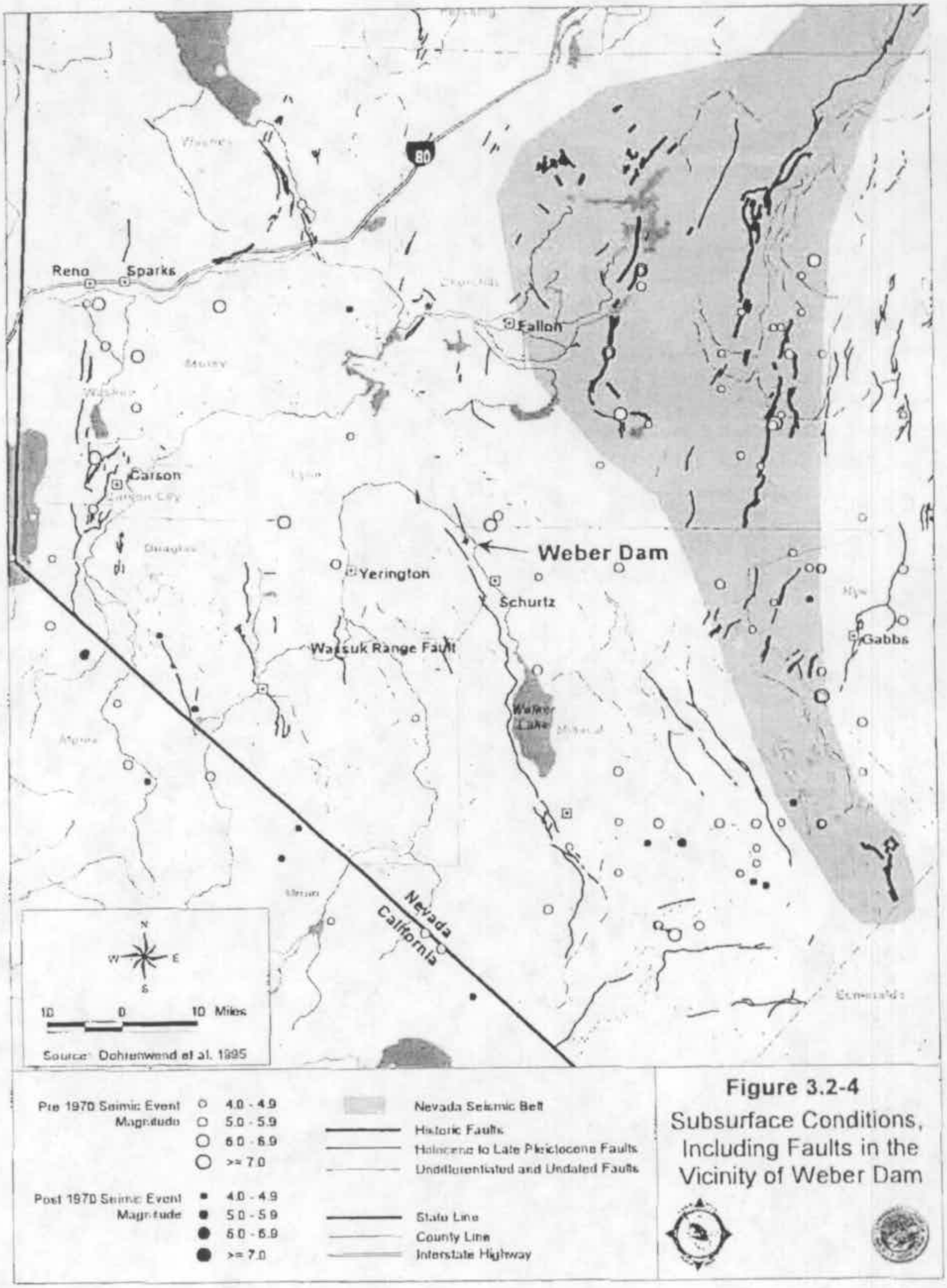


Figure 3.2-4
Subsurface Conditions, Including Faults in the Vicinity of Weber Dam

Table 3.2-2. Recorded earthquakes with Richter magnitude of 6.0 or greater located within a 60 mile radius of the Dam.[1]

Year	Month/Day	Location (latitude, longitude)	Approximate Distance from the site (miles)	Estimated Richter Magnitude	Estimated Peak Bedrock Acceleration[2] (g)[3]
1860	3/15	39.5,-119.5	47	6.3	0.03
1869	12/27	39.4,-119.7	51	6.1	0.025
1887	6/3	39.2,-119.8	52	6.3	0.027
1914	2/18	39.5,-119.8	59	6.0	0.015
1914	4/24	39.5,-119.8	59	6.4	0.023
1932	12/21	38.75,-118.0	50	7.2	0.06
1933	6/25	39.080,-199.33	25	6.1	0.065
1934	1/30	38.280,-118.36	58	6.5	0.025
1954	7/6	39.42,-118.530	31	6.8	0.08
1954	7/6	39.3,-118.5	26	6.0	0.06
1954	8/24	39.58,-118.45	43	6.5	0.045
1954	12/16	39.283,-118.117	43	7.2	0.078
1959	3/23	39.6,-118.02	59	6.3	0.02
1959	6/23	39.080,-118.82	3	6.1	0.37

[1] Seismic data from the USGS Earthquake Database.
[2] Peak bedrock acceleration at the Weber Dam site was estimated based on the seismic attenuation relationships presented in Idriss 1985.
[3] Times the force of gravity (g).

southeast, and in 1954 which was located approximately 43 miles northeast of Weber Dam, both within the Nevada Seismic Belt. The closest recorded earthquake with a magnitude of 6 or greater was a 6.1 magnitude event that occurred in 1959 in the immediate vicinity of Weber Dam. This event may have been associated with the northern segment of the Wassuk Range fault zone. Due to the proximity of the earthquake, this event was responsible for generating the strongest historic ground motion at the site. Although no surface faulting occurred during this earthquake, the earthquake reportedly caused large sections of the Reservoir bank to fall into the Reservoir (USBR 1990, Seismological Notes 1960). Details regarding the locations of the failures around the Reservoir, or possible causes of these failures, are not available.

Considering the fine-grained granular materials and high ground water elevation along the Reservoir rim, one possible explanation is that the reported failures were caused by lateral spreading triggered by liquefaction. Lateral spreading is a term referring to a type of landslide triggered by seismically induced liquefaction that commonly forms on gentle slopes and has rapid fluid-like flow movement.

3.2.1.5 Seismic Parameters for Dam Design

Besides surface rupture hazards, the primary seismic hazard at Weber Dam is the effect of strong ground motions from future earthquakes in the region. The maximum ground motion that could occur at a site is a function of: 1) the size of the earthquake events that could occur; 2) the distance from the earthquake epicenter to the site; and, 3) subsurface conditions at the site which may amplify or dampen the ground motions. Note that it is the combination of the size and distance that controls ground motion. For example, a very large earthquake located a considerable distance from the site will have less ground motion at the site than a moderate earthquake nearby.

For the purposes of design of the Dam, it is important to consider the strongest ground motion that is likely to occur at the site from earthquakes that could occur in the region. A measure of the intensity of ground motion used in seismic design determinations is peak ground acceleration (PGA). The units of acceleration are measured in terms of g, the acceleration due to gravity. PGA, in percent g, decreases, with distance from the earthquake. PGA's are estimated using empirical attenuation relationships applicable to the region. Estimated PGA's that have occurred at the site from historic earthquakes reported for the region are presented in Table 3.2-2. As presented in Table 3.2-2, the largest estimated PGA that has occurred at the site from historic earthquakes was the 1959, 6.1 magnitude earthquake that occurred in the immediate vicinity of Weber Dam (estimated 0.37g).

BOR conducted a seismotectonic study (USBR 1990) for use in evaluating the seismic hazards, and establishing seismic parameters for design of Dam improvements. The baseline description and seismic design parameters discussed herein are based on the information provided in the BOR study. The estimated MCE for the most significant seismic sources in the region are listed in Table 3.2-3.

Based on the size of the potential earthquake and proximity to the Dam site, the greatest potential seismic hazard to Weber Dam is the potential for an estimated 7.5 magnitude MCE occurring on the northern portion of the Wassuk Range fault zone located approximately two miles south of the Dam site. This 7.5 MCE estimated for the Wassuk Range fault is consistent with the magnitude of several historic earthquakes that have occurred on other similar faults in central Nevada (Ryall 1977). Paleoseismic evidence indicates that the Wassuk Range fault zone has experienced recurring movement during the Holocene, including at least two large earthquakes (Magnitude greater than 7) within the last 7,000 years (USBR 1990).

Random earthquakes are earthquakes that cannot be associated with mapped active or potentially active faults. Random earthquakes are relatively common throughout the Basin and Range region. For example, the 6.1 magnitude earthquake that occurred in 1959 in the vicinity of the Dam is considered a random earthquake. A random MCE of 6.5 at the Dam site is considered possible based on random earthquake analysis conducted for the region (USBR 1990).

Table 3.2-3. Estimated MCEs for Weber Dam.

Earthquake Source	Closest Epicentral Distance (Miles)	Maximum Credible Earthquake (Richter Magnitude)
Random Earthquake	0	6.5
Wassuk Range fault	3	7.5
Walker Lane.	16	7
Singatse Range fault	19	7
Rainbow Mountain-Fairview Peak-Dixie Valley Region	28-34	7.25

Source: USBR 1990

3.2.2 Mineral Resources

Deposits of copper, manganese, tungsten, gold, silver, mercury, soda, pumice, building stone, and sand and gravel occur on the Reservation. However, no mineral deposits have been identified in the vicinity of the Dam, or area that would be affected by the proposed Dam modifications. As described in Chapter 2, the proposed quarry for riprap material for the Dam modification is located four miles southwest of the Dam at the base of White Mountain (See Figure 1.1-2). Several historic prospects occur in this area. Prior exploration activities in this area explored mineralized quartz veins that contained lead and copper mineralization. However, the limited lateral extent of the mineralization apparently prohibited extensive mining in this area (Albers and Magill 1976).

3.2.3 Soil Resources

The Walker River flows through a valley fill composed of sediments from the Tertiary age. It consists of fluviolacustrine deposits of siliceous and diatomaceous shale, siltstone and sandstone parent materials. The most recent alluvial deposits are located along the Walker River flood plain and on the inset fans and bolson floors of the valleys. The primary soil series that may be disturbed during Dam repair and realignment in the bolson floor and flood plain materials are the Fallon, Sagouspe, Slaw and Barnmot. The Fallon and Sagouspe soils formed on flood plains and river terraces and are somewhat poorly drained and slightly to moderately affected by salts. The Slaw soils formed on the inset fans and bolson floors and are calcareous and strongly affected by salts. The Barnmot soils formed in residuum and colluvium derived from semiconsolidated lake sediments including coarse textured beach terraces (USDA SCS 1991).

The Proposed Action involves the disturbance of undisturbed and previously disturbed areas (approximately 20 acres) of located below, adjacent and remote from the Dam (Figure 2.1-2). Potentially affected soils in the construction areas are composed of three primary map units of upland Torriorthent soils, with minor components being bottomland Torrifluvent and Xerofluvent soils (Habitat Management, Inc. 2002).

3.3 Water Resources

This section discusses baseline conditions for ground water and surface water resources.

3.3.1 Ground Water Resource

3.3.1.1 Hydrogeologic Setting

The following discussion of the hydrogeology of the Reservation is based on discussions provided in Everett and Rush (1967) and Schaefer (1980) unless otherwise noted. The complex geology on the Reservation can be simplified into three hydrogeologic units with distinct water bearing properties: consolidated bedrock, basin fill deposits, and playa deposits.

The consolidated rock consists primarily of Precambrian to Tertiary age rocks consisting of intrusive igneous rocks and volcanics which form the resistant mountains and underlie unconsolidated sediments in the basins and valleys. These rocks are relatively impermeable and water within the rocks is stored and transmitted through fractures. Because of their low storage and yield potential, the consolidated rocks are not considered an important source of groundwater.

Basin fill deposits (late Tertiary and Quaternary age) consist of unconsolidated to poorly consolidated, interbedded and lenticular sand, silt and clay, and gravel deposits. These deposits include both alluvial fan deposits derived from erosion of the adjacent mountain ranges, and fine-grained lake sediments deposited in the Pleistocene Lake Lahontan. Seismic refraction/reflection investigations on the Reservation indicate that basin fill sediments average about 1,000 feet in thickness. Where saturated, these deposits yield water freely to wells. In the upper several hundred feet of basin fill sediments, groundwater occurs primarily in unconfined aquifers.

Playa deposits (Quaternary age) underlie several dry lakes on the Reservation. These deposits consist of clay and evaporate beds with minor amounts of sand and silt. Groundwater generally occurs in confined beds within the playa deposits. Due to low yields and poor water quality, playa areas are considered undesirable areas for groundwater development.

Drillers' logs for wells located within a mile of the Walker River, and between Weber Reservoir and Schurz, indicate that the depth to groundwater ranges from 5 to 55 feet, with most wells being less than 25 feet. Similarly, Everett and Rush (1967) indicated that the depth to water in most wells located near the river averaged less than 40 feet. In the Weber Reservoir area, groundwater flows in a southeasterly direction, parallel to the general flow direction of the Walker River (Schafer 1980).

Groundwater flow splits near the town of Schurz, with part continuing southward towards Walker Lake, and part moving east and flowing into the adjacent sub-basin known as Rawhide Flats. In the upper 200 feet of saturated thickness (the zone that can be readily exploited with water supply wells), the Schurz area has an estimated storage of 1.8 million acre-feet of groundwater with localized zones of poor quality water (Schaefer 1980). According to studies by the USGS (Schaefer 1980), there is an estimated 9.1 million acre-feet of groundwater stored in deep formations (over 200 feet deep) in the Schurz area (an area extending from Weber Dam to approximately 10 miles south of Schurz). It is unknown whether these supplies are suitable for use.

Everett and Rush (1967) noted that the groundwater in playas between Schurz and the northern end of Walker Lake was too mineralized for agricultural use. Groundwater northwest of Schurz was probably suitable for agricultural use. Schaefer concluded that except for wells drilled in playa areas, the groundwater quality on the reservation was generally similar to the Walker River.

On the Reservation, five 16-inch diameter irrigation wells have been completed. Currently, only three of the five wells are operational. All of the wells were completed in basin fill sediments and are located in the Walker River Valley, approximately four to five miles south and southeast of Schurz. Production rates for the wells ranged from 1,200 to 1,800 gpm. Short-term aquifer pump tests performed by the drilling contractor during well completion demonstrated yields up to 2,500 gpm (Kleinfelder 1995). Numerous other small capacity wells used for domestic and stock water purposes exist on the Reservation. Most of these wells are located in the Walker River Valley within a few miles of Schurz.

Based on the available information, it appears that there is a potential to develop additional high capacity wells on the Reservation. However, the cost to develop the groundwater resources on the Reservation raises a concern about the practicality of this resource as a usable water supply. For example, the capital cost simply to develop a 10,000 af supply to replace Weber Reservoir storage is estimated to be $16 million, with an estimated annual O&M cost of $240,000 (Miller Ecological Consultants, Inc., March 2002).

3.3.2 Surface Water Resources

3.3.2.1 General Watershed Characteristics

Weber Dam and Reservoir are located in the Walker River Basin. The drainage area within the basin above Weber Dam that contributes streamflow to the Reservoir encompasses approximately 4,050 square miles in western Nevada and eastern California (Figure 3.2-1). The headwaters of the Walker River originate in the Sierra Nevada Mountains. Water flows approximately 122 miles to Weber Dam. Downstream from Weber Dam, the Walker River flows approximately 28 miles to its terminus in Walker Lake. The Walker River Basin is a closed basin. Water that is not diverted, consumed, or evaporated along the course of the river eventually ends up in Walker Lake.

The East and West Walker Rivers are the two major upstream branches of the mainstream of the Walker River. Two of the largest Reservoirs in the basin are located in the upper watershed. Bridgeport Reservoir, with a capacity in excess of 42,000 acre-ft, is located on the East Walker River. Topaz Reservoir, with a capacity in excess of 57,000 acre-ft, is located on the West Walker River. The East and West Walker Rivers flow predominantly to the north where they join to form the mainstream of the Walker River in Mason Valley. The mainstream of the Walker River continues flowing to the north through Yerington, Nevada and changes its predominant direction to the south-southeast near Wabuska (Figure 3.3-1). Most of the streamflow in the basin is derived from snowmelt in the headwaters located in the Sierra Nevada Mountains. The majority of the basin's drainage area is located in the lower arid to semi-arid basins that receive only limited precipitation. There are no significant tributaries to the Walker River in the lower basin reaches. The runoff in the basin is affected by annual precipitation, which varies greatly from year to year.

The most recent determination of the relation between Weber Reservoir surface area, storage volume and water surface elevation (Anderson Consulting Engineers 2001) indicates a maximum Reservoir surface area of about 931 acres, with a maximum Reservoir volume and water surface elevation of 10,911 af and 4,208 ft msl, respectively (Table 3.3-1).

The geomorphology of the Walker River channel has been described upstream of the historical backwater effect from the maximum water storage elevation in Weber Reservoir. As determined from channel profile data (Huffman & Carpenter 1999), the channel gradient in this reach is about 0.001 ft/ft. The channel is typically incised and meanders through alluvial deposits. Only a few minor sand bars and minor terracing are present. The upper surfaces of the small terraces are distinctive because they are covered by upland vegetation that appears much different from the riparian/wetland vegetation growing adjacent to the river channel. Very few of the oxbows adjacent to the river channel contain standing water during low flow conditions.

The three- to four-mile river reach upstream of the high water elevation (4,208 ft msl) of Weber Reservoir is characterized by a change to a flatter channel gradient (0.0007 ft/ft) (Huffman & Carpenter 1999). Based on the geomorphic evaluation, the construction of Weber Dam raised the base level of the channel and created a backwater effect upstream of the Dam. As the water and sediment conveyed in the channel encounters the Reservoir pool, most of the sediment deposits in the form of a delta that slowly advances downstream. The deposition of sediment at the entrance to the pool induces aggradation in the upstream channel. This aggradation may continue to migrate upstream after long periods of time. Presently, this effect is evident in the three to four mile reach upstream from the Weber Reservoir high water elevation, where a network of multiple channels actively migrates within the floodplain. This condition has apparently been exacerbated by beaver activity. Field observations revealed that some of these channel bottoms consist of a thin layer of medium to coarse sand underlain by a dark gray to black organic clay. Both the main channel and secondary channels appear to have a low width to depth ratio (relatively deep compared to their width), indicating that they may be dominated by suspended load and fine bedload transport (Schumm 1985). The channels themselves are only slightly inset into the low gradient floodplain and have small steep banks commonly bound by the roots of abundant riparian/wetland vegetation. Few terraces are evident along this reach.

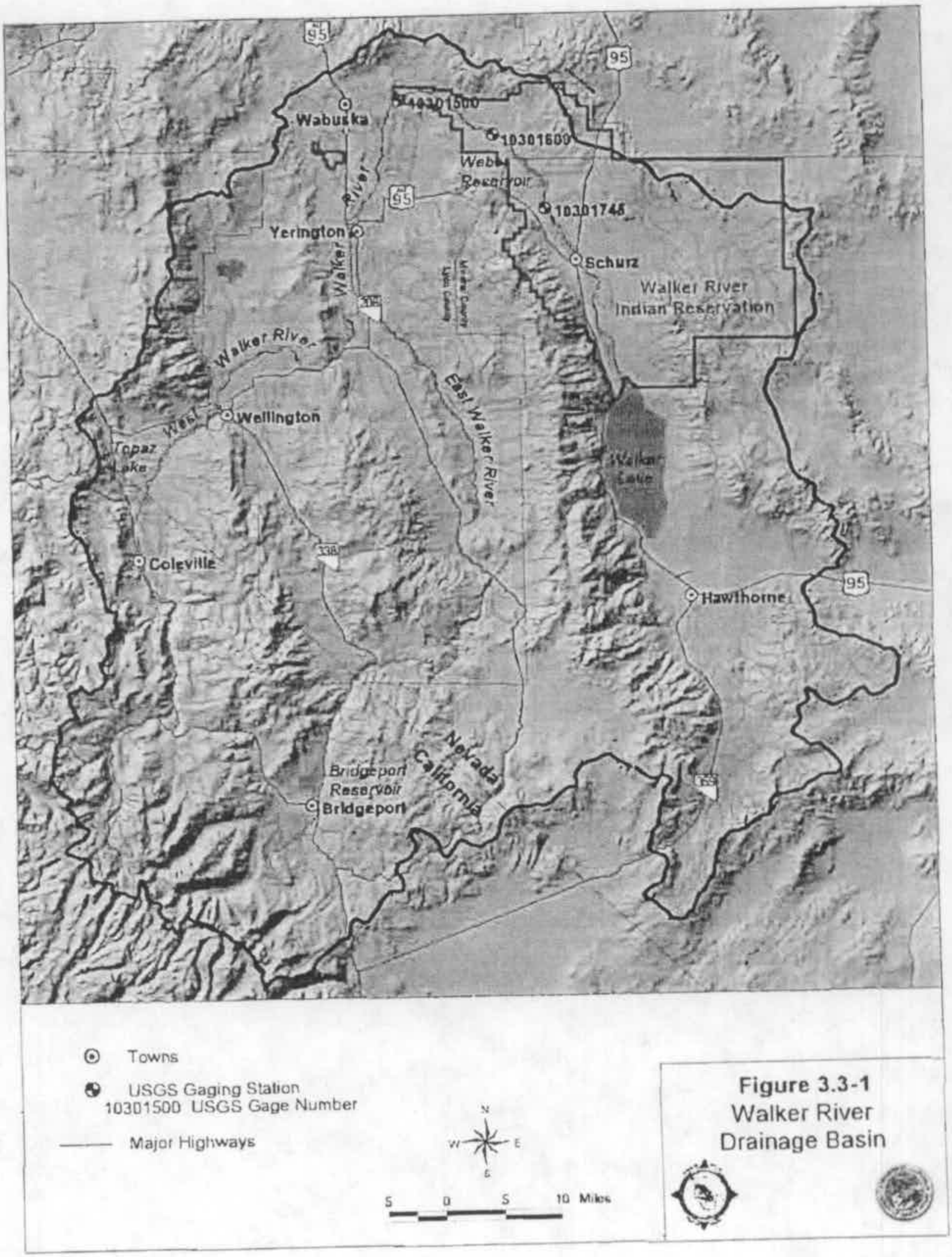


Figure 3.3-1
Walker River
Drainage Basin

Table 3.3-1. Weber Reservoir water surface elevation, volume, surface area data (Anderson Consulting Engineers 2001).

Water Surface Elevation (ft msl)	Reservoir Volume (acre-ft)	Surface Area (acres)
4,183	0	5
4,184	9	24
4,185	44	48
4,186	96	59
4,187	163	75
4,188	244	86
4,189	371	168
4,190	561	221
4,191	794	256
4,192	1,067	299
4,193	1,382	345
4,194	1,745	383
4,195	2,144	421
4,196	2,584	471
4,197	3,075	516
4,198	3,604	548
4,199	4,165	583
4,200	4,766	624
4,201	5,407	663
4,202	6,083	692
4,203	6,790	728
4,204	7,539	778
4,205	8,333	813
4,206	9,156	848
4,207	10,015	888
4,208	10,911	931

3.3.2.2 Mean Annual Precipitation and Runoff

Mean annual precipitation within the Walker River Basin varies from approximately 15 to 20 inches in the Sierra Nevada headwaters and Wassuk Range to about five inches in the arid and semi-arid valleys. Much of the annual precipitation falls early in the year, typically by May or June. Snow in the mountains during winter and localized thunderstorms during the summer months provide most of the precipitation (Nevada Water Resources Investigations 1976). The flow in the Walker River that eventually reaches Weber Reservoir is largely controlled by hydrologic conditions and extensive agricultural withdrawals and consumptive use along the River's length (Horton 1996). The nearest consistent flow measurement gage with a long-term record (1903 to present) is located on the Walker River near Wabuska

(USGS Gage No. 10301500) approximately 10 miles upstream from Weber Reservoir (Figure 3.3-1). Based on the reported gage records from 1903 through 2000, the annual volume of water passing the gage ranged from 6,664 acre-ft in 1931 to 601,218 acre-ft in 1983 (Figure 3.3-2, Table 3.3-2). The peak daily average discharge of 3,280 cfs occurred in July, 1906. Peak runoff typically occurs in May or June. About 18 percent of the annual daily average flow peaks have been greater than 2000 cfs, 15 percent between 1000 and 2000 cfs, and 67 percent less than 1000 cfs. The measured historical peak flows have been affected by regulation and/or diversion.

Another stream gage is located directly upstream of Weber Reservoir (USGS Gage No. 10301600, Figure 3.3-2). This gage apparently does not measure all of the flow at high levels due to the recent development of a braided channel geometry. Therefore, data from this gage were not used to characterize the baseline hydrology. Very limited long-term gaging records are available for the Walker River downstream from Weber Dam. A gage located upstream of Little Dam upstream of Shurz (USGS Gage No. 10301745, Figure 3.3-2) was installed in 1995.

Figure 3.3-2. Walker River discharge near Wabuska, 1902 through 2002.

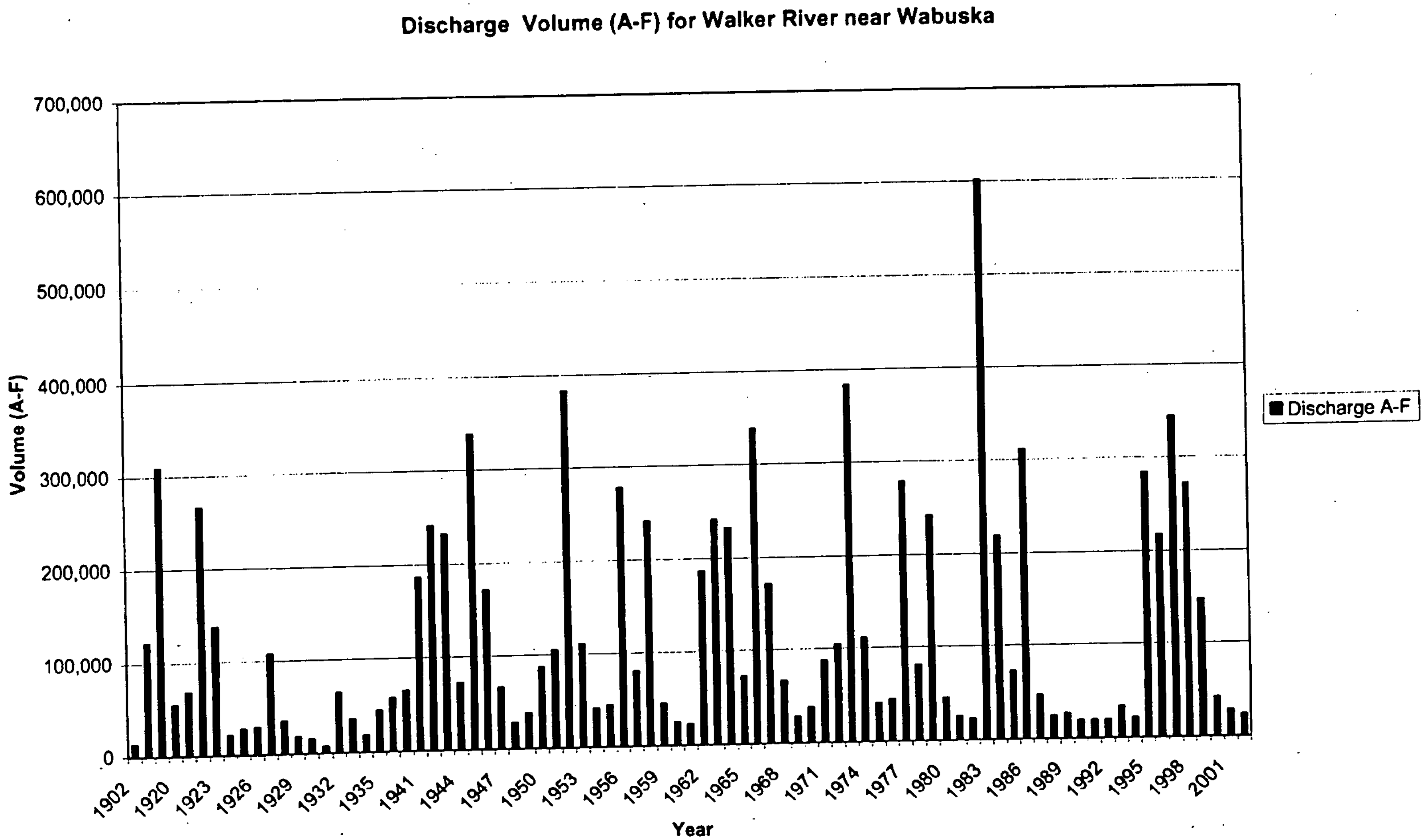


Table 3.3-2. Annual Walker River discharge near Wabuska (USGS Gage No. 10301500).

Calendar Year	Discharge Volume (AF)	Calendar Year	Discharge Volume (AF)	Calendar Year	Discharge Volume (AF)	Calendar Year	Discharge Volume (AF)
1902	12,981	1941	186,159	1962	43,408	1983	601,218
1903	121,261	1942	241,174	1963	176,932	1984	218,120
1904	308,503	1943	232,276	1964	43,506	1985	72,159
1920	54,545	1944	72,605	1965	158,279	1986	310,804
1921	68,225	1945	338,394	1966	71,676	1987	46,740
1922	266,301	1946	170,973	1967	252,248	1988	23,674
1923	137,393	1947	66,633	1968	75,933	1989	26,474
1924	20,773	1948	27,952	1969	417,903	1990	18,743
1925	27,420	1949	37,847	1970	123,771	1991	18,884
1926	29,010	1950	87,142	1971	99,612	1992	19,037
1927	107,447	1951	104,795	1972	59,341	1993	33,302
1928	35,361	1952	383,702	1973	109,605	1994	20,608
1929	17,996	1953	110,890	1974	122,450	1995	283,958
1930	14,824	1954	40,945	1975	161,738	1996	217,000
1931	6,664	1955	44,906	1976	34,673	1997	344,438
1932	64,673	1956	277,910	1977	15,828	1998	271,367
1933	35,800	1957	80,420	1978	40,484	1999	147,404
1934	17,774	1958	241,335	1979	99,310	2000	41,560
1935	44,259	1959	45,150	1980	257,280	2001	27,899
1939	57,535	1960	25,018	1981	48,768	2002	22,988
1940	65,502	1961	22,438	1982	354,413		

3.3.2.3 Flood Flows

BOR has evaluated three different flood-producing scenarios for Weber Dam and Reservoir associated with the PMF (USBR 1998). The results (Table 3.3-3) indicate that Weber Dam embankment as it currently exists would begin overtopping at 7 percent of the spring rain-on-snow PMF (inflow volume of approximately 72,380 acre-ft with a peak outflow of almost 21,000 cfs). Instantaneous flows into Weber Reservoir vary considerably, from near zero during low-flow periods to more than several thousand cfs during flood events. Even though the capacity and length of Weber Reservoir is relatively small, the impoundment has the ability to reduce peak discharges below Weber Dam by storing some of the floodwater, and also attenuating the peak by spreading the channelized inflow over the surface area of the Reservoir.Table 3.3-3 Weber Reservoir Probable Maximum Flood (PMF) Peaks (USBR 1998).

Table 3.3-3. Weber Reservoir Probable Maximum Flood (PMF) Peaks (USBR 1998).

Type PMF Event	Peak (cfs)	Volume (acre-ft)	Duration	Percent Storm Event at Threshold of Dam Overtopping
Local Thunderstorm	132,500	86,424	6 hours	24
Spring Rain-on-Snow	247,000	1,034,000	15 days	7
Fall General Storm	295,000	508,000	10 days	7

3.3.2.4 Surface Water Quality

Erosion and Sedimentation. Within the full pool limit of Weber Reservoir, the Reservoir is apparently effective in impounding most fine sediment (sand, silt, and clay). It is estimated that over 3.5 million cubic yards of fine-grained sediment has accumulated behind Weber Dam (Huffman & Carpenter 1999; Anderson Consulting Engineers, Inc. 2001; Resource Concepts, Inc. 1999). Suspended sediment samples collected at various depths within the Reservoir typically show an increase in sediment concentration with depth, as would be expected. Additionally, measured sediment concentrations in the inflow to Weber Reservoir were several times greater than the sediment concentrations in the water released through Weber Dam (Resource Concepts, Inc. 1999). Weber Reservoir also serves to reduce the turbidity of water moving through the Reservoir, and the temperature of water released from the Dam during the summer is typically cooler than inflow water temperature.

The quality of sediments deposited in Weber Reservoir and upstream has been evaluated based on a very limited number of grab samples. Preliminary results indicate that metals have not accumulated within these sediments (Huffman & Carpenter 1999).

General Surface Water Quality. Very little water quality information is available for Weber Reservoir. Since operation of the Reservoir results in a relatively rapid exchange between water flowing into and out of the Reservoir, Reservoir water quality (with the exception of temperature and suspended sediment) can be expected to be similar to the quality of water in the Walker River upstream from the Reservoir. The water quality data used to describe surface water conditions in Weber Reservoir and the Walker River flowing into the Reservoir were summarized from monthly data collected at the Wabuska USGS gage from 1968 to 1995 (Table 3.3-4). This gaging station has been designated as a part of the USGS National Stream Quality Accounting Network. Walker River water entering Weber Reservoir has been deemed suitable for irrigation (USGS 1980).

Table 3.3-4. Ranges of values for selected water quality parameters for the Walker River near Wabuska (USGS Gage No. 10301500).

Parameter	Range	Parameter	Range	Parameter	Range
Temperature (deg C)	0.0-30.0	Total Hardness (CaCO3)	52-210	Chloride (Cl)	3.8-41
Conductance (mmhos/cm)	152-779	Calcium (Ca)	13-59	Sulfate (SO4)	8.4-130
pH (standard units)	6.8-13.2	Magnesium (Mg)	3.1-14	Fluoride (F)	<0.1-1.4
Bicarbonate (HCO3)	85-285	Sodium (Na)	12-97	Total Dissolved Solids (TDS)	98-515
Nitrate (N)	0.02-1.1	Potassium (K)	2.2-7.5	Suspended Sediment	1-1728

Note: All values are dissolved concentrations in mg/L unless otherwise indicated.
Ranges based on data collected approximately monthly from 1968 to 1995.

3.4 Air Quality

Baseline meteorological and air quality conditions at the project site were characterized from on-site data and data records from nearby monitoring stations in western Nevada.

3.4.1 Temperature and Precipitation

Temperature and precipitation data were obtained for three sites in relatively close proximity to the project site as well as available data from a recently installed meteorological data station within Reservation boundaries. Information includes long-term data from three nearby monitoring stations: Fallon (about 35 miles north), Hawthorne (about 30 miles south/southeast), and Yerington (about 20 miles west). All locations are similar in elevation and terrain to the project site and are therefore considered representative of the immediate project area. Table 3.4-1 summarizes the available temperature and precipitation data for each of the three sites, for the periods on record: Fallon (1903 through 2001); Hawthorne (1954 through 2001); and Yerington (1914 through 2001).

In addition, the Tribe recently started collecting meteorological data at its own monitoring station located in Schurz. Data from the Schurz site is available for the first year of data collection; March 1, 2002 through February 28, 2003. A summary of monthly temperatures and total precipitation recorded at this site is provided in Table 3.4-2.

In general, the temperature data indicate large diurnal and seasonal variations, typical of arid and semi-arid regions. The warmest temperatures occur in July and August; while the coldest occur in December and January. Extremes can range from an average high of 95.5 °F in July to an average low of 17.2 °F in December.

The site specific temperature data obtained to date at the Schurz meteorological monitoring site are comparable to the regional data. The maximum temperature of 105.8 °F was recorded in July 2002 and the lowest recorded so far was in February 2003, 8.6 °F.

Precipitation in this region of Nevada is relatively low. The annual average precipitation recorded at the three off-site meteorological stations were similar; all about five inches per year for the recorded data period. According to this data, much of the precipitation falls early in the year, typically by May or June.

The precipitation data obtained to date at the Schurz monitoring station does not really conform to the long-term regional data. However, precipitation in semi-arid and arid areas is highly variable; particularly over short-term periods (less than five years). During the first year of data collection, Schurz recorded about 2.6 inches of rain and most of that occurred in the winter months of November, December, and February. This precipitation pattern is not considered an anomaly or unexpected, and is related to the severe, long-term drought being experienced by much of the western United States. Further, a single year of precipitation data does not provide an adequate assessment of long-term trends. It is expected that, as the Schurz data recording is extended, the precipitation at the site will be comparable to regional data and show annual averages around five inches per year.

Table 3.4-1. Regional Temperature and Precipitation Data

Station	Station Number	Years of Record	Period of Record		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Monthly Temperatures; Maximum and Minimum (°F)																	
Fallon	262780	99	1903-2001	Max	44.2	51.3	58.7	66.0	73.8	83.0	91.9	90.0	80.9	69.2	55.4	45.7	67.5
				Min	17.9	23.1	27.7	33.8	41.2	47.7	53.7	51.2	43.0	33.5	24.7	18.7	34.7
Hawthorne	263512	48	1954-2001	Max	48.2	54.3	61.7	67.5	76.1	85.6	95.5	94.4	85.1	73.3	57.9	50.0	70.8
				Min	23.9	27.7	32.8	37.0	45.7	53.0	60.4	59.3	51.2	41.5	30.5	25.2	40.7
Yerington	269229	88	1914-2001	Max	46.2	52.8	59.5	67.2	74.9	83.6	91.9	90.8	82.9	70.9	57.0	47.6	68.8
				Min	17.2	22.1	26.5	32.1	39.7	46.2	51.6	49.6	41.5	32.6	22.9	17.3	33.3
Mean Monthly Precipitation (Average Total Inches)																	
Fallon	262780	99	1903-2001	Precipitation	0.53	0.55	0.46	0.50	0.62	0.45	0.16	0.22	0.30	0.40	0.37	0.47	5.04
				Snowfall	2.0	1.0	0.9	0.2	0.1	0.0	0.0	0.0	0.0	0.1	0.5	1.2	6.0
Hawthorne	263512	48	1954-2001	Precipitation	0.74	0.55	0.48	0.39	1.05	0.61	0.31	0.18	0.36	0.16	0.35	0.21	5.39
				Snowfall	0.9	0.6	0.3	0.2	0.3	0.0	0.0	0.0	0.0	0.0	1.0	0.2	3.7
Yerington	269229	88	1914-2001	Precipitation	0.59	0.55	0.45	0.41	0.67	0.50	0.24	0.27	0.26	0.36	0.42	0.50	5.22
				Snowfall	2.1	1.3	1.0	0.2	0.1	0.0	0.0	0.0	0.0	0.1	0.9	1.1	6.9

Table 3.4-2. Temperature and Precipitation Data, Meteorological Station at Schurz, Nevada, March 1, 2002 through February 28, 2003.

	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb
Monthly Temperatures; Average, Maximum, and Minimum (°F)												
Average	41.0	52.9	60.1	72.0	79.0	73.4	65.7	48.9	38.3	35.1	38.8	35.1
Max	73.0	81.0	94.6	98.1	105.8	99.7	93.2	78.6	65.5	64.8	68.0	69.3
Min	11.8	24.4	26.6	41.0	51.1	44.1	37.0	17.4	12.4	13.3	18.7	8.6
Monthly Precipitation (Total Inches)												
Total	0.07	0.22	0.56	0.02	0.08	0.13	0.0	0.04	0.74	0.47	0.10	0.23

3.4.2 Winds

The Weber Dam project site is located within the Campbell Valley at an elevation of approximately 4,300 feet above mean sea level. Surrounding mountain ranges are in close proximity, rising several thousand feet above the valley floor. The valley floor is oriented in a northwesterly/southeasterly direction. The local topography features affect winds in this area, which is evident in the Schurz wind data collected to date. The wind data shows predominant northwest flow, which is parallel to the valley floor and predominant local mountain ranges.

A cumulative wind rose, which shows direction and speed, generated for the wind data collected at the Schurz monitoring site during the first year of data collection is provided as Figure 3.4-1. These data show the directions from which the wind blows. Wind direction, as noted, is predominantly from the northwest, with an average speed of about 5 miles/hour. Maximum winds are typically less than 7.0 m/s or about 16 mi/hr.

3.4.3 Air Quality

Air quality issues center on the major criteria pollutants regulated by the US Environmental Protection Agency (EPA). The six major criteria pollutants include nitrogen oxides (NO_x), ozone (O_3), lead (Pb), sulfur dioxide (SO_2), carbon monoxide (CO), and particulate matter (typically as PM-10 and/or PM-2.5). A variety of sources, both natural and anthropogenic, contribute to air pollution. Some of the sources include stationary sources (factories, power plants, smelters, mines, and residential wood burning), mobile sources (cars, trucks, buses, trains, and planes), and natural sources (wildfires and windblown dust).

The proposed project site is located within a rural, fairly unpopulated area with few residences and little to no traffic. A modeling study was conducted by the Tribe to determine the impacts of stationary sources within 60 kilometers of Reservation lands. The air dispersion modeling study (August 2002) was centered on potential impacts from industrial sources near the Reservation. Air dispersion modeling evaluated NO_x, SO_2, CO, and PM-10. A total of 21 stationary sources were considered in the study; all sources within 20 km of the Reservation boundary were included. All sources 21 to 60 km from tribal boundaries with at least one major pollutant emission of 50 tons per year were also included. Data regarding each source was obtained from Nevada Division of Environmental Protection (NDEP).

The results of the air dispersion modeling study determined that off-site industrial sources have little impact on the Walker River tribal lands as compared to National Ambient Air Quality Standards (NAAQS). Table 3.4-3 provides a summary of both the maximum concentrations for each averaging period considered and the concentration estimated for Schurz as well as the applicable NAAQS. A review of on-Reservation activities indicates that the most likely criteria pollutant of concern is PM-10, due to wood and garbage burning and fugitive dust emissions from vehicular traffic on unpaved roads.

Figure 3.4-1. Wind Rose for Data Collected at Schurz Monitoring Site.

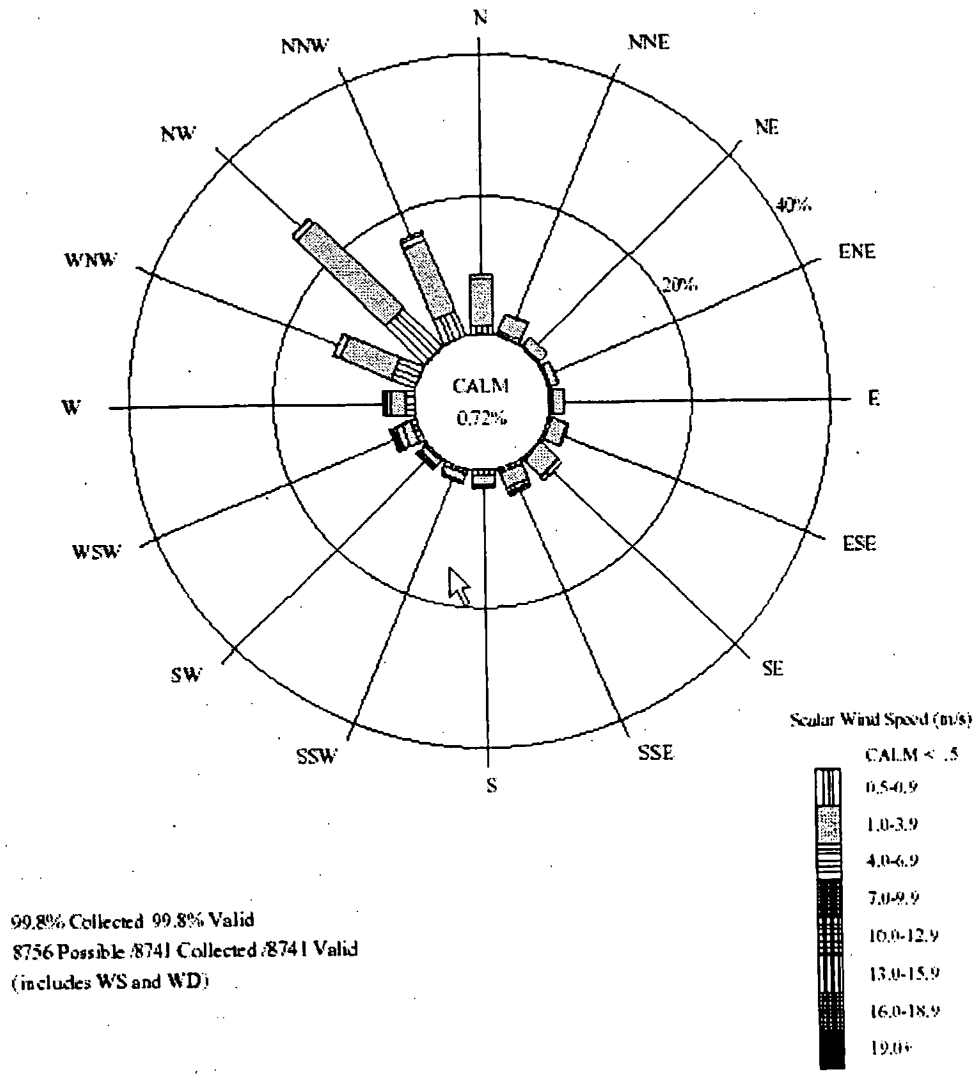


Table 3.4-3. Air Dispersion Modeling Results, Off-Site Industrial Source Impacts on the Walker River Paiute Tribal Lands.

Pollutant	Averaging Period	Maximum Concentration ($\mu g/m^3$)	Concentration at Schurz ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
NOx	Annual	8.0	<1.5	100
SO2	3-hour	200	25	1,300*
	24-hour	50	6	365
	Annual	10	1	80
CO	1-hour	80	40	40,000
	8-hour	25	5	10,000
PM-10	24-hour	6	1.0	150
	Annual	1	<0.5	50

*Note: A primary NAAQS does not exist for this averaging period, therefore the secondary NAAQS was utilized.

NDEP maintains information regarding ambient air quality monitoring and publishes periodic trend reports, the most recent of which provides information for the period 1989 through 2000. The nearest site with PM-10 monitoring is Fallon, Nevada. The Fallon data are presented as representative of PM-10 baseline conditions for the project area. However, the Fallon data are considered conservative due to the fact that it is a more populated area.

Measured concentrations at the Fallon station are for the period May 1993 through June 1998. These data are summarized in Table 3.4-4. The maximum concentration recorded was 111 $\mu g/m^3$ measured in 1993. Compliance with NAAQS is determined by comparing the second highest 24-hour average concentration to the NAAQS standard (150 $\mu g/m^3$). The annual mean NAAQS is 50 $\mu g/m^3$. No exceedances of either the annual or 24-hour averaging periods were recorded during the entire monitoring period at the Fallon site.

Table 3.4-4. PM-10 Monitoring Data, Fallon, Nevada, May 1993 through June 1998.

Year	No. of Samples	1st Highest 24-hour Average ($\mu g/m^3$)	2nd Highest 24-hour Average ($\mu g/m^3$)	Arithmetic Mean ($\mu g/m^3$)	24-hour Exceedances
1993*	35	111	103	40	0
1994	45	66	62	27	0
1995	47	74	60	28	0
1996	54	102	61	25	0
1997	53	53	53	26	0
1998**	25	79	47	19	0

* Data for May through December.
** Data for January through June.

Table 3.3-2. Annual Walker River discharge near Wabuska (USGS Gage No. 10301500).

Calendar Year	Discharge Volume (AF)	Calendar Year	Discharge Volume (AF)	Calendar Year	Discharge Volume (AF)	Calendar Year	Discharge Volume (AF)
1902	12,981	1941	186,159	1962	43,408	1983	601,218
1903	121,261	1942	241,174	1963	176,932	1984	218,120
1904	308,503	1943	232,276	1964	43,506	1985	72,159
1920	54,545	1944	72,605	1965	158,279	1986	310,804
1921	68,225	1945	338,394	1966	71,676	1987	46,740
1922	266,301	1946	170,973	1967	252,248	1988	23,674
1923	137,393	1947	66,633	1968	75,933	1989	26,474
1924	20,773	1948	27,952	1969	417,903	1990	18,743
1925	27,420	1949	37,847	1970	123,771	1991	18,884
1926	29,010	1950	87,142	1971	99,612	1992	19,037
1927	107,447	1951	104,795	1972	59,341	1993	33,302
1928	35,361	1952	383,702	1973	109,605	1994	20,608
1929	17,996	1953	110,890	1974	122,450	1995	283,958
1930	14,824	1954	40,945	1975	161,738	1996	217,000
1931	6,664	1955	44,906	1976	34,673	1997	344,438
1932	64,673	1956	277,910	1977	15,828	1998	271,367
1933	35,800	1957	80,420	1978	40,484	1999	147,404
1934	17,774	1958	241,335	1979	99,310	2000	41,560
1935	44,259	1959	45,150	1980	257,280	2001	27,899
1939	57,535	1960	25,018	1981	48,768	2002	22,988
1940	65,502	1961	22,438	1982	354,413		

3.3.2.3 Flood Flows

BOR has evaluated three different flood-producing scenarios for Weber Dam and Reservoir associated with the PMF (USBR 1998). The results (Table 3.3-3) indicate that Weber Dam embankment as it currently exists would begin overtopping at 7 percent of the spring rain-on-snow PMF (inflow volume of approximately 72,380 acre-ft with a peak outflow of almost 21,000 cfs). Instantaneous flows into Weber Reservoir vary considerably, from near zero during low-flow periods to more than several thousand cfs during flood events. Even though the capacity and length of Weber Reservoir is relatively small, the impoundment has the ability to reduce peak discharges below Weber Dam by storing some of the floodwater, and also attenuating the peak by spreading the channelized inflow over the surface area of the Reservoir.Table 3.3-3 Weber Reservoir Probable Maximum Flood (PMF) Peaks (USBR 1998).

3.5 Biological Resources

This section provides baseline information on biological resources in the study area.

3.5.1 Fish

Weber Reservoir area and volume fluctuates annually as water is stored and released downstream for irrigation with the lowest volumes and water surface acreage occurring in late summer and early fall. Weber Reservoir experienced fish kills due to high water temperatures and low dissolved oxygen levels as a result of low water levels in 2000 and 2001. At extremely low levels, Weber Reservoir is not capable of maintaining even resilient warmwater fish species as evidenced by the large fish kill that occurred during August 2000.

The Reservoir is not stocked. The Reservoir fish population is supported by warmwater fish moving in from Walker River. Numerous ponds containing warmwater gamefish communities exist upstream in Mason Valley. Many of these ponds are connected to the Walker River without fish barriers and thus provide a source of these species into the river and Reservoir.

The fish community in Weber Reservoir is composed of nonnative, warmwater fish species, such as brown bullhead (*Ameiurus nebulosus*), channel catfish (*Ictalurus punctatus*), common carp (*Cyprinus carpio*), largemouth bass (*Micropterus salmoides*) and white crappie (*Pomoxis annularis*) (Miller et al. 2001) (Table 3.5-1). Prior to the fish kill that occurred in 2000, white crappie was the predominant game species in the Reservoir. Miller et al. (2001), captured individuals as large as 303 mm (12 inches), although local anglers have reported larger specimens. The Nevada state record for this species was caught in Weber Reservoir in 2000. A detailed description of the aquatic community in Weber Reservoir is presented in Miller et al. (2001).

The Walker River upstream of and downstream from Weber Reservoir contains a warmwater fish community consisting of bluegill (*Lepomis macrochirus*), brown bullhead, channel catfish, common carp, largemouth bass, western mosquitofish and white crappie (Miller et al. 2001). During spring high flows, LCT migrate from Walker Lake into the river as far upstream as Weber Dam (Walker River Tribe observations. Channel catfish up to 530 mm (20.9 inch) and 1850 gram (4 lb) were captured during fish sampling (Miller et al. 2001). Riverine populations of largemouth bass and white crappie are dominated by small individuals with very few specimens larger than 200 mm (7.9 inches). All of these species are found in the Walker River upstream of the Reservation boundary. Those populations are the source of fish in Reservation waters. Common carp was the most common fish captured downstream from Weber Reservoir, accounting for 31-35% of the total fish collected (Miller et al. 2001).

Table 3.5-1. Fish species collected during sampling on Walker River and Weber Reservoir.

Common Name	Scientific Name	Native species	Trophic Status
Bluegill	*Lepomis macrochirus*	No	Omnivore
Brown bullhead	*Ameiurus nebulosus*	No	Omnivore
Channel catfish	*Ictalurus punctatus*	No	Omnivore
Common carp	*Cyprinus carpio*	No	Omnivore
Largemouth bass	*Micropterus salmoides*	No	Predator
Western mosquitofish	*Gambusia affinis*	No	Omnivore
White crappie	*Pomoxis annularis*	No	Predator

Sources for trophic status: Harrington and Harrington 1961, Eder and Carlson 1977, Sublette et al. 1990, Brooks et al. 2000.

Physical conditions in the river are currently suitable only for warmwater fish species. Weber Reservoir acts as a buffer to high water temperatures during the summer months. In 1999, water temperatures were approximately 10°C lower downstream from Weber Reservoir compared to upstream. Weber Reservoir's outlet structure releases water from the bottom of the Reservoir, which is cooler than the Reservoir inflow during the summer months.

The combination of lack of river flow and climatic conditions result in summer water temperatures throughout the mainstem Walker River are lethal to trout species, including LCT. LCT could use the river in cooler months. Water temperatures recorded at the Wabuska gage from April to September during a normal water year (1979) ranged from 17.5° to 27.0°C. During the 1999 monitoring, water temperatures reached as high as 35°C. The historical and recent temperature data document that conditions in the Walker River downstream from the confluence of the East and West Walker rivers and upstream of Weber Reservoir are lethal to LCT in the summer (See Section 3.5.4.2). Data collected on August 26, 1999 throughout the Walker River basin shows water temperatures at or above 20°C at most locations, including the upper East and West Walker rivers (Miller et al. 2001).

The most abundant habitat at each site was glide habitat (i.e., river channel with moderate current and smooth water surface). Lateral scour pools were found in all three reaches and were the only type of pool habitat that was recorded. Table 3.5-2 provides a comparison of specific habitat features among sites. While glide habitat dominated at all sites, the best habitat diversity is downstream from Weber Dam.

Table 3.5-2. Summary of habitat characteristics of the Walker River, Nevada. (Source: Miller et al. 2001)

Site	Total Length (ft)	Pool			Riffle			Glide		
		% of Tot. Hab.	Avg. Depth (ft)	Max. Depth (ft)	% of Tot. Hab.	Avg. Depth (ft)	Max. Depth (ft)	% of Tot. Hab.	Avg. Depth (ft)	Max. Depth (ft)
Downstream from Weber Dam	5204	13.4	2.7	>5.0	10.4	1.1	3.5	76.2	2.1	4.5
Upstream of Weber Reservoir	4270	6.9	2.8	>4.5	0.0	0	0	93.1	2.3	>4.5

3.5.2 Wildlife

3.5.2.1 Wildlife Habitats

The Weber Dam study area supports upland brush, riparian forest and shrub, marsh, open water, disturbed land, and rock outcrops/cliffs wildlife habitats. Detailed descriptions of the vegetation species present on the site are presented under Vegetation, Section 3.5.3. General descriptions, as they relate to the wildlife habitat types, are presented here.

Upland Brush. The upland brush habitat is the dominant vegetation type in the vicinity and it begins within close proximity of the Reservoir as elevation rises from the Reservoir and river. It is characterized by stabilized sand dunes near the Reservoir. These turn to harder surfaces and rock farther from the site, as elevation increases. The habitat is dominated by greasewood, saltbush and hops-sage, with a sparse herbaceous undergrowth. Ground cover is often less than 50 percent.

This habitat type supports mammal species such as black-tailed jackrabbit (*Lepus californicus*) and coyote (*Canis latrans*), bird species such as sage sparrow (*Amphispiza belli*) and sage thrasher (*Oreoscoptes montanus*), and reptiles such as horned toad (*Phrynosoma platyrhinos*) and sagebrush lizard (*Sceloporus graciosus*).

Riparian Forest and Shrub. A ribbon of riparian forest and shrub habitat rims the Reservoir in a narrow band ranging in width from 2 to 40 feet. The habitat includes scattered cottonwood trees as well as willows and tamarisk. In some segments, bare sand separates the riparian forest from the open water of the Reservoir, as a result of fluctuating water levels.

Riparian habitat is much denser as it forms a corridor adjacent to the Walker River. Width of this habitat ranges from 50 to 200 ft. It supports a large number of mature cottonwood trees as well as willows and tamarisk and an understory of saltgrass, curly dock, and horsetails. This habitat is rich in wildlife species due to the attraction of the water and the varied vegetative strata. Mammal species expected in the area include beaver (*Castor canadensis*), striped skunk (*Mephitis mephitis*), desert cottontail (*Sylvilagus audubonii*), long-tailed vole

(*Microtus longicaudus*), common muskrat (*Ondatra zibethicus*), and raccoon (*Procyon lotor*). Avian species include yellow warbler (*Dendroica petechia*), black-billed magpie (*Pica hudsonia*), house wren (*Troglodytes aedon*), and northern oriole (*Icterus galbula*).

Marsh. There are two areas with marsh habitats on the project area. The first surrounds a pond formed by seepage below the Dam. The pond contains emergent vegetation with reeds and willows. Marsh habitat is also present along the north end of the Reservoir. The marsh habitat is due to the gradual lowering of the water level in the Reservoir.

Wildlife species expected in this habitat include a wide range of wading birds such as great blue heron (*Ardea herodias*), sanderling (*Calidris alba*), and sandpipers (*Calidris spp.*).

Open Water. The Reservoir forms a large expanse of open water, covering up to 900 acres. Actual surface area is considerably less, however. For example, in the fall of 1992, BOR (1994) reported the Reservoir covered approximately 180 acres. There is also open water in the small seep pond south of the Dam and in the Walker River.

This habitat type is especially rich in waterfowl. Common species include mallard (*Anas platyrhynchos*), Canada goose (*Branta canadensis*), and blue-winged teal (*Anas discors*).

Disturbed Land. Disturbed areas are located in heavy use areas next to the Reservoir and south of the Dam as well as in previous construction staging areas and a portion of the proposed borrow area. These areas support sparse vegetation that is primarily weedy species such as halogeton and Canada thistle. This habitat is typically patchy and small in acreage. Consequently, wildlife tends to be species from adjacent habitats that wander onto the disturbed area during foraging.

Rock Outcrop/Cliffs. Bluffs rising parallel to the river drainage form cliff and rock outcrop habitat. Most extensive are cliffs that rise east of the river, above the riparian forest habitat. Actual rock face is not extensive, typically rising only 5 to 10 ft. Most of the bluffs are comprised of hardpack dirt instead. Such is the case on a 150-ft. span of bluff rising approximately 30 feet immediately above and adjacent to the western bank of the Reservoir. Rock outcrop is also present above the borrow area, located west of the Reservoir. The terrain in that area is steep, as the hillside rises towards the Wassuk Range.

3.5.2.2 Migratory Birds

The Migratory Bird Treaty Act, 16 U.S.C. § 703 (MBTA) makes it illegal for anyone to take, possess, import, export, transport, sell, purchase, barter, or offer for sale, purchase, or barter, any migratory bird, or the parts, nests, or eggs of such a bird except under the terms of a valid permit issued pursuant to federal regulations.

Migratory birds of particular concern on the site are nesting raptor species. During site surveys in May 2001, the project area and a half-mile buffer zone in the vicinity were searched for raptor nest sites. Additional surveys for nests were conducted in February 2002 when the lack of leaf foliage allowed easier viewing of the cottonwood trees along the river. During the spring survey, one stick nest was found in a cottonwood tree approximately 0.5

mile south of the Dam and adjacent to the river. The nest was inactive at the time of the survey on May 2 and 3, 2001.

Four raptor species were observed on the project site during spring 2001 surveys: Swainson's hawk (*Buteo swainsoni*), red-tail hawk (*Buteo jamaicensis*), prairie falcon (*Falco mexicanus*), and American kestrel (*Falco sparverius*). All were observed either flying over the area or roosting in trees. None exhibited defensive behavior, indicating they were foraging in the area rather than nesting.

During the winter survey in February 2002, five raptor species were observed on the project area: bald eagle, golden eagle (*Aquila chrysaetos*), rough-legged hawk (*Buteo lagopus*), red-tailed hawk, and northern harrier (*Circus cyaneus*). Six golden eagles were observed while only one of each of the other species was sighted.

3.5.2.3 General Wildlife Species

Due to the scarcity of water in the region, the project area provides important habitat for a wide range of wildlife species. The Reservoir, river, and seep pond act as attractants to a wide range and high number of wildlife species. This is evidenced by the large numbers and diversity of wildlife observed during surveys conducted by Real West Natural Resources Consulting (Real West) in May 2001 and February 2002.

During these surveys 59 wildlife species were observed on the site, including four mammal, 51 bird, and four reptile species (Table 3.5-3). Also included in Table 3.5-3 are additional species, including three mammals, eight birds, and three reptiles, that were reported during surveys conducted by the BOR (USBR 1994) but not observed during the recent surveys. Additional species, especially small mammals such as deer mice (*Peromyscus maniculatus*) and voles (*Microtus* spp.), likely inhabit the area but were not observed.

During the 2001-2002 surveys, four mammal species were observed on the project area. Coyote was the most abundant mammal species. A group of five and an individual coyote were observed along the edge of the Reservoir during the February 2002 survey.

Fifty-one different bird species were observed on the project area during 2001-2002 surveys and an additional nine species were reported in previous surveys of the area (USBR 1994). Additional bird species would be anticipated, especially during spring and fall migrations.

Four species of reptiles were observed during May 2001 surveys. The majority of reptiles were observed on the Dam itself where the lizards inhabit the riprap and large boulders on the slopes of the structure. Three additional reptile species - the collared lizard, Great Basin whiptail, and Great Basin gopher snake - were observed during BOR surveys (USBR 1994).

Table 3.5-3. Observed and expected wildlife species at the Weber Dam Project Site.

Common Name	Scientific Name	Observed[1]
Mammals		
Black-tailed jackrabbit	*Lepus californicus*	X
Nuttall's cottontail	*Sylvilagus nuttallii*	
Desert cottontail	*Sylvilagus audubonii*	X
White-tailed antelope squirrel	*Ammospermophilus leucurus*	
Striped skunk	*Mephitis mephitis*	
Common muskrat	*Ondatra zibethicus*	
Racoon	*Procyon lotor*	
Long-tailed vole	*Microtus longicaudus*	
Beaver	*Castor canadensis*	X
Coyote	*Canis latrans*	X
Kit fox	*Vulpes macrotis*	
Birds		
Common loon	*Gavia immer*	X
Western grebe	*Aechmophorus occidentalis*	X
Horned grebe	*Podiceps auritus*	X
American white pelican	*Pelecanus erythrorhynchos*	X
Black-crowned night heron	*Nycticorax nycticorax*	X
Black-necked stilt	*Himantopus mexicanus*	X
Great blue heron	*Ardea herodias*	X
White-faced ibis	*Plegadis chihi*	X
Sanderling	*Calidris alba*	X
Sandpiper	*Calidris spp.*	X
California gull	*Larus californicus*	X
Canada goose	*Branta canadensis*	X
Pintail duck	*Anas acuta*	X
Ruddy duck	*Oxyura jamaicensis*	X
Mallard	*Anas platyrhynchos*	X
Redhead	*Aythya americana*	X
Wood duck	*Aix sponsa*	X
Common goldeneye	*Bucephala clangula*	X
Lesser scaup	*Aythya affinis*	X
Gadwall	*Anas strepera*	X
Blue-winged teal	*Anas discors*	X
Cinnamon teal	*Anas cyanoptera*	X
American coot	*Fulica americana*	X
California quail	*Callipepla californica*	X
Common raven	*Corvus corax*	
Turkey vulture	*Cathartes aura*	X
Bald eagle	*Haliaeetus leucocephalus*	X (T[2])
Golden eagle	*Aquila chrysaetos*	X
Swainson's hawk	*Buteo swainsoni*	X
Red-tail hawk	*Buteo jamaicensis*	X
Rough-legged hawk	*Buteo lagopus*	X
Prairie falcon	*Falco mexicanus*	X
Northern harrier	*Circus cyaneus*	X

Table 3.5-3 (continued). Observed and expected wildlife species at the Weber Dam Project Site.

American kestrel	*Falco sparverius*	X
Common nighthawk	*Chordeiles minor*	
Say's phoebe	*Sayornis saya*	X
Horned lark	*Eremophila alpestris*	
American robin	*Turuis migratorius*	X
Brewer's blackbird	*Euphagus cyanocephalus*	X
Yellow-headed blackbird	*Xanthocephalus xanthocephalus*	
Red-winged blackbird	*Agelaius phoeniceus*	
Mourning dove	*Zenaida macroura*	X
Bank swallow	*Riparia riparia*	
Northern rough-winged swallow	*Stelgidopteryx serripennis*	
Barn swallow	*Hirundo rustica*	X
Violet-green swallow	*Tachycineata thalassina*	X
Black-billed magpie	*Pica hudsonia*	X
American crow	*Corvus brachyrhynchos*	X
Common flicker	*Colaptes auratus*	X
Northern oriole	*Icterus galbula*	X
Black-headed grosbeak	*Pheucticus melanocephalus*	
Western kingbird	*Tyrannus verticalis*	X
House wren	*Troglodytes aedon*	X
Rock wren	*Salpinctes obsoletus*	X
Yellow warbler	*Dendroica petechia*	X
Song sparrow	*Melospiza melodia*	X
MacGillivray's warbler	*Oporornis tolmiei*	X
White-crowned sparrow	*Zonotrichia leucophrys*	X
Black-throated sparrow	*Amphispiza bilineata*	
Sage sparrow	*Amphispiza belli*	X
Reptiles		
Desert horned lizard	*Phrynosoma platyrhinos*	X
Zebra-tailed lizard	*Callisaurus draconoides*	X
Greater earless lizard	*Cophosaurus texanus*	X
Sagebrush lizard	*Sceloporus graciosus*	X
Collard lizard	*Crotaphytus collaris*	
Great Basin whiptail	*Cnemidophorus tigris*	
Great Basin gopher snake	*Pituophis melanoleucus*	

[1]Species observed during field surveys by Real West Natural Resource Consulting on May 2 and 3, 2001 and Feb. 1 and 2, 2002
[2]T = Federally listed as threatened.

3.5.3 Vegetation Resources

Vegetation in the project area is composed primarily of upland rangelands, with minor components being bottomland rangeland, and riparian and wetland vegetation communities. The range lands to be disturbed by the project include desert scrub-shrub vegetation communities. Predominate plant species found within this area include Indian ricegrass, desert needlegrass, bottlebrush squirreltail, Galletta, needlegrass, pine bluegrass, shadscale, Bailey greasewood, bud sagebrush, Nevada ephedra, winterfat, Wyoming big sagebrush, spiny hopsage, King desertgrass, Anderson wolfberry, littleleaf horsebrush, burrobrush, Nevada dalea, Cooper wolfberry, rubber rabbitbrush, four-wing saltbrush, desert pine bluegrass, sandberg bluegrass, basin wildrye, black sagebrush, western wheatgrass, slender wheatgrass, inland saltgrass, alkali sacaton, sedges, alkali muhly, Torrey quailbush, and Fremont cottonwood. A majority of the areas to be disturbed (approximately 20 acres) represent upland rangeland with nominal annual herbaceous biomass production.

Wetland plant communities have been identified within the river channel and the associated riparian zone above and below the Weber Dam and Reservoir complex. The extreme fluctuations in the water level on an annual and seasonal basis have a significant affect on wetlands in and around the Reservoir itself. Most of the wetland areas are located within operational confines of the Reservoir. At capacity much of the peripheral wetland vegetation would be submerged and subsequently drowned out if water levels were maintained for a significant period. Alternatively, drawdown can be extreme, leaving previously inundated or sub-irrigated areas high and dry. The duration and timing of these events can affect species composition and distribution of vegetation over both the short-term and long-term with wetland communities in these areas being in a constant state of flux. Wetlands identified within this area had varying species composition with hydrophyllic grasses and a few willows dominating the ephemerally wet sites and bulrush dominating the perennially inundated wetland sites. All wetlands observed within the construction disturbance area are classified as palustrine emergent.

Downstream from Weber Dam the river channel is shallow and varies from 50-200 feet wide. Water depths varied from a few inches to no more than a few feet at the time of survey. Seasonal flow fluctuates considerably; most of the time there is very little flow below the Dam as most of the water is being diverted for irrigation purposes. Approximately 0.14 acres of wetlands were delineated around the foot of the Dam, being located within and around the proposed disturbance area associated with realignment of this structure. These wetlands are classified as palustrine emergent. Wetlands below the spillway are confined to shallow pools within the river channel and a narrow zone along the typically steep-sided banks. Hydrologic wetland conditions are created primarily by flows contained within the river channel. These areas are generally within the defined channel of the river or below the T1 terrace. The transition between upland and wetland areas is abrupt. Rush (*Juncus balticus*) is common in transitional areas. Dominant vegetation in wetland areas includes soft stem bulrush (*Schoenoplectus validus*), rabbitfoot grass (*Polypogon monospliensis*), and cattail (*Typha lattifolia*) (Table 3.5-4).

Table 3.5-4. Wetland Plant Species Observed Within Proposed Dam Realignment Disturbance Area.

Site	Common Name	Scientific Name
Transitional upland	Baltic rush	*Juncus balticus*
Transitional upland	Yellow Sweet clover	*melilotus officionalis*
Wetland	Willowherb	*Epilobium sp.*
Wetland	Buttercup	*Ranunculus sp.*
Wetland	Olney three square	*Scirpus americanus*
Wetland	Soft-stem bulrush	*Schoenoplectus validus*
Wetland	Rabbit foot grass	*Polypogon monospliensis*
Wetland	Broad-leaf cattail	*Typha lattifolia*

3.5.4 Threatened and Endangered Species

The U.S. Fish and Wildlife Service (FWS) was contacted for information on federally listed threatened and endangered (T&E) species potentially occurring in the project area. The USFWS responded in a letter dated June 18, 2001, by providing a list of species to be considered with the project. This list was updated in letters dated November 12, 2002 and March 15, 2004. In all responses, the only T&E species potentially occurring in the area are the bald eagle (*Haliaeetus leucocephalus*) and Lahontan cutthroat trout (*Oncorhyncus clarki henshawii*).

Bald eagle was first classified as endangered by the Federal government in 1978 (43FR Section 6233). It was later downlisted to threatened in 1995 (USFWS 1995a, 60FR133). LCT were first listed as endangered in 1970 (FR35 Page 13520) and reclassified as threatened in 1975 (FR40 Page 29864).

The Nevada Natural Heritage Program (NNHP) database was accessed to obtain any records of T&E species previously observed in the project area. NNHP personnel reported the database contained no records of T&E species in the vicinity of the Weber Dam project area. The area searched for records included all 36 Sections in Township 14N and Range 28E.

3.5.4.1 Bald Eagle

Bald eagles were reported to overwinter in the Walker River riparian corridor downstream from Weber Dam in large cottonwood trees (Miller Ecological Consultants, Inc. 2002). Primary bald eagle wintering areas are typically associated with concentrations of food sources along major rivers that remain unfrozen where fish and waterfowl are available, and near ungulate winter ranges that provide carrion (Steenhof et al. 1980). Wintering bald eagles are also known to roost in forests with large, open conifers and snags protected from winds by ridges, often near concentrations of domestic sheep and big game (Anderson and Patterson 1988).

Real West conducted surveys for roosting bald eagles on Feb. 1 and 2, 2002. During those surveys, a single bald eagle was observed on the site, north of the Dam and adjacent to the

Reservoir. It was perched in a large cottonwood tree, located approximately halfway between the Dam and the north end of the Reservoir. The bald eagle was observed only once during the two-day survey, indicating it was a temporary roost site. The observation of only one bald eagle, present in the area for only a short period, indicates the area is used by bald eagles for foraging and temporary roosting, but there is no evidence of a traditional roosting site on the project area.

3.5.4.2 Lahontan Cutthroat Trout

Historically, LCT were found in a wide variety of cold-water habitats: large terminal alkaline lakes (e.g., Pyramid and Walker Lakes); oligotrophic alpine lakes (e.g., Lake Tahoe and Independence Lake); slow meandering low-gradient rivers (e.g., Humboldt River); moderate-gradient montane rivers (e.g., Carson, Truckee, Walker, and Marys Rivers); and small headwater tributary streams (e.g., Donner and Prosser Creeks). No reproducing or resident populations of LCT are found in the project area.

The earliest settlers and emigrants to this region of Nevada documented that Walker Lake and the Walker River system contained large numbers of native trout. Annual runs of LCT ascended the Walker River in early spring and if water flow conditions were adequate, migrated into the headwater region of the West and East Walker Rivers (Gold Hill News, 1874). During the early 1860's, major irrigation projects were implemented in Mason and Smith Valleys with numerous diversion ditches and dams constructed (Walker River Chronology, 1996). Habitat modifications to the Walker River and its two major forks have persisted annually since that time. Irrigation diversions along all reaches of the river system and channelization, primarily for flood control, have decreased the potential of the main Walker River and greatly reduced the potential of the East and West Walker rivers to produce and sustain trout populations.

To supplement the native trout in the western Nevada rivers, hundreds of thousands of rainbow trout, brook trout, salmon, whitefish, carp, catfish, bass and perch were stocked during the late 1800's. Nevada identified the need to augment trout populations referred to then as "black spotted trout", in the three river systems of western Nevada in the early 1900's (G.T. Mills, 1909). During 1910, 1,347,151 black spotted trout were stocked throughout northern Nevada waters. The source of the eggs for these stockings was the Truckee River (G.T. Mills, 1911) where fish traps were constructed just east of Reno.

From 1911 through 1925, approximately 1,006,000 black spotted trout were stocked into Walker Lake, main Walker River and the East and West Walker Rivers. These stockings of wild stock LCT contributed greatly to the fishery in Walker Lake and Walker rivers for years after the upper river habitat and stream flows had been greatly altered and the natural reproduction potential severely lessened. For the period 1926 until 1946, no additional LCT were stocked into Walker Lake (Biennial Reports of the State Fish and Game Commission, 1927-28 to 1946-48) resulting in the loss of this fishery. Since 1946, annual stockings of LCT into Walker Lake have restored and maintained the lake's fishery.

Generally, riverine LCT inhabit small streams characterized by cool water, pools in close proximity to cover and velocity breaks, well vegetated and stable river banks, and relatively silt free, rocky substrate in riffle-run areas. Fluvial LCT generally prefer rocky areas, riffles, deep pools, and habitats near overhanging logs, shrubs, or banks (McAfee 1966; Sigler and Sigler 1987).

LCT inhabiting small tributary streams within the Humboldt River basin can tolerate temperatures exceeding 27°C (80°F) for short periods of time and daily fluctuations of 14° to 20°C (25 to 35°F) (Coffin 1983; French and Curran 1991). Intermittent tributary streams are occasionally utilized as spawning sites by LCT, and fry develop until flushed into the main stream during higher runoff (Coffin 1981; Trotter 1987).

Typical of cutthroat trout subspecies, LCT is an obligatory stream spawner. Spawning occurs from April through July, depending on stream flow, elevation, and water temperature (Calhoun 1942; La Rivers 1962; McAfee 1966; Lea 1968; Moyle 1976). Females mature at three to four years of age, and males at two to three years of age. Consecutive-year spawning by individuals is uncommon. King (1982) noted repeat rates of 3.2 and 1.6 percent for LCT spawners returning in subsequent migrations one to two years later. Cowan (1982) noted post-spawning mortality of 60 to 70 percent for females and 85 to 90 percent for males, and spawner repeat rates of 50 and 25 percent for surviving females and male spawners, respectively. Others (Calhoun 1942; Lea 1968; Sigler et al. 1983) observed that most repeat spawners return after two or more years.

Lake residents migrate up tributaries to spawn in riffles or tail ends of pools. Spawning behavior of LCT is similar to other stream-spawning trout. They pair up, display courtship, lay eggs in redds dug by females, and chase intruders away from the nest. LCT generally spawn in riffle areas over gravel substrate.

LCT spawning migrations have been observed in water temperature ranging from 5°C to 16°C (41 to 61°F) (Lea 1968; USFWS 1977; Sigler et al. 1983; Cowan 1983) during April through June. LCT eggs generally hatch in four to six weeks, depending on water temperature, and fry emerge 13 to 23 days later (Calhoun 1942; Lea 1968; Rankel 1976). Progeny of Summit Lake LCT spawners generally begin moving out of spawning tributaries shortly after emergence (Cowan 1991). Fry movement is density-dependent and correlated with fall and winter freshets (Johnson et al. 1983). Some fluvial-adapted fish remain for one or two years in nursery streams before emigrating in the spring (Rankel 1976; Johnson et al. 1983; Coffin 1983).

The Walker River both upstream of and downstream from Weber Reservoir is a low gradient stream with a low pool to riffle ratio. The substrate is composed of primarily fines and sand, making the riparian area highly erodible. The absence of large canopy cover likely contributes to high summer water temperatures. Stream flow varies considerably depending upon time of year and location. The Walker River discharge pattern is influenced by two dams (Bridgeport and Topaz) near its headwaters and direct flow diversions for irrigation. Except during periods of above normal snow pack and above normal reservoir storage, river flows mainly serve adjudicated water rights. During normal water years, summer flows upstream of the Yerington Weir fluctuate between 100 to 200 cfs and downstream from the Weir, flows are generally below 60 cfs. It is not uncommon to record river flows below the Weir of 5 cfs - 25 cfs in late summer (Water Resources Data For Nevada).

Because of the lack of river flow and the degraded nature of the river, summer water temperatures throughout the Walker River prohibit the survival of trout species. Water temperatures recorded at the Wabuska Gage (April - September) during a normal water year (1979) ranged from 17.5° to 27.0°C (63° to 79°F) (Water Resources Data for Nevada, Water Year, 1979). Water temperatures reached 35°C in 1999 (Miller et al. 2001).

Temperatures suitable for LCT survival likely exist in the river until late May and possibly further into the summer season with cool water releases from Weber Dam. River temperatures, however, are too high for incubation of LCT eggs. Water temperatures for successful incubation would need to be less than 13°C. Water temperatures in Walker River upstream of Weber Dam exceed lethal temperatures for LCT by late May (Miller et al. 2001). It is unlikely that the current situation at Weber Dam with the interim operating criteria would allow sufficient water to maintain cool water releases out of the Reservoir. It is likely that water temperatures would exceed lethal limits even for adult LCT by early summer. The potential use of the lower Walker River downstream from Weber Dam by LCT depends on several factors. The first factor is sufficient flow for migration from Walker Lake. Currently, LCT have been documented migrating up to the base of Weber Dam during the spring of high runoff years (Walker River Tribe observations). It is likely that during many years insufficient flow would exist in the mainstem Walker River to allow LCT to migrate.

There are many species of warm water fish inhabiting the lower 30 miles of Walker River that can be competitors with LCT. Game fish species include channel catfish, black and brown bullheads, Sacramento perch, green and bluegill sunfish, white crappie and largemouth bass. Other species reported include carp, tui chub, Tahoe and Lahontan mountain sucker, redside shiner and speckled dace. Periodically during large discharges in the spring, LCT have been observed in the river downstream from Weber Dam.

There currently is no fish passage facility at Weber Dam or any of the many other diversions on the Walker River or East and West Forks Walker River upstream of Weber Dam. The major upstream diversions and dams were constructed between 1920 and 1923 and have blocked upstream passage since that time. The Yerington Weir, approximately 15 miles upstream of Weber Reservoir was constructed in 1920 and likely blocked upstream passage since its completion. Water temperatures and stream habitat downstream from this structure are not suitable for LCT spawning and rearing.

3.5.4.3 Species of Concern

Species of Concern do not fall under the jurisdiction of the Endangered Species Act but there is evidence from state and federal agencies as well as private sources that such species may be at risk. By considering these species and exploring management alternatives early in the planning process, it may be possible to provide long-term conservation benefits for these species and avoid the need in the future to list such species as threatened or endangered.

Wildlife Species of Concern identified by FWS as potentially occurring in the project area are listed in Table 3.5-5. The table also includes the preferred habitat for each species and the potential for their occurrence on the project area.

Table 3.5-5. U.S Fish and Wildlife Service Species of Concern that may occur in the Weber Dam study area.

Species	Scientific Name	Preferred Habitat	Potential on Site
Mammals			
Pygmy rabbit	*Brachylagus idahoensis*	Basin-prairie and riparian shrub.	Possible but unlikely
Pale Townsend's big-eared bat	*Corynorhinus townsendii pallescens*	Roosts in caves and abandoned mines.	Unlikely
Pacific Townsend's big-eared bat	*Corynorhinus townsendii townsendii*	Uses cliffs, caves, and old mines for roosting, nursery, and hibernation.	Unlikely except borrow area
Spotted bat	*Euderma maculatum*	Roosts in cliff faces and rock crevices.	Unlikely except borrow area
Small-footed myotis	*Myotis ciliolabrum*	Prefers caves and abandoned mine shafts.	Unlikely except borrow area
Long-eared myotis	*Myotis evotis*	Roosts in small colonies in caves, buildings and under tree bark.	Unlikely except borrow area
Fringed myotis	*Myotis thysanodes*	Roosts in caves, mine tunnels, rock crevices, and old buildings.	Possible
Long-legged myotis	*Myotis volans*	Roosts in buildings, cliff crevices, and hollow trees.	Possible
Yuma myotis	*Myotis yumanensis*	Roosts in caves, abandoned mine tunnels, and buildings.	Unlikely except borrow area
Birds			
Northern goshawk	*Accipiter gentiles*	Conifer and deciduous forests	Unlikely
Western burrowing owl	*Athene cunicularia hypugea*	Open, dry grasslands, and desert habitats often associated with burrowing animals	Unlikely
Black tern	*Chlidonias niger*	Lakes, pond, and marshes. Nest in higher elevated areas slightly surrounded by water.	Possible
Least bittern	*Ixobrychus exilis hesperis*	Emergent vegetation in freshwater marshes	Possible
White-faced ibis	*Plegadis chihi*	Marshes, wet meadows	Observed during Migration

Of the species listed, only one was observed on the project area. A flock of approximately 30 white-faced ibis was observed in marsh habitat at the north end of the Reservoir on May 3, 2001. It is likely the birds were migrating through the area and using the Reservoir as a resting site.

Pygmy rabbits could potentially occur on the site due to the shrub habitat surrounding the Reservoir. However, their occurrence is unlikely due to the low density of the shrubs.

Of the bat species listed, only the fringed myotis and long-legged myotis potentially roost in the area for any duration. Both species might utilize rock crevices for roosting and such habitat is present, although it is not extensive, on the project area. Habitat for use as winter hibernacula or summer nursery areas is not present on the main project area. However, at the borrow area, located west of U.S. Highway Alternate 95, abandoned mine features are present including mine tunnels and shafts. The tunnels could provide roosting habitat for any of the eight bat Species of Concern.

Black terns and least bitterns have the potential to occur on the project area but, as with the white-faced ibis, such occurrences would be expected only during migration through the area. It is unlikely that they would nest in the area.

3.5.5 Biodiversity

Consideration of biodiversity is a requirement of CEQ (1993) and was not identified as a concern during scoping. Biological diversity or biodiversity refers to the variety abundance of species, their genetic composition and their communities (Wilson, 1998). Physical alteration of ecosystems as a result of resource development and changing land use is the primary cause of biodiversity loss (CEQ, 1993). When natural areas are converted to residential, agricultural or other uses, ecosystems are disrupted and biodiversity can be diminished. Managing for biodiversity includes steps to prevent risk to natural habitats and biological processes. Changes to natural conditions can result in changes in the number and variety of species. It is generally accepted that the more natural an environment remains, the healthier or better able it is to withstand all but major catastrophic events.

A change in biodiversity occurred with the construction of Weber Dam. The Dam and Reservoir physically altered the river and the surrounding terrain and slightly modified patterns of flow downstream. One result of the operation of Weber Reservoir has been the creation and maintenance of wetlands at the upstream end of the Reservoir. Those wetlands and riparian areas associated with the Reservoir have resulted in an increase in the number of species present and the diversity of the species associated with the Reservoir. An impact of the Reservoir to the river system was a lower passage block to Lahontan cutthroat trout. Prior to the construction of Weber Dam, the block to fish passage was approximately 15 miles upstream at the Yerington weir and the many diversions upstream of that location, all of which changed the life cycle patterns available to Lahontan cutthroat trout and adversely affected their ability to maintain a naturally reproducing population in Walker Lake.

3.6 Cultural Resources

The study area is the Walker River as it flows through Campbell Valley and Sunshine Flat in Lyon County, including Weber Reservoir, extending from the northwestern boundary of Nye County to Walker Lake. This area's prehistoric and environmental context can be best understood with reference to this portion of the Walker River drainage basin within the southernmost part of the Lahontan Basin of the Western Great Basin, as defined by Elston (1986). The headwaters of the east fork of the Walker River are near the Bodie Hills and the Borealis locality. Settlements in the upper regions of the river were relatively small and sparse, with inhabitants largely limited to late spring through early fall foraging and collecting parties.

3.6.1 Prehistoric Background

The prehistoric human populations of the Walker River Basin were at a "cultural stage" termed Western Archaic from approximately 9,000 to 10,000 B.P. until the earliest Euro-American contact. Regional variation in natural resources and habitat accounted for such settlement pattern variation that occurred geographically and through time (Elston 1986, Jennings 1986).

In general, small kin-based parties hunted and foraged together spring through fall, storing surplus commodities to provision a winter settlement. Assemblages of artifacts and food remains distributed over the landscape provide the available information about the settlement patterns of the Walker River basin populations throughout their long residence of the area. In his 1986 analysis, Elston had little to report for the lower Lahontan basin before the beginning of Middle Archaic (ca. 1500 B.C.). Of the Central subregion, he noted that the Early Archaic or Pre-Archaic (8000 - 6,000 B.C.) populations left a distinct suite of "...large bifacial knives, stemmed and concave base projectile points with edge grinding, crescentic objects, gravers, punches, choppers, and several types of scrapers with steep, well-formed edges."

Pre-Archaic sites are relatively small and sparse. In contrast to later assemblages, seed processing equipment is rare (Elston 1986). These conditions prevailed through Early Archaic times (6,000 to 2,000 B.C.).

By the Middle Archaic (1500 B.C. to A.D. 500), the east slope of the central Sierra Nevada was being extensively used with residential base camps on valley margins in the Lake Tahoe and Truckee River basins north and west of the Weber Dam EIS area (Heizer and Elsasser 1953; Elsasser 1960; Elston 1970, 1979; Elston and others 1977). Obsidian was exported from Bodie Hills quarries north to other Sierran sites (Singer and Ericson 1977) and as far northeast as the Humboldt River sites near Valmy, Nevada (Rusco and Davis 1979). Winter camp and village sites were located near mouths of major rivers, including the Walker River.

During the Late Archaic (A.D. 500 - ca. A.D. 1830) the occupation of upland base camps continued, but at less intensity (Elston 1986). Villages at the mouth of the Truckee and Humboldt River cited by Elston (1986) suggest their presence at the mouth of the river at Walker Lake.

3.6.2 Ethnohistoric Background

The Walker River/Lake area was inhabited by the Aga'idokado (trout eaters) group, a subdivision of the Northern Paiute people (Johnson 1975; Fowler and Liljeblad 1986:436-7, Fig. 1). Variations in the spelling of this name are discussed by Fowler and Liljeblad (1986:Fig. 1 and 463).

The Walker Lake people hunted both large and small game. Bow and arrow were used by individual hunters and traps and corrals were used for communal hunting drives for large game. The traps and corrals were considered to be the property of "a group of men passing down use rights to their sons" (Park 1934, 1937, 1941, cited by Fowler and Liljeblad 1986). Most small mammals were hunted or trapped individually. Burrowing mammals such as ground squirrels were trapped "by bringing them from their burrows by directing water or smoke down the entrance." According to Park (1937) ground squirrel trapping areas on Walker River were also private property. Hares and rabbits were communally hunted in fall rabbit drives, where they were driven into large nets and clubbed.

Riverine and marsh fauna were important foods for the Walker River and Lake people. Tule boats were used to collect eggs in marshes, as well as for duck hunting and fishing in both the River and Lake (Stewart 1940, cited by Fowler and Liljeblad 1986; Johnson 1975).

Like all Great Basin populations the Walker River people made use of edible plants, expecially the nourishing seeds, which could be stored for winter use. Residents of winter settlements eagerly waited the greens as they became available in the spring (Johnson 1975).

The Walker River Reservation was established for its Northern Paiute population in 1859, consisting of 329,692 acres on the Walker River and encompassing Walker Lake. An additional 277,100 acres were added later (Clemer and Stewart 1986). When gold was discovered at the foot of the Eastern Sierra in 1859, the ensuing population boom settled the "most agriculturally desirable lands, including those on the Walker River Reservation" (Clemmer and Stewart 1986).

Both the Walker River and Pyramid Lake reservations, established at the same time, were intended as

> . . . areas where the former hunting, gathering and fishing Northern Paiutes would learn to be farmers. The degree to which this was ever accomplished was limited, largely due to the unsuitability of the areas chosen for agriculture and to the lack of water (Fowler and Liljeblad 1986, citing Knack and Stewart 1984, Johnson 1975, and Inter-Tribal Council of Nevada [ITC] 1976).

Local newspapers joined a campaign to abolish the Reservation. The Walker Lake Bulletin, for example, wrote in 1883,

> "If the reservation were opened to the whites, it would bring great wealth to this state. Whites could operate the fisheries better than the Indian people. Great mines would

be found in the mountains surrounding Walker Lake. Farmers would cultivate the fine lands at the north end of the reservation (Walker Lake Bulletin, March 28, 1883, cited by Johnson 1975:73). The ensuing controversy culminated in a 1906 agreement, signed by the Walker River band of Northern Paiutes relinquishing the portions of the land not set aside for allotments for tribal members. Following this, Presidential Proclamation eliminated tribal title to Walker Lake, reducing the Reservation to 85,760 acres, approximately one-fourth its original size. Later efforts led to reservation lands being increased to 323,000 acres in 1936, close to its original size in 1859 (ITC 1976:100)."

Meanwhile, day schools were established on the Reservation in the late 1870s and early 1880s. Twenty new houses were built in 1965 and an additional 80 between 1973 and 1980 (Knack 1986:Table 2). Poverty and poor health remained a problem on the Reservation, but the latter was ameliorated when the Indian Health Service Hospital was constructed at Schurz (Johnson 1975).

3.6.3 Cultural Resources Identified in the Dam Project Area

The few cultural resource studies that have been conducted in the area (Figure 1.2-2) are associated with development of the Reservation, especially the Housing Authority, and highway betterment projects along U.S. 95 and U.S. 95A completed by the Nevada Department of Transporation (NDOT). Besides Weber Dam, the cultural resources that have been identified include small lithic scatters, stone rings, a human burial, and a petroglyph site. No Traditional Cultural Properties occur in the project area.

Weber Dam site has been recommended eligible for listing under the National Historic Preservation Act, 16 U.S.C. §§ 470 to 470x-6 (NHPA) under Criterian a, and the Section 106 consultation process between BIA and the State Historic Preservation Officer (SHPO) is underway to lessen or resolve any effect the Proposed Action may have on the historic property.

3.7 Socioeconomic Conditions

The study area for socioeconomic conditions is focused primarily on the Reservation. Most of the reservation and virtually all of its resident population are located in Mineral County. Because of this and because much of the data is only available at the county level, the following discussion addresses Mineral County.

The population of Mineral County has been generally declining since the 1970 Census; however, the Schurz area has grown (Table 3.7-1). The population of Mineral County is projected to continue declining over the current decade, but the degree of decline is uncertain because the most recent projection was made in June 2000, before the Census data were released, and the actual county population turned out to be well below the estimate the state was using as a starting point (Hardcastle 2000).

Table 3.7-1. Population Change 1980 to 2000 in Mineral County and on Walker River Indian Reservation.

Jurisdiction	Population		
	1980 Census	1990 Census	2000 Census
Schurz CDP[1]	N.A.	617	721
Walker Reservation	N.A.	N.A.	853
Mineral County	6,217	6,475	5,071

[1]Census Designated Place. Source: U.S. Bureau of the Census 2001.

The racial and ethnic character of the population in the study area is heavily influenced by the American Indian contingent. The Reservation and Mineral County have much higher percentages of American Indians than does the state as a whole. Other non-white races make up comparatively smaller segments of the study area population than of the state population, as is common in rural areas. Hispanics and Latinos of all races make up 10 percent, 8.4 percent, and 11 percent of the populations of the Reservation, the county, and the state, respectively.

The size of a county's labor force is measured as the total of those currently employed and those actively seeking employment. As illustrated in Table 3.7-2, the Mineral County labor force has declined at a faster rate than the population. This is partly a function of the rising unemployment rate, but it likely also indicates that some people have given up their job searches and are no longer actively looking for employment. For the third quarter of 2002, the labor force had declined even further to 1,770 with 1,670 employed and 100 unemployed for an unemployment rate of 5.4 percent. The continuing decline, despite a falling unemployment rate suggests more people have given up their job searches and others may have left the county. The 2002 third quarter numbers are similar, but not directly comparable with the numbers in Table 3.7-3, which are monthly numbers averaged over a full year.

Table 3.7-2. 2001 Employment by major industry[1].

Industry	Mineral County		Nevada	
	No.	%	No.[2]	%
Mining	170	10.0	10.2	1.0
Construction	20	1.2	90.0	8.4
Manufacturing	<10	<0.6	45.2	4.2
Transportation, Communications & Utilities	10	0.6	57.7	5.4
Wholesale & Retail Trade	210	12.3	235.8	22.1
Finance, Insurance & Real Estate	40	2.4	49.9	4.7
Service Industries	670	39.4	450.0	42.1
Government	570	33.5	129.9	12.1
Total	1,710	100	1,068.7	100

[1]Includes multiple jobholders, may not coincide with labor force concept.
[2]In thousands.
Source: Nevada Research and Analysis Bureau 2001.

Table 3.7-3. Mineral County average monthly civilian labor force.

	1990	1995	2000
Total Labor Force	2,930	2,720	2,060
Unemployment	180	200	210
Unemployment Rate	6.1%	7.4%	10.1%

Source: Nevada Research and Analysis Bureau 2001.

Employment in Mineral County is much more dependent on mining and government jobs than is the State of Nevada; it has about the same reliance on service sector jobs, and it is substantially lower in all other industries (Table 3.7-4). Comparable data are not available for the Reservation or for Schurz.

The Census Bureau looks at employment categories somewhat differently, however, and data are available for those classifications (see Table 3.7-5). These data not surprisingly show that Mineral County has a notably higher percentage of extractive workers offset by lower percentages of service and sales/office workers. As previously noted, Mineral County has a much higher percentage of government workers. The Reservation has a substantially lower percentage of service workers and higher percentages of management/professional and production/transportation workers. Although the percentage of total workers is small for all three jurisdictions, the Reservation's farming/fishing workers make up more than twice the percentage of Mineral County and more than three times the percentage of statewide workers in the same category. The percentage of government workers on the Reservation is extremely high in comparison to the county and especially the state.

Table 3.7-4. Occupation, industry, and class of worker of employed civilians 16 years and over: 2000.

Occupation	Walker River Indian Reservation[1] (%)	Mineral County (%)	Nevada (%)
Management, Professional & Related	28.0	26.4	25.7
Service	14.0	22.1	24.6
Sales & Office	27.3	23.0	27.6
Farming, Fishing & Forestry	1.1	0.5	0.3
Construction, Extraction & Maintenance	16.3	16.6	11.4
Production, Transportation & Material Moving	13.3	11.3	10.4
Total	100.0	99.9	100.0
Selected Industries			
Agriculture, Forestry, Fishing & Hunting	1.5	0.6	0.5
Manufacturing	6.8	6.2	4.9
Government Workers – All Levels	46.2	30.3	12.5

[1] Census Tract 9402 is almost an exact surrogate for the Reservation.
Source: U.S. Bureau of the Census 2001.

Table 3.7-5. Income and poverty levels: 1999.

Jurisdiction	Median Household Income	Per Capita Income	Income Below Poverty Level	
			Percent of Population	Percent of Families
Walker River Indian Reservation	$24,412	$10,092	32.5	22.1
Mineral County	$32,891	$16,952	15.2	11.0
Nevada	$44,581	$21,989	10.5	7.5

1. Census Tract 9402 is almost an exact surrogate for the reservation.
Source: U.S. Bureau of the Census 2001.

The employment data are somewhat misleading regarding the economic value of agricultural activities on the Reservation, which is particularly relevant to the evaluation of Weber Dam modifications. Over 8,000 acres of Reservation land are privately owned in approximately 400 20-acre parcels - many with multiple owners - that are considered potentially irrigable. Approximately 3,179 acres are currently irrigated or have been in the recent past, including both private land and common tribal pasture land. Although the employment data indicate fewer than one dozen individuals are employed as agricultural workers, there are approximately 40 members of the tribal Cattlemen's Association and there are over 150 separate, currently irrigated parcels in private ownership, many of which are leased to the small group of full-time farmers. Consequently, there are likely several hundred individuals who obtain some measure of income from agriculture on the Reservation, even though they are not actively employed in the agricultural industry.

Income statistics indicate that Mineral County and the Walker River Indian Reservation, in particular, are among the poorest regions in Nevada. Among Nevada's 17 counties, Mineral County has the second lowest median household income, the second lowest per capita income, the third highest percentage of total population below the poverty level, and the second highest percentage of families below the poverty level (Table 3.7-5). As the table shows, the Reservation is at the low end of the spectrum even in Mineral County, with per capita income over 40 percent below the county average and poverty levels more than twice the county level. Percentages of persons and families falling below the poverty level are respectively more than three times, and nearly three times the comparable levels for Nevada as a whole.

Most of the housing on the Reservation consists of single-family, detached units, including 300 of the 348 total units on the reservation in 2000, or 88.5 percent of the total housing. The comparable figure for Mineral County was 62.9 percent; for the state, it was 57.7 percent. The Reservation Housing Authority manages approximately 170 of the units on the Reservation, some of which have been built since the 2000 Census (Lockwood 2002). Most of the Housing Authority units are managed under a lease-purchase arrangement under which income qualified families work toward home ownership. Currently, the qualifying range for a family of four is a family income between $17,500 and $42,000 (Lockwood 2002). Funding for the Housing Authority programs comes from the U.S. Department of Housing and Urban Development through a specific grant program for Indian housing. Some of the housing on the Reservation is privately owned and built on individually owned parcels of land. Additionally, housing is located on trust allotments, which the United States holds in trust for the benefit of allottees. The majority of HUD housing consists of tribal assignments of homesites on tribal trust land.

Temporary, transient housing is available in substantial numbers in Hawthorne, 33 miles south of Schurz, in Fallon, 39 miles to the north, and in Yerington, 24 miles to the west.

The Tribe has an annual operating budget of between $2.5 million and $3 million. Revenues derive from a sales tax, a possessory interest tax on utility easements crossing Reservation lands, and gasoline and cigarette taxes. Contracts and grants of various types also provide tribal revenues. The budget provides a variety of facilities and services for Reservation residents, including law enforcement, fire protection and a health clinic.

A tribal police department, with a chief and seven officers, provide law enforcement on the Reservation. The police provide protection for the 500-square-mile Reservation including joint traffic enforcement with the Nevada Highway Patrol on the two major highways, U.S. 95 and U.S. 95A. The Reservation does not have a jail and must transport prisoners to the Mineral County jail in Hawthorne. Indian offenders are adjudicated in Tribal court; non-Indians are sent to county court (Benner 2002).

Fire protection is provided by an all-volunteer staff of 17 fire fighters. The department has two pumper trucks and a rescue truck, providing mainly a structure fire capability, although they do have an assistance agreement with BLM to fight wildland fires. The department receives dispatch assistance from the county sheriff's 911 response service. The department has an ISO rating of 10, the lowest assigned by ISO. They have upgraded some facets of the department since the last rating in 1993, such as hazardous materials (HAZMAT) training for several staff people, but no reevaluation is scheduled at this time (Willey 2002).

The Tribal Health Clinic provides a range of health services on an outpatient basis. Services include optometry, dental care, ambulatory outpatient care provided by a medical doctor and a physician's assistant, mental health counseling, substance abuse treatment, diabetic education, a pharmacy and a lab. The clinic does not have a trauma center, but there are full-time and volunteer emergency medical technicians at the Reservation. In most cases, patients would be transported to medical facilities in the towns of Fallon, Hawthorne and Yerington. For especially severe cases, CareFlight of Reno would be called to provide care and rapid transport (McMasters 2002).

There is a school in Schurz for children from kindergarten through the 8th grade. Beyond grade 8, students are transported to Hawthorne and Yerington to complete their schooling.

3.8 Resource Use Patterns

The study area lies along the Walker River in a long southeasterly trending valley with a shape faintly reminiscent of an hourglass. Campbell Valley and Sunshine Flat make up the upper "bulb", Weber Reservoir is at the "neck", and the valley opens up to a broad, flat plain approximately two miles below Weber Dam. Terrain falls at a very shallow 0.15 percent grade along the river from the north boundary of the Reservation, 12 miles above the Dam, to Schurz, six miles below the Dam and beyond. Surrounding terrain, though, is much more complex and varied. The Desert Mountains to the north, a low ridge ending in the Calico Hills to the east, and the Wassuk Range along the southwest define the valley. Reservation Hill and White Mountain jut forth from the Wassuk Range south of Weber Reservoir and there are a number of smaller buttes around the valley as well. The Walker River flows southeasterly through the center of the valley above the Reservoir, drops to the south below Weber Dam for about two miles, and then heads back to the southeast along the west edge of the lower valley to Schurz.

Weber Dam and Reservoir are situated in a narrow, flat-bottomed section of the valley mostly surrounded by hills and bluffs sloping back from the Reservoir and rising from 50 feet to over 100 feet above the Dam crest. The Walker River drops into a narrow, steep sided ravine for about two miles after leaving the Weber Dam spillway, but breaks out into a broad, nearly flat plain beyond the ravine. Vegetation surrounding the Reservoir is sparse composed mainly of desert shrubs except along the banks of the Reservoir and river where there are cottonwoods and willows. There are wetlands, with wetland vegetation, both upstream and downstream from the Reservoir where the river meanders due to the very shallow elevation drop.

3.8.1 Land Use and Ownership

Most of the Reservation is held in trust by the United States for the benefit of the Tribe. In 1906, approximately 9,783 acres of the Reservation were divided into 20-acre parcels that were distributed to 492 members of the Tribe as allotments held in trust by the United States for the benefit of those individuals. The Tribe bought back some parcels in recent years (Miller 2001) and documents show a small amount of acreage held in individual fee ownership. Many of the 20-acre parcels currently have multiple owners through inheritance.

Much of the approximately 10,000 acres of allotments could potentially be irrigated because they are lower in elevation than the two main canals or could be reached by extensions of the canals. Some of the land is at higher elevation than the canals, however, more than half the land lower than the canals is not currently irrigated.

The three main land uses on the Reservation are grazing, irrigated farming and the community of Schurz. Schurz occupies about 120 acres, mostly in small lot residential use with several community buildings and a few commercial enterprises. The Tribal headquarters is located in Schurz as is the post office, a senior center, and a school. An additional 40 to 45 acres adjacent to Schurz is in larger lot homesites of about five acres each.

Allottees irrigate approximately 2,100 acres of allotments, which consist primarily of alfalfa and grass hay. An additional 767 acres of tribal trust land are irrigated on the Reservation by center pivots. In some years, water from Weber Reservoir provides for flood irrigation of up to 312 acres of pasture land, not including the center pivots and the 2,100 acres of irrigated allotments.

With the exception of a few alkali flats, steep rocky slopes and similar non-productive areas, a substantial majority of the remainder of the 505 square mile Reservation is currently used for grazing cattle and horses, mostly on tribal trust land.

There is no adopted land use plan for the Reservation, although with tribal ownership of a large majority of the land, effective control resides with the Tribal Council over most land use decisions. Control over trust allotments and individually owned parcels is less formal, but the community does influence decision making by private owners in this close-knit community if unacceptable uses are proposed.

3.8.2 Transportation

Highway U.S. 95, a major arterial running north and south through Schurz, provides the primary access to the Reservation and the study area. Alternate U.S. 95, the only other highway in the vicinity, runs westerly from Schurz to Yerington. U.S. 95A is classified as a minor arterial. Both U.S. 95 and U.S. 95A are two-lane, undivided highways with approximately 12-foot wide lanes; they are in generally good condition and have broad, gently sloped shoulders in most locations.

Level of service (LOS) is a method of qualitatively measuring the operational conditions of traffic flows on roadways, and the perception of those conditions by motorists and passengers (TRB 2000). Levels of service are rated "A" through "F"; "A" generally represents free flowing traffic conditions with few restrictions, and "F" represents a "forced or breakdown" flow with queues forming and traffic volumes exceeding theoretical capacity of the roadway (TRB 2000). Generally, level "E" represents traffic volumes at the capacity of the roadway. Both highways in the study area are lightly traveled; U.S. 95A carries only an average of 1,200 vehicles per day. U.S. 95 carries 2,200 vehicles per day in the rural area north of Schurz and 3,000 to 3,500 vehicles per day in Schurz and near the U.S. 95A intersection (NDOT 2002). Visibility and roadway geometry are excellent for both highways and terrain is relatively flat with few restrictions on passing. Assuming peak hour traffic is approximately ten percent of average daily traffic flows, U.S. 95A would be classified LOS "A", indicating traffic is free flowing at all hours of the day. U.S. 95 would be classified LOS "B", which indicates motorists are slightly more affected by the presence of other vehicles in traffic, although traffic flows are still stable and freedom to maneuver in traffic is still quite high. During non-peak periods, traffic on U.S. 95 is also free flowing and unrestricted by other traffic.

There is a Southern Pacific rail spur through Schurz, providing freight service only to Hawthorne, Mineral County. There are general aviation airports in Hawthorne and Yerington; the nearest scheduled commercial air service is in Reno.

3.8.3 Recreation

The Reservation and nearby public lands provide ample opportunities for dispersed recreation activities in the area. Camping and fishing are the main recreation activities near Weber Dam and Reservoir, which, under normal operating conditions, supports a warm water fishery. Although there are no developed facilities to support camping, fishing or picnicking at the Reservoir, anecdotal reports indicate it is a popular weekend spot for tribal members. Public access is generally prohibited without specific permission from the Tribe. There are minimal developed recreation opportunities in Schurz.

Walker Lake is a major outdoor recreation attraction just south of Schurz. The lake has BLM-developed camping facilities at beach areas and is popular for boating, fishing, water skiing and waterfowl hunting. There are also BLM and Forest Service camping facilities in the mountain canyons to the southwest (Adam 1986). Developed, urban recreation facilities are available in Hawthorne, 33 miles south of Schurz, in Fallon, 39 miles north of Schurz, and in Yerington, 24 miles west of Schurz. (Adam 1986).

3.9 Noise

Describing the existing environment potentially affected by noise from the proposed project involves identifying noise-sensitive receptors and existing noise sources in the vicinity, characterizing terrain features that may affect noise transmission, and determining existing noise levels.

The study area is fairly remote. The nearest residence is approximately 3.4 miles south of the existing Dam. There are additional homes on large-lot, rural residential and small agricultural parcels from that point south into the community of Schurz, centered approximately six miles from the Dam. The nearest potential, non-residential, noise-sensitive receptor is the recreation area at the Reservoir where local people gather for fishing, camping and picnicking.

Principal sources of noise near the proposed project site are natural sounds, including wind, insects, and birds. The Southern Pacific Railroad and highway Alternate U.S. 95, 2.2 miles and 2.5 miles to the west, respectively, provide the nearest notable man-made noise sources at most times. Recreation activity in the Reservoir area generates occasional noise from vehicles and related human interaction. There are occasional high noise levels in the area caused by military aircraft overflights.

Noise levels were not measured for this analysis, but were estimated based on measured levels from other locations with similar land use characteristics. Nighttime noise levels likely fall in the range of 30 to 35 decibels, A-weighted (dBA), when the wind is calm or very low. Daytime levels are estimated to be in the range from 35 to 45 dBA when wind is low and there are no major intrusive noise sources such as aircraft nearby (USEPA 1971).

3.10 Public Health and Safety

The Weber Dam Modification Project was proposed due to a concern for the structural integrity of the Dam. The Weber Dam site was first investigated as a potential Reservoir location in 1915 with construction of the Dam initiated in 1933 and completed in 1935. In the late 1970s, the federal government started to evaluate all its dam and reservoirs for safety. Pursuant to this effort, Weber Dam safety investigations began with the Safety Evaluation of Existing Dams (SEED) study in 1982 (USBR 1982b). Although no major conclusions were reached regarding Dam safety at that time, issues were identified that resulted in a series of ten recommendations. These studies led to subsequent studies addressing the PMF, the MCE and associated seismic loadings for the Dam, the cause and potential effects of observed seepage on the Dam foundations, and static and dynamic stability of the Dam embankment. The subsequent studies determined that Weber Dam has a high hazard rating and a poor overall safety rating. The hazard rating means more than six lives could be lost should the Dam fail, and the safety rating means the overall risk of overtopping due to flooding or structural failure during an earthquake is relatively high (USBR 1993).

Subsequent analysis during design for the project identified two additional safety concerns. The existing Dam embankment is situated on a secondary earthquake fault, which could result in seepage instability from cracking of the Dam materials in the event of a MCE. Also, a secondary earthquake fault beneath the outlet works could rupture the conduit during a MCE, which would result in seepage instability.

Weber Dam has a double radial gate spillway with a capacity of 5,200 cfs at a water surface elevation of 4,208 feet and an emergency fuse plug spillway with an estimated capacity of 7,000 cfs at a water surface elevation of 4,217 feet. It is estimated that a storm causing a peak of 17,300 cfs would raise the water level to the crest of the Dam at elevation 4,217 feet and overtop it (USBR 1992). The PMF would produce 247, 400 cfs at Weber Dam from a spring rain-on-snow event with a 16-day total volume of 1,034,000 acre-feet of water (USBR 1992). Consequently, just 7 % of the PMF would result in a flood event that would overtop the Dam. The Deficiency Verification Analysis (DVA) (USBR 1992) estimated that the PMF would result in floodwaters that would overtop the existing Dam by 12.8 feet for greater than 30 hours. The existing spillway would accommodate only 7 % of the PMF; the Dam would be expected to erode and breach, or fail, under PMF conditions. Failure would result in a flood wave approximately 21 feet above the riverbed leaving the canyon and 16 feet above the river bed in Schurz, traveling at 4 feet per second, which would be "... sufficient to cause substantial property damage and probable loss of life." (USBR 1990b).

The 1992 DVA also noted the estimated MCEs for Weber Dam ranged from magnitude 6.5 to magnitude 7.5 centered at distances of 0 to 55 km (0 to 34 miles) from the Dam (USBR 1992). The secondary faults under the Dam were deemed unlikely to be the source of an earthquake, but they were believed to be subject to "sympathetic movement" because of seismic activity on active faults in the area (USBR 1992). The analyses determined that "minor" displacement of the Dam foundation in the event of an earthquake could not be ruled out, but that the probable scenario that would cause Dam failure from an earthquake would be liquefaction of Dam foundation materials.

The community of Schurz would be in the path of a potentially catastrophic flood in the event of a Dam failure. Studies indicate there are no residents in the first three miles downstream from Weber Dam; there are a number of scattered residences – estimated at 15 in 1990 (USBR 1990c) – in the next three miles toward the community of Schurz , which is the major population center.

An Assessment of Downstream Impacts, conducted in 1990, estimated the population at risk from Dam failure would be 716 people, all located between four and 12 miles downstream from the Dam (USBR 1990c). At the time of the 2000 census, the Schurz CDP had grown to 721 people and there has been additional growth between April 2000 and November 2002 (Lockwood 2002). The current estimated population at risk is in excess of 721 people.The Assessment of Downstream Impacts concluded that a PMF event would be unlikely to cause loss of life from failure of Weber Dam because it would cause flooding upstream at Mason and Yerington approximately 16 hours before it would overtop Weber Dam, which would be ample time to warn people below the Dam and evacuate the area subject to flooding (USBR 1990c). The warning and evacuation would be facilitated by the relatively compact population distribution in the area at risk.

The earlier Screening Threat to Life study (USBR 1990b) addressed the potential for sudden Dam failure, without warning, from seismic activity such as the MCE. Although it was less specific than the Assessment of Downstream Impacts study, it estimated that up to 25 percent of the town of Schurz and 15 residences upstream of Schurz would be inundated (USBR 1990b). It is possible to infer from the two studies that approximately 50 people would lose their lives from sudden, catastrophic Dam failure without time to warn and evacuate the area. In addition to the potential loss of life, a failure of Weber Dam from either a PMF or a MCE would cause an estimated $13,719,000 (1990 dollars) in monetary damages, including damage to structures and contents, damage to community infrastructure, losses to irrigated agriculture, and loss of recreation opportunities (USBR 1990c).

A secondary issue regarding public health and safety would be potential for traffic conflicts between project construction traffic and the traveling public. Construction traffic would access the project site from U.S. 95A, west of the project area. U.S. 95A is an asphalt paved, two-lane highway in good to very good condition. NDOT classifies it as a "minor arterial".

Average annual daily traffic levels (AADT) on U.S. 95A in the vicinity of the Weber Dam access road have consistently been in the range from 900 to 1,100 vehicles per day for the past decade; they were up slightly to 1,200 vehicles per day in 2000 and 2001 (NDOT 2002). These traffic levels are well below the capacity of the highway.

NDOT statistics indicate vehicle crash rates for Mineral County have been approximately one-third of the statewide average rates in recent years and have declined by 22 percent from 1998 to 2000 (NDOT 2001, 2000, 1999). There has been one fatal crash on U.S. 95A northwest of Schurz from 1998 through 2000 (NDOT 2001). Environmental Justice

Executive Order No. 12898, Environmental Justice, is "intended to promote nondiscrimination in Federal programs substantially affecting human health and the environment, and to provide minority communities and low-income communities access to public information on, and an opportunity for participation in, matters relating to human health and the environment." It requires each federal agency to achieve environmental justice as part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects, including social and economic effects, of its programs, policies, and activities on minority and low-income populations.

EPA guidelines (CEQ 1998) for evaluating potential adverse environmental effects of projects require specific identification of minority populations when either: (1) a minority population exceeds 50 percent of the population of the affected area; or (2) a minority population represents a meaningfully greater increment of the affected population than of the population of some other appropriate geographic unit, as a whole.

The populations of the Schurz CDP and the Reservation are 83.6 percent and 78.2 percent Native American, respectively, well above the 50 percent threshold. Mineral County's population is 15.4 percent Native American, which is "meaningfully greater" than the statewide percentage of 1.3 percent of Nevada's total population. In addition, income levels on the Reservation are substantially below the levels for Mineral County and the state as a whole and the percentage of the Reservation population living below the poverty level is more than double that of Mineral County and more than three times that of Nevada as a whole (see Table 3.6-6).

3.11 Indian Trust Assets

Indian Trust Assets are legal interests held in trust by the United States for the benefit of an Indian tribe and/or its members. The trust relationship usually stems from a treaty, an executive order, or an act of Congress. Assets may be anything that has monetary value, including real property, physical assets, development potential, or other property rights. Examples include land, minerals and mineral rights, hunting and fishing rights, and water rights.

Trust Assets in the Weber Dam study area include but are not limited to the Reservation, irrigated and non-irrigated trust allotment lands, rights to use the water stored by the Dam, Weber Dam and Reservoir, and the fish, wildlife, wetlands, and riparian vegetation in and along the river corridor and Reservoir.

4 Chapter 4. Environmental Consequences

4.1 Introduction

Chapter 4 discusses the environmental consequences of the Proposed Action for repair and modification of Weber Dam on the effected resources. Both potentially adverse and beneficial impacts resulting from implementation of the Proposed Action are evaluated and presented. The environmental consequences discussion addresses the potential short-term and temporary impacts from construction activities and the long-term impacts from operation of the Dam. The Proposed Action and No Action alternative are analyzed for this project. If implementation of the Proposed Action causes a substantial negative effect to the environment, it could be reduced through implementation of reasonable mitigation measures. These measures are identified in the subsequent text section. In many cases, construction and permitting considerations require the implementation of measures to improve safety or reduce potential negative effects and are, therefore, already included as part of the alternative. In these instances, additional mitigation is not recommended. Mitigation has been identified as necessary to reduce potentially harmful effects to the human or natural environment that have not been addressed in the description or design of the alternatives.

4.2 Geology and Soil Resources

Key issues related to geology and soil resources are: 1) geologic and geotechnical hazards created or exacerbated by project development; 2) stability of the Dam embankment under both static and earthquake loads; and 3) damage to and potential failure of the Dam caused by surface faulting or seismically induced liquefaction.

Environmental impacts to geology and soils would be significant if any of the following occurred:

- Substantial erosion and siltation.
- Exposure of people or structures to major geologic hazards (including earthquakes, ground failure, or similar hazards).
- Impacts to the Dam, outlet structures, or spillways caused by geologic hazards, including active fault rupture, landslides, or ground subsidence, which could result in Dam failure or the uncontrolled release of Reservoir waters.
- Potential damage to the Dam, outlet structure, or spillways caused by seismic loading from the MCE for the site that could result in Dam failure or the uncontrolled release of Reservoir water.

4.2.1 No Action

4.2.1.1 Geology

As summarized in Chapter 2, No Action would consist of operating under the interim operating criteria which limit the maximum Reservoir elevation. The key geologic and geotechnical concerns for Weber Dam include potential for movement of a secondary fault located beneath the Dam to result in cracking of the Dam foundation and embankment, and rupture of the outlet conduit; potential for liquefaction of the lower portion of the Dam embankment and portions of the Dam foundation during a strong earthquake, and; stability of the embankment slopes during high Reservoir levels, and during rapid drawdown events.

As discussed previously, a potentially active fault (referred to as the "left abutment fault") projects through the left abutment and intersects the outlet conduit near the axis of the existing Dam. This fault is considered a secondary fault that is capable of movement that could be triggered by movement along the Wassuk fault zone, a major, active, normal fault, situated about two miles south of the Dam. Because of the recurrence interval (4,500-6,500 years) for displacement along the Wassuk fault, and the fact that there is no evidence that the left abutment fault has moved within the late Quaternary or Holocene (>10,000 years), there is a low probability that this fault will move during the life of the Dam. In the unlikely event that this fault does move during the life of the Dam, the fault rupture could crack the embankment, and rupture the outlet works. Since the Dam is not designed to accommodate these types of movements, it is possible that the fault induced cracking, and/or conduit rupture could result in uncontrolled seepage, and internal erosion of the embankment. This type of erosion could cause the Dam to breach resulting in flooding at Schurz and the surrounding area.

Extensive subsurface investigations in the footprint of the existing Dam identified the presence of unconsolidated, fine-grained, granular alluvial sediments located beneath sections of the Dam that are susceptible to liquefaction. Intermittent zones of fill located within the lower half of the embankment are also susceptible to liquefaction. Earth slopes in, or founded on, materials that are subject to liquefaction may experience catastrophic slope failure or flow slides during or shortly following an earthquake. Under No Action, materials susceptible to liquefaction in the foundation and within the embankment would not be replaced. Therefore, during a large earthquake event, such as an MCE on the nearby Wassuk fault (or other similar large earthquake event affecting the site) it is possible that the Dam embankment or Dam foundation could experience liquefaction. Liquefaction of the Dam foundation and/or portions of the embankment could result in failure of the embankment and breaching of the Dam.

Stability analysis indicated that the Dam could potentially fail under a full Reservoir condition, during flood stage loading conditions or during rapid drawdown. The interim operating criteria are designed to maintain the water levels at relatively low levels. If the water level in the Reservoir is maintained at these levels it appears unlikely that the Dam embankment would experience a major slope failure under static conditions. However, since the existing spillways do not have the capacity to maintain the Reservoir levels at low levels during a major flood event, portions of the Dam embankment could potentially fail during flood events. Deep slope movements that extend up to the crest of the Dam would likely result in complete failure of the Dam even under the interim operating criteria.

Weber Dam has several significant geologic hazards and geotechnical deficiencies. Even under the interim operating conditions, which would prevail under No Action, these deficiencies could eventually result in rapid failure of the Dam and catastrophic downstream flooding which is considered a significant impact.

4.2.1.2 Soil Resources

Under No Action, BIA would operate the Reservoir at a reduced capacity with no construction activities. No Action may have minor impacts on exposed soils associated with the maximum pool in Weber Reservoir being lowered. There would be indirect impacts to the vegetation communities as soils along the maximum pool elevation dry out and the plant available soil moisture contents fall below thresholds required to support that particular plant community's species. As these silty lacustrine soils dry out and vegetation community boundaries adjust, increased wind and water erosion would occur along the exposed banks. However, invasive species would rapidly populate these exposed banks and lakebeds, thereby minimizing the soil erosion potential after the first growing season. No Action would have no major effects on soil resources in the project area unless a Dam failure occurs. In the event of a seismic-related Dam failure, the uncontrolled release of the pool could substantially erode the earthen Dam embankment and transport rock and sediment downstream. Restoration of the Dam would require a large amount of earthen and durable rock materials obtained from off-site borrow locations. During and after the Dam failure, stored Reservoir sediments would be transported and deposited downstream changing the downstream floodplain dynamics and downstream hydric soils could be lost due to channel scouring and sediment deposition. Transported sediments could end up in Walker Lake.

4.2.2 Proposed Action

4.2.2.1 Geology

Several geologic and geotechnical concerns have been identified for Weber Dam. These concerns include: (1) potential for movement of a secondary fault located beneath the Dam that results in cracking of the Dam foundation and embankment, or rupture of the outlet conduit; (2) static stability of the downstream slope; (3) potential for liquefaction of the lower portion of the Dam embankment and portions of the Dam foundation during a strong earthquake; and (4) potential for instability of the Dam embankment slopes during normal, high level Reservoir conditions, flood events, and during rapid drawdown. The key geologic/geotechnical concerns for Weber Dam, and the proposed Dam modifications designed to address these concerns, are summarized in Table 4.2-1. Failure of the Dam could potentially cause the loss of lives (USBR 1995b) and inundate up to about 25 % of the town of Schurz.

Table 4.2-1. Summary of geologic and geotechnical concerns and proposed Dam modifications.

Geologic and Geotechnical Concern	Potential Failure Mode	Proposed Dam Modification
(1) Movement of existing secondary fault during the MCE could result in cracking of Dam foundation and embankment.	Fracturing the embankment could result in uncontrolled seepage through the core of the Dam that could eventually erode the embankment material and result in Dam failure.	Move embankment downstream such that the crest of the embankment is located downstream of projected trace of the secondary fault.
(2) Movement of secondary fault during the MCE could result in rupture of the outlet works conduit.	Rupturing the outlet works could result in uncontrolled seepage that could erode the embankment material and eventually result in Dam failure.	Enlarge embankment at the outlet works conduit (resulting in extension of the conduit by 105 feet), and construct internal filters surrounding the extended portion of the outlet to minimize internal erosion.
(3) Unsatisfactory dynamic stability associated with potentially liquefiable materials in the lower portion of the embankment and Dam foundation.	Liquefaction of portions of the Dam embankment and foundation could cause unacceptable movement of the embankment resulting in potential Dam failure.	Complete removal of liquefiable materials in the Dam foundation and replacement with nonliquefiable, engineered fill.
(4) Unsatisfactory slope stability of the downstream slope of the embankment during static conditions (at high Reservoir levels), and at flood stage.	A large slope failure could occur in the downstream slope that could result in rapid Dam failure.	Construct a new zoned embankment from the outlet works to the left abutment with a wider crest and flatter upstream and downstream slopes with internal filters and drains to control seepage and pore pressures.
(5) Rapid Drawdown: Analysis indicates potential for minor and major sloughing on the upstream face of the Dam during rapid drawdown.	Large failures involving the upstream slope of the embankment and extending up to the crest of the Dam could occur and result in Dam failure.	Flatten upstream slope as stated in (4) above.

A potentially active fault has been identified beneath the left abutment and intersects the outlet conduit near the axis of the existing Dam. For the purposes of discussion, this fault is herein referred to as the "left abutment fault." No evidence was found for late Quaternary or Holocene displacement along the left abutment fault. However, since the Dam is considered a critical structure, BOR conservatively assumed that movement could occur along this fault coincident with (and caused by) a MCE or similar large event on the nearby Wassuk Range fault. The left abutment fault is referred to as a secondary fault since it can only be traced for a short distance, and is not located along the trend of a major fault zone (such as the Wassuk Range fault). Movement along major normal faults during large earthquakes is typically accompanied by rupture along numerous secondary faults, particularly at the ends of each fault segment. Based on observed movements on other secondary faults in similar geologic settings, the maximum vertical displacement observed on secondary faults is typically about 10% of the maximum displacement occurring on the primary fault (USBR 1995a). The last major ground-rupturing event on the Wassuk Range fault was accompanied by about six to ten feet of vertical displacement (USBR 1995a). Considering the maximum movement on the Wassuk Range fault, BOR estimates that the maximum expected vertical displacement along the secondary fault located in the Dam foundation would be about one foot (USBR 1995a).

As summarized in Table 4.2-1, this amount of movement on the secondary fault in the Dam could generate cracks through the foundation that could provide pathways for Reservoir water movement and erosion of the embankment. In addition, up to a foot of movement in the outlet works would cause deformation and rupture of the reinforced concrete conduit lining which would result in damage or failure of the outlet structure and erosion of the embankment. In summary, Reservoir water flowing through the fault displacement cracks in the embankment and rupture of the outlet works is expected to erode embankment materials rapidly and cause a sudden release of the Reservoir (USBR 1995a).

To minimize the potential for damage and risk to the Dam associated with movement of the left abutment fault, BIA proposes to relocate the portion of the embankment located between the outlet and the left abutment downstream from the existing embankment. The proposed alignment for the new embankment positions the upstream portion of the embankment over the fault; however, more than half of the embankment, and all of the internal filters and drains would remain intact after movement has occurred. If the fault moves, the impervious zone of the embankment situated downstream of the fault would be sufficient to impend flow, the internal filters would prevent internal erosion, and the drains would relieve excessive pore pressure.

To minimize the potential for internal erosion of the embankment material in the event that the fault ruptures the conduit: (1) the embankment will be enlarged (or overbuilt) downstream from the fault; and (2) the downstream section of the conduit will be surrounded with internal filters capable of accommodating cracking associated with the fault movement. Enlargement of the embankment downstream of the fault combined with the internal filters should prevent failure of the embankment if the left abutment fault moves during a MCE or similar event on the Wassuk fault.

Based on the recurrence interval (4,500-6,500 years) for displacement along the Wassuk fault, and the fact that there is no evidence that the left abutment (secondary) fault has moved within the late Quaternary of Holocene (>10,000 years), there is a low probability that this fault will move during the life of the Dam. However, in the unlikely event that this fault does move during the life of the Dam, the position of the crest of the new Dam alignment, relative to the fault, and position of filters and drains located in the embankment downstream of the fault, is expected to protect the Dam from failure.

Extensive subsurface investigations in the footprints of the existing Dam and proposed Dam modifications identified the presence of unconsolidated, fine-grained, granular alluvial sediments located beneath sections of the Dam and proposed new embankment. The physical properties of these sediments indicate that they are susceptible to liquefaction.

Portions of the existing embankment fill, specifically, intermittent zones within the lower half of the embankment, are also susceptible to liquefaction. Liquefaction is the near complete loss of shear strength within certain soil materials. It is caused by fluid pressure within the soil increasing very quickly in relation to the ability of the soil mass to drain and relieve the pressure. Liquefaction can occur when saturated, loose granular soils are shaken by an earthquake. Earth slopes in, or founded on, materials that are subject to liquefaction may experience catastrophic slope failure or flow slides during or shortly following an earthquake. Under the Proposed Action, materials susceptible to liquefaction in the foundation of the new alignment will be removed and replaced with compacted, engineered fill. Therefore, potential impacts associated with liquefaction are not anticipated.

The stability of an earth slope under static loading (no earthquake), whether it is manmade fill or a natural slope, is expressed as a factor of safety against slumping or sliding. Factors of safety are calculated as part of the engineering design of dams. The calculations are based on the geometry (steepness) of the slope relative to the shear strength and weight of the soil or rock materials in the slope, the level of ground water, and possibly other factors. A computed factor of safety greater than or equal to one implies that the slope will be stable and is strong enough to support the assumed static design loads. Engineers design fill slopes to have factors of safety greater than one to account for uncertainties about the strength of materials, future ground water levels, or unforeseen loading conditions. Typical minimum static factors of safety used to design stable embankment slopes in Dams, or to assess the adequacy of stability of an existing Dam, range from 1.3 to 1.5. For example, the BOR recommends a minimum factor of safety of 1.5 for the high level steady-state condition, and 1.3 for rapid drawdown loading conditions.

The results of the stability analysis indicated that for (1) high Reservoir level (elevation 4,208), steady state conditions, (2) rapid drawdown (assume no drainage), and (3) flood stage loading conditions (Reservoir at Dam crest elevation 4,217), the factors of safety were unsatisfactory (USBR 1992). In other words, the analysis indicates that there is risk of large slope failures in the downstream slope of the Dam when the Reservoir is at high levels, or during flood stage, and the potential for large slope failures in the upstream slope during periods of rapid drawdown. These types of slope failures could result in complete failure of the Dam.

As described in Section 2, the Proposed Action includes constructing a new embankment from the outlet works to the left abutment. The new embankment will be zoned including a low permeability core, and internal filters and drains to minimize the potential adverse effects of seepage and to reduce and maintain pore pressures. The embankment will also have a wider crest width, flatter slopes and more extensive slope protection than the existing Dam. Stability analysis of the proposed new embankment indicates that the design meets or exceeds BOR minimum factor of safety criteria for steady state, flood level, and rapid drawdown conditions. Therefore, potential impacts associated with Dam failure resulting from slope instabilities are not anticipated.

4.2.2.2 Mineral Resources

Existing geologic and mineral resource information for the Dam site indicates that the construction of the new embankment and other Dam modifications would not affect any known or inferred mineral deposits. The proposed quarry site for rock rip rap material located at the base of the White Mountains is located in an area that has experienced mineral exploration and development activities. Prospectors in this area explored and locally mined lead and copper mineralization (Albers and Magill 1976). However, limited lateral continuity of the mineralization has precluded extensive mineral extraction in this area. There is some potential that quarry activities in this area could result in the extraction of rip rap material that contains some mineralization. However, since the volume of rock required for the Dam is relatively small, the quarry should only have a minimal impact on the mineral resource in this area.

4.2.2.3 Soil Resources

The Proposed Action is an integrated set of actions that would involve all major features of the Dam and result in direct and indirect impacts to soil resources. Direct impacts are related to construction activities required to construct Dam modifications including soil removal, storage and replacement.
As discussed in Chapter 2, the construction actions that would affect the soil resource adjacent and remote from the Dam include: repair of the outlet works and service spillway; enlargement of the emergency spillway; changes to downstream foundation of the Dam and emplacement of a geomembrane seepage barrier; construction of a downstream stability berm; and borrow of soil materials. The environmental effects to the soil resource would be temporary and may include: losses from wind and water erosion of the salvaged materials during removal, storage and reconstruction; chemical and physical losses in soil quality caused by soil handling; and off-site sedimentation, chemical and physical impacts from construction activities. These temporary effects would be minimized with proper soil handling and revegetation methods that are discussed in further detail in the Technical Soil Memo (Habitat Management, Inc. 2002).

4.2.3 Mitigation Measures

4.2.3.1 Geology

Because the proposed Dam modifications are designed to address all of the identified geologic hazards and geotechnical concerns, there are no significant impacts to geology and minerals associated with the Proposed Action. Therefore, mitigation of the geology resources would not be necessary under the Proposed Action or No Action.

4.2.3.2 Soil Resources

Salvage, storage and replacement of suitable soil materials would impact the soil resources. Appropriate soil removal, storage and reconstruction methods would be used to offset or mitigate these potential impacts to the soil resource. Selection of suitable soil to support revegetation combined with proper soil handling and soil reconstruction methods would be necessary to successfully reclaim disturbances associated with Weber Dam modifications. Reconstruction of suitable plant growth media is feasible and is a critical step in ensuring that disturbed areas are adequately stabilized. Soil handling methods are discussed in further detail in the Technical Soil Memo (Habitat Management, Inc. 2002). In concert with prescribed soils handling, site adapted seed mixtures would be carefully planted to ensure the successful establishment of native plant species capable of stabilizing and protecting the disturbed areas from excessive soil erosion.

4.3 Water Resources

Impacts of the Proposed Action and No Action on groundwater and surface water resources were determined to be minimal, as discussed in the following analysis. Environmental impacts to water resources would be significant if the Proposed Action and No Action resulted in any of the following:

- A substantial decrease of groundwater quality.
- A substantial drawdown of groundwater levels in the Walker River Basin.
- A substantial decrease in water level/available water resource that would have been available to other users.
- Exposure of people and property to substantial flooding and/or substantial degradation of water quality.
- Substantial erosion, scour, or siltation.
- Alteration of existing drainages in a manner that could substantially negatively affect listed and/or sensitive species or associated habitats.

4.3.1 No Action

4.3.1.1 Groundwater Resources

Because no groundwater development is being considered as part of No Action, no impacts on groundwater resources are anticipated.

4.3.1.2 Surface Water Resources

No Action would not alter the existing conditions; therefore, no new impacts on surface water resources are expected. The No Action Alternative results in the long-term lack of full irrigation of Tribal lands and also likely eliminates the possibility that any future additional lands could be irrigated.

The Tribe would continue to receive its annual water entitlement under the Walker Decree. BIA would continue to manage the direct flow right in conjunction with available storage in Weber Reservoir under the interim operating criteria to maximize irrigation deliveries during the 180-day irrigation season. However, the reduced storage volume available under IOC does not satisfy the demand needed for irrigation of the Tribe's 2,100 acres nor will the reduced storage be able to provide for any future irrigation. IOC has caused a reduction in the number of times fields are irrigated each season and the early curtailment of the irrigation season prior to the 180 days during which the Tribe is entitled to irrigate under the decree.

4.3.2 Proposed Action

4.3.2.1 Groundwater Resources

Because no groundwater development is being considered as part of the Proposed Action, no impacts on groundwater resources are expected.

4.3.2.2 Surface Water Resources

The Proposed Action would result in considerable excavation to install a longer emergency spillway crest and realign a portion of the Dam. Surface disturbance activities could result in localized increases in soil erosion and stream sedimentation. Additionally, the use of heavy equipment could result in the accidental spillage of contaminants such as gasoline, diesel fuel, oil, and other materials that could enter the Reservoir or Walker River in storm runoff. The potential for these impacts to occur is considered to be extremely remote since a comprehensive water quality control plan will be developed by the contractor, approved by BIA and implemented prior to the start of construction activities. As prescribed in the plan, the contractor's construction activities would be performed using methods that would prevent entrance or accidental spillage of; solid matter, contaminants, debris or other pollutants into flowing streams, dry watercourses, or Weber Reservoir. Excavated materials would not be stockpiled or deposited near or on stream banks, or in other locations where the material could be washed away by high water or storm runoff. Where possible, construction activities including staging, storage, excavation, and movement of borrow material would be in areas of previous disturbance.

The contractor would be required to comply with applicable federal and tribal laws, permits, orders, regulations, and water-quality standards concerning the control and abatement of water pollution to protect surface water resources (Table 1.4-2). The contractor's methods of dewatering, excavating, or stockpiling of earth and rock materials would include appropriate measures and BMPs to control surface soil erosion and siltation. Wastewater from general construction activities, such as drainwater collection, drilling, grouting, or other construction operations would not be allowed to enter watercourses without the use of sediment and turbidity control methods. These BMPs may include, but are not limited to, interception ditches, settling ponds, gravel-filter entrapment dikes, silt fences, rock check berms, recirculation, or combinations thereof.

Several positive environmental consequences would be realized by implementing the proposed action. Widening of the spillway crest length to 420 feet with a fuse plug will increase the magnitude of flood that can be safely passed by the Dam and appurtenant structures from 7 % (about 21,000 cfs) to 13.8 % (about 41,000 cfs) of the PMF. Installation of an engineered fuse plug would eliminate concerns about the erodability of the existing road embankment. Additionally, installation of an erosion sill would limit spillway erosion in the event the fuse plug operates (USBR 1998).

Under the Proposed Action, Weber Dam and Reservoir would provide less flood protection (flood flow storage) at full capacity than under the current interim operating criteria. The Proposed Action would provide for a maximum reservoir elevation of 4,208 ft msl and 10,700 af capcity, as compared to interim operating criteria limits of 4,200 ft msl and 4,766 af, respectively. As previously stated, the Proposed Action would increase the magnitude of flood that can be safely passed from 7 % (about 21,000 cfs) to 13.8 % (about 41,000 cfs) of the PMF. To compare, under the Proposed Action at an inflow of 41,000 cfs, the Reservoir would begin to spill about 1.75 hours sooner than under IOC.

4.3.3 Mitigation Measures

4.3.3.1 Groundwater Resources

Since no impacts on groundwater resources are anticipated, no mitigation measures are proposed.

4.3.3.2 Surface Water Resources

The development and implementation of the proposed comprehensive water quality control plan would be adequate to protect surface water resources and limit any potential impacts. No additional mitigation measures are proposed.

4.4 Air Quality

Impacts to air resources resulting from construction activity are considered significant if:

- Emissions would cause or contribute to a new violation of any ambient air quality standard.
- They would substantially aggravate existing violations.
- They would substantially delay attainment of air quality standards.

Impacts of proposed project and alternatives to air quality were determined to be minimal, the basis for this conclusion is provided in the following analysis.

4.4.1 No Action

The selection of No Action alternative would produce no significant changes in air quality.

4.4.2 Proposed Action

Under the Proposed Action, the primary impact to air quality is expected to be particulate matter (PM-10) emissions from earth moving activities. Also, impacts associated with fuel combustion emissions from internal combustion engines on earth moving equipment have been considered. Project activities would be conducted over a period of approximately 1 ½ years and would be phased to preclude disturbance across the entire site at a single time.

The primary air emissions generated by the Proposed Action would be particulate matter. Particulate emissions from the Proposed Action are related to earth moving, removal and reconstruction of Dam components, material stockpiles, and truck traffic on project haul roads. It is estimated that 109,000 cubic yards of material would be transported, redistributed or otherwise handled during project activities; 23,000 cubic yards of which would be transported from a nearby quarry to the project site to provide necessary structural materials. Particulate matter impacts associated with these activities are expected to be minimal. Material handling PM-10 emissions are estimated at less than 550 pounds over the duration of the project (or an average of about 1.58 pounds per day). Haul road emissions are estimated at 17.3 tons over the duration of the project or an average of about 77 pounds per day along the 4-mile route to the quarry. At the project site, PM-10 emissions from trucks hauling materials are estimated at 38.06 tons over the duration of the project or an average of around 169 pounds per day within the proposed footprint of disturbance.

Air emissions are also associated with stockpiling of materials at the site. The construction plan includes dust abatement measures in the project area. Although some emissions may become airborne during periods of strong wind if the material becomes dried out, these emissions are expected to be localized around the stockpile areas. According to on-site meteorological data, strong winds occur infrequently in the vicinity of the project site. In addition, the size of the on-site stockpiles are expected to be relatively small since much of the proposed activities would quickly redistribute materials from old sections of the Dam to new construction areas. Regardless, emissions from wind erosion are expected to be minimal.

Exhaust emissions from construction equipment would be generated from on-site fuel combustion in trucks and other equipment. These emissions would result in short-term increases in nitrogen oxides (NO_x), sulfur dioxide (SO_2), carbon monoxide (CO), and particulate matter (PM-10) in areas where the equipment operates. These emissions are similar to any construction activities and would be localized around the active construction areas. Construction equipment emissions would be both short-term and temporary and are not considered significant.

4.4.3 Monitoring and Mitigation Measures

Since minor and short-term effects to air quality are expected from the Proposed Action, monitoring has not been included as a component of proposed project activities and mitigation measures would not be necessary.

4.5 Biological Resources

Impacts to biological resources would be considered significant if they:

- Cause a substantial reduction of habitat for fish, wildlife, or plants.
- Threaten to cause a fish or wildlife population to drop below self-sustaining levels.
- Threaten to eliminate a plant or animal community.
- Reduce the number of, or restrict the range of an endangered, threatened, or rare species.
- Substantially affect a rare, threatened, or endangered species of animal or plant or its habitat.
- Interfere substantially with the movement of any resident or migratory fish or wildlife species.

4.5.1 Fish

4.5.1.1 No Action

Under No Action, Weber Reservoir would be dewatered every year. Weber Reservoir would be filled to a storage capacity of 4,766 af in the springtime. As the stored water is used for irrigation and other purposes, the Reservoir would be drawn down to near empty. Fish could move into the Reservoir from upstream. The low water levels experienced annually would result in low fish populations and a poor quality sport fishery in the Reservoir.

4.5.1.2 Proposed Action

With an operating capacity of 10,700 af, the Reservoir would provide sufficient water to allow a warmwater fishery to persist except in times of severe drought. A gamefish community consisting of bluegill, brown bullhead, channel catfish, largemouth bass and white crappie could be expected in Weber Reservoir from recruitment upstream. The reservoir would not be actively managed for a warmwater fishery.

Weber Reservoir operations would be consistent with operations prior to the interim operating criteria were adopted in February 2000. The main factor limiting the value of any sportfishery established in Weber Reservoir would be the quantity of water stored in the Reservoir.

4.5.1.3 Mitigation

No negative impacts to the warmwater fish population is expected under the Proposed Action, therefore, no mitigation is proposed.

4.5.2 Wildlife

4.5.2.1 No Action

4.5.2.1.1 Wildlife Habitats

Under this alternative, there would be no change in existing habitats, barring any catastrophic event resulting in Dam failure. There would be no impacts to wildlife habitats with this alternative.

4.5.2.1.2 Migratory Birds

No impacts would occur with this alternative since there would be no change to existing conditions.

4.5.2.1.3 General Wildlife Species

No impacts would occur with this alternative since there would be no change to existing conditions.

4.5.2.2 Proposed Action

4.5.2.2.1 Wildlife Habitats

Implementation of the Proposed Action would result in potential short-term and long-term impacts to wildlife habitats. Short-term impacts are disturbance to vegetation during the construction period. With revegetation following construction, disturbance to these areas would be only temporary. Long-term impact would be loss of a small amount (approximately 3 acres) of upland habitat at new Dam structures and facilities. In addition, 1.6 acres of waters of the United States would be affected.

4.5.2.2.2 Migratory Birds

Impacts to migratory birds with implementation of the Proposed Action would be both short and long-term. Short-term impacts would result from disturbance due to noise and dust during construction causing avoidance and temporary dislocation from the area. Some temporary loss of habitat would occur at staging areas, along roadways, and near construction areas. These would be short-term following successful reclamation of the areas. Long-term losses would occur if nesting sites are removed by vegetation removal on areas where new facilities and structures are established. Measures would be taken to minimize impacts.

4.5.2.2.3 General Wildlife Species

Impacts to general wildlife species with implementation of the proposed action would be both short and long-term. Short-term impacts would be disturbance during construction due primarily to noise and dust that would cause dislocation and avoidance of the area. Long-term losses would result from loss of habitat where new facilities and structures would be established.

Of the general species in the area, individual reptiles would be affected the most due to modifications to the Dam. The existing riprap on the Dam provides habitat for a large number of lizards. There would likely be loss of individual lizards during construction as well as loss of habitat. However, once the Dam construction is completed, new areas of riprap would be established to provide an increased amount of habitat for these species. Impacts, over the longrun, would be positive.

4.5.2.3 Mitigation Measures

4.5.2.3.1 Wildlife Habitats

Loss of wildlife habitat from the proposed action would be minimized by following mitigation measures such as:

- Where possible, construction activities including staging, storage, excavation, and movement of borrow material would be in areas of previous disturbance.
- Willows and other riparian vegetation would be replanted to replace vegetation lost due to modification of the Dam.
- Loss of marsh habitat would be mitigated by creating additional wetland areas near the river, possibly in the currently barren areas downstream from the Dam that are proposed as staging areas.
- Loss of marsh habitat in the seep pond south of the Dam would be minimized by diversion of small quantities of water to replace the water currently provided by seepage through the Dam.
- A detailed riparian habitat restoration plan would be prepared to include restoration of grades and the reestablishment of native vegetation consistent with the affected community type. Containerized plants and seeding would be used to replace shrubs in riparian habitats. Seeding would be used to restore grasses and other herbaceous plants.

4.5.2.3.2 Migratory Birds

To mitigate impacts to migratory birds, construction would avoid destroying active nests of birds breeding in the area. If construction were planned during the summer, a wildlife biologist would survey the area for active bird nests that might be disturbed. If nesting birds were present in these areas, construction would not begin until two weeks after young birds have fledged.

4.5.2.3.3 General Wildlife Species

General wildlife species would benefit from the mitigation measures already described and no additional mitigation measure would be needed.

4.5.3 Vegetation Resources

4.5.3.1 No Action

Under No Action additional site disturbance would not occur. During most of the year the pool of Weber Reservoir would be maintained at a lower elevation than 4,200 ft msl, with higher pool storage (up to 4,766 af) occurring periodically in response to runoff events. Upland rangelands and riparian/wetland vegetation communities would be indirectly affected by changes in soil moisture content associated with pool elevation changes from historical levels.

No Action would indirectly affect rangeland and riparian/wetland vegetation communities in both the short-term and long-term. The net affect of a lower operating pool would be the permanent loss of riparian/wetland habitat along the old historical shoreline and a net gain in upland vegetation as adjacent native vegetation communities invade banks exposed between the old and new shorelines. In the long-term, riparian/wetland vegetation communities along the new shoreline may realize an increase in extent. If No Action were selected, there would be no direct adverse impacts on vegetation resources in the Walker River downstream from the Reservoir, unless a catastrophic precipitation/runoff event occurs that breaches Weber Dam. If this should occur, wetlands associated with the Reservoir would be temporarily affected until such time as the Dam was restored. Also, wetland resources located downstream would be at least temporarily affected by the uncontrolled release of the Reservoir's pool. Although there is the potential to affect an extensive area, the impacts to wetlands associated with the failure of Weber Dam would be temporary.

4.5.3.2 Proposed Action

The Proposed Action would result in direct and indirect impacts on a variety of vegetation communities near or adjacent to Weber Dam. Construction activities would disturb the realigned Dam footprint; topsoil storage areas; the contractor staging area located west southwest of the Dam; the borrow area located west northwest of the Dam; and the rock quarry located west of U.S. Highway Alternate 95. An area located within the Reservoir pool on the east side and about 1.5 miles north of the Dam may also be used to obtain supplemental soil resources for reclamation of disturbed areas. Within the disturbance limits of the directly affected areas there are seven soil complexes or associations and two primary vegetation community types that have the potential to be disturbed. The loss of rangeland habitat within these disturbance areas would be temporary. Following completion of Weber Dam modifications, these areas would be reclaimed to native rangeland vegetation communities.

The Proposed Action has the potential to directly impact jurisdictional wetlands and waters of the U.S. in the area just below the existing Weber Dam (See Appendix E, 404(b)(1) analysis). Realignment of the Dam is projected to directly impact jurisdictional wetland and waters of the United States (Figure 2.2-1). This loss would be temporary, since Army Corps of Engineers permits for the project will require that the loss of jurisdictional wetlands be compensated in kind on site at a minimum 1:1 ratio.

Indirect impacts are associated with a temporary lowering of the maximum pool elevation in the Reservoir and a more reliable supply of water in the Walker River below the modified Dam during the growing season. In the long-term, wetlands surrounding the Reservoir would be subject to the same fluctuations in the water level that have occurred historically and no adverse impacts would be realized.

Under the Proposed Action, the salvage and reconstruction of soil materials is necessary to reclaim disturbances associated with Weber Dam modifications. In concert with prescribed soils handling, site adapted seed mixtures would be carefully planted to ensure the establishment of native plant species capable of stabilizing and protecting the disturbed areas from excessive soil erosion, and supporting the Tribe's historical land uses. The reclamation of areas disturbed by the Proposed Action can be achieved with use of suitable plant materials that are either commercially available or can be custom collected in and adjacent to the construction site.

Direct impacts to riparian/wetland vegetation communities associated with the proposed alternative would be mitigated through the creation of new wetlands in kind on site at a minimum ratio of 1:1. The mitigation site would be specifically designed to replace or improve the function and quality of disturbed wetlands. The methods to be used in establishing riparian/wetland vegetation will be developed in consultation with the Army Corps of Engineers during the 404 permitting process. The permits would be acquired prior to construction.

Completion of reclamation activities would ensure that adverse impacts to most vegetation resources are temporary in nature. Long-term impacts to vegetation would be limited to the: 1) loss of some upland rangeland that is converted embankment; 2) riparian/wetlands and bottomland rangeland immediately under and lost to realignment of the Dam; and 3) small amount of bottomland rangeland that is displaced by construction of compensatory wetlands to satisfy Army Corps of Engineers permit requirements.

4.5.3.3 Mitigation

Construction methods would include revegetation of disturbed areas and the wetlands mitigation would be specified in the 404 permitting process. Therefore, no additional mitigation is identified.

4.5.4 Threatened and Endangered Species

4.5.4.1 No Action

4.5.4.1.1 Bald Eagle

No Action would not result in any long term loss of roosting habitat and there would be no impact to bald eagles.

4.5.4.1.2 Lahontan Cutthroat Trout

Under No Action, conditions in the Walker River would remain as they have since Dam construction began in 1933. LCT would be able to move from Walker Lake to Weber Dam in years when sufficient flow is in the Walker River to permit migration. LCT would not be able to pass upstream of Weber Dam.

4.5.4.1.3 Species of Concern

No Action would not result in any long term loss of habitat and there would be no impact to Species of Concern.

4.5.4.2 Proposed Action

4.5.4.2.1 Bald Eagle

While bald eagles may temporarily roost and forage in the area in the winter, there are no concentrated roosting sites. There are two important habitat features to consider with this species within the project area including:

Because there is little, if any, riparian vegetation that would be affected by project implementation, roosting and nesting habitat (large Freemont cottonwoods) would not be affected. Equipment use and camping restrictions, as specified below, would insure avoidance of these riparian areas and their protection.

Reservoir draw-down during dam modifications has both potentially positive and negative effects on bald eagles. During draw-down, forage fishes would be confined to a very small pool area immediately upstream of Weber Dam. Fish prey would be concentrated in one location with limited options for escape, making foraging easier for eagles. Concurrently, personnel and heavy equipment would be working on the dam faces adjacent to the drawn down pool. This combination of factors with considerable construction noise occurring near a large concentration of forage fishes might place unusual stress on these raptors, but presence of extensive foraging areas should remain in the three to four miles of old river channel that would be exposed upstream of the dam at the upper end of Weber Reservoir. In addition, construction activity timing would take place mainly during early fall prior to arrival of eagles to further avoid conflict with this species.
The following protective measures and monitoring would be implemented during construction:

1. Document the date of arrival and numbers of bald eagles in the area stretching from the Dam for 6 miles upstream along the Reservoir and river.
2. Document whether and where foraging is occurring at Weber Reservoir or in adjacent upland areas.
3. Monitor use of communal night roost and diurnal perch trees in the vicinity of the Dam and Reservoir. Monitoring shall occur from no less than a quarter of a mile away.
4. No large cottonwood trees would be removed or damaged by the project. Protection of perch and roost sites would occur with equipment use and camping restrictions for avoidance of riparian areas. No camping in these areas would occur between October and March.
5. Documentation/reports of bald eagle activity, if occurring, would be provided to FWS every two weeks during project construction.
6. If disturbance of bald eagles occur due to the project, the factors (i.e. noise, disturbance at roost or perch trees, loss of prey species from Reservoir, disturbance during foraging at Reservoir, etc.) which caused the disturbance would be noted and BIA would reinitiate formal consultation.

There may be short-term disturbance to bald eagles at temporary roost sites; however this impact would be minor since there are alternate roost sites in the area. The proposed action would not result in any long-term loss of roosting habitat.

4.5.4.2.2 Lahontan Cutthroat Trout

Both short- and long-term impacts from the Proposed Action to LCT would be minimal if the proposed construction schedule and mitigation measures are followed. Short term impacts include disturbance of the river channel with the construction of the fish passage. The construction could be scheduled to avoid working at times when LCT are expected to be in the river.

During normal and dry years, very little flow would reach Weber Dam and Walker Lake and LCT are unlikely to inhabit the river downstream from Weber Dam. The timing of operations for the reservoir modification are planned to begin in April and extend through December (Table 1). Reservoir releases for downstream irrigation diversions would occur during modification from April through September , which includes the spawning period. Excess flow could convey down Walker River to Walker Lake and result in an upstream migration of LCT. Reservoir operation under IOC is expected during construction. Water storage is not anticipated until the Dam repair is complete (approximately mid-December).

Construction activities could affect LCT that migrate to the base of the dam if precautions are not taken to exclude the fish from that area. As currently proposed, a small coffer dam would be constructed downstream from the outlet works but upstream of the spillway pool for use in dewatering the excavation area for the new embankment. This feature would exclude LCT from the excavation area. The contractor would prepare a water quality plan, which would include provision for sediment retention due to any construction activities. Construction would be excluded from the active river channel by the coffer dam and therefore the sediment generated should be kept from entering the Walker River (Weber Dam Modification Solicitations/Specifications Volume 1, Page 2-1). Further, the majority of the earth-moving activities are scheduled to take place between June and December when LCT would not be in the river. Therefore, there should be no impact to the species from sedimentation. Major construction activities, including embankment excavation and placement are expected to be complete no later than mid December.

The construction activity itself does not preclude any of the activities listed in the LCT recovery plan from occurring. The fish passage at Weber Dam is consistent with the both short-term and long-term recovery measures identified for LCT. Removal of instream barriers to fish passage is one of several measures identified to assist with recovery of LCT. Impacts to LCT from the proposed project construction would be minimal due to the proposed construction schedule and mitigation measures. Potential risks of impacts to LCT (e.g. accidental sediment spills or wet-year attraction flows) would be slight.

Fishway Operation. Similar to water and fish passage facility management for cui-ui spawning in the Truckee River basin, a modified Weber Dam with a fish ladder would be operated to promote fish passage when hydrologic conditions are forecast to be adequate to satisfy LCT life history requirements or to inhibit or prevent passage or river access when conditions would be inimical to target fish species.

The annual timing of the fishway operation would determine its success. Depending on numerous factors – particularly annual hydrological conditions – it may be possible to minimize any conflicts between LCT migration and the Tribe's irrigation diversions. Therefore, the proposed annual coordination meeting would allow development of an effective plan for fishway operation that reflects the unique conditions of each year.

The annual meeting also would allow BIA and the Tribe to address and minimize any other potential and unintended impacts to LCT. For example, if the fishway were not operated during a particular period, but water nevertheless reaches Walker Lake and attracts LCT upstream to the Dam, fish may be blocked from further migration. Or, injury or mortality may occur in the fishway or dam facilities. The risk of such unintended events exists, but is relatively small.

Delays in upstream and downstream migration also is a potential impact from the Proposed Action. Information on migrations of LCT through reservoirs the size of Weber Reservoir (approximately 3 miles long) is not available, however, there is information on migration of other salmonids through small reservoirs.

Available information on salmon smolt migration in the Columbia River system shows that they migrate approximately 21 to 37 kilometers per day at low- and mid-flows, respectively (Raymond 1968). That investigation looked at downstream Chinook smolt migration through the Ice Harbor, McNary, and John Day reservoirs. With the exception of McNary Reservoir, the times for migration through reservoir or free-flowing areas did not differ, and the migration rate of the smolts was correlated with river discharge. Raymond concluded that the delay in McNary Reservoir was likely due to the lower water velocity in that impoundment as compared to the remainder of the river. Water velocities in McNary Reservoir are approximately 30% of the velocity downstream of McNary Reservoir. This reduction in velocity directly correlates with the delay in migration time.

There was no mention in the literature of small reservoirs delaying migration. Most of the studies on both upstream and downstream migration have focused on reservoirs that are several kilometers to over 100 kilometers in length. Although information from the large Columbia River system reservoirs does not apply directly to the Proposed Action, we have inferred the implications on the migration of fish from those studies.

Raymond (1968, 1969) stated that large reservoirs, in particular McNary Reservoir, on the Columbia River delayed downstream migration of smolts. The distance traveled by smolts through the long reservoirs (> 100 km) was approximately one-third the distance traveled in free-flowing sections of the Columbia River. Bentley and Raymond (1976) confirmed such delays on the lower Snake River caused by the large reservoirs on that river. This type of delay was not apparent in small reservoirs (i.e., several kilometers in length, similar to Weber Reservoir).

Hansen et al. (1984) showed that Atlantic salmon smolts traveled approximately 1.3 kilometers per day through a short reservoir. They stated that the smolts traveled in the direction and at the approximate speed of the surface water. Thorpe et al. (1981) calculated travel time of smolts at 5 to 8 kilometers per day. Aarestrup et al. (1999) calculated travel time through a 12-kilometer-long reservoir at 0.165 kilometer per hour (4 kilometers per day).

Gowans et al. (1999) reported upstream travel times of adult salmon through a 4-kilometer-long reservoir as short as 3 hours, a speed of approximately 1.3 kilometers per hour. The longest travel time in that same study was 39 hours, approximately 0.1 kilometer per hour. From the above information on small reservoirs, it is concluded that Weber Reservoir should cause little, if any, delay in upstream or downstream migration.

When the dam is rehabilitated, Weber Reservoir would not be actively managed for a warmwater fishery. No warmwater species stocking is planned for Weber Reservoir. The warmwater fishery may exist from migration of species upstream of Weber Reservoir into the Reservoir itself. Potentially predatory warmwater species, such as bass and catfish, exist in a 30-mile stretch of Walker River upstream of Walker Reservoir. The proposed project (i.e., dam rehabilitation and fishway addition) would have no effect on the conditions for these warmwater predator species. Moroever, until LCT again spawn upstream of Weber and migrate down to Walker Lake, these warmwater predators have no opportunity to consume LCT. (Predators are unlikely to consume full-size LCT migrating upstream.) If and when upstream spawning returns, reducing the risks of LCT predation from these species would require a basin-wide solution involving the WRIT. The Tribe therefore is interested in actively pursuing LCT recovery, which includes taking steps to provide beneficial habitat conditions for LCT in Walker Lake and the lower Walker River as the recovery program progresses. Weber Reservoir would be managed to promote LCT passage and minimize predation to the extent reasonably possible.

Weber Reservoir, as modified, may provide valuable assistance in recovering Walker River basin LCT by facilitating water deliveries to Walker Lake. Weber Dam and Reservoir's downstream location provides a location to support a pulse flow to Walker Lake. In addition, the fishway would allow passage at Weber Dam for migrating LCT. The fishway at Weber Dam would therefore provide a beneficial impact to LCT by removing the migration barrier at Weber Dam. Both the reservoir and fishway would be managed in coordination with WRIT and FWS to promote recovery of LCT in the Walker River.

In addition to upstream passage barriers, there are issues of water quality and river flow that would need to be addressed as part of the recovery effort. Water temperatures upstream of Weber Reservoir at Wabuska exceed 34°C during the summer months whereas maximum temperatures downstream from Weber are generally about 6 to 8°C less during that same time period (Table 4.5-1, Miller et al. 2001). The high upstream temperatures are likely due to the lowered discharge and also the ambient air conditions that exist during the summer months. It is unknown if the same temperature conditions existed prior to the major water development in the upper and middle basin of the Walker River. Other than water temperature, water quality conditions should be suitable for LCT in the river upstream of Weber Dam and Reservoir. Water quality in the reservoir is sufficient for survival of LCT.

Very little water quality information is available for Weber Reservoir. BIA and the Tribe therefore would continue collecting water quality data at the Wabuska USGS gauge, which is part of the USGS National Stream Quality Accounting Network. In addition, the Tribe collects certain water quality data on the Reservation consistent with its water quality plan.

Table 4.5-1. Walker River water temperature (°C) May 25 through August 25, 1999 (Miller et al. 2001)

	Wabuska	Downstream from Weber
Maximum	34.6	26.4
Average	19.9	22.0
Minimum	9.4	14.8

4.5.4.2.3 Species of Concern

Short-term impacts to Species of Concern under the proposed action include disturbance during construction of white-faced ibises, least bitterns, and black terns, which may use the site for temporary stopovers during migration. Additional noise, dust, and human activity could result in their avoidance of the area. However, the bulk of the habitat for these species is located on the north end of the Reservoir, and is well removed from the proposed construction area. These impacts would not be significant and there would be no long-term impacts.

Impacts to bat species could occur over the short-term during removal of material at the borrow site. As long as such activities did not result in closure of any existing mine tunnels, there would be no long-term impact. If closure occurs, loss of habitat is possible.

4.5.4.3 Mitigation

4.5.4.3.1 Bald Eagle

To minimize temporary disturbance to winter roosting bald eagles under the Proposed Action, noise and dust impacts would be minimized using best management practices.

4.5.4.3.2 Lahontan Cutthroat Trout

The Proposed Action includes fish passage at Weber Dam by construction of a rock ramp fishway to allow fish to migrate past Weber Dam. The proposed design is patterned after the fishway recently installed at Derby Dam on the Truckee River. The fish passage removes the impact from the current passage impediment. The full documentation of the fish passage evaluation is presented in Anderson (2002).

The results of the evaluation indicate that the boulder weir-rock lined fish passage structure is technically feasible and more cost effective than the more conventional vertical-slot baffle fish passage structure. Furthermore, the boulder weir-rock lined fish passage structure appears to better reflect a natural channel and may enhance the passage of the LCT. Therefore, the Proposed Action, which includes fish passage and operation, does not require additional mitigation for LCT.

4.5.4.3.3 Species of Concern

To mitigate for the potential short-term impacts to Species of Concern with implementation of the Proposed Action, noise and dust impacts could be minimized using best management practices. Loss of marsh habitat, which could serve as temporary wading areas for white-faced ibises, least bitterns, and black terns, could be mitigated by the following measures:

- Creating additional wetland areas near the river, possibly in the currently barren areas downstream from the Dam that are proposed as staging areas.

- In the seep pond south of the Dam, habitat loss could be minimized by supplying small quantities of water to replace the water currently provided by seepage through the Dam.

4.5.5 Biodiversity

The Proposed Action would result in a stabilization of the water levels in the Reservoir by maintaining them at a higher level than currently, possibly reducing the impact to the upstream wetland areas that may be somewhat altered by the lower pool under No Action. In addition, the fish passage associated with the Proposed Action would once again open the lower Walker River to migration by LCT, thus providing a future benefit to LCT in that section of river. It is also expected that other species would be able to use the fish passage and the overall connectivity in the lower Walker River would be restored with fish passage past Weber Reservoir and benefit biodiversity in the lower Walker River.

4.5.5.1 Conclusions

Listed species that potentially occur within the study area are bald eagle and LCT. Species of concern include several wildlife species and bird species.

Potential impacts to bald eagle in the short term are due to disturbance during construction. Wintering bald eagles would be disturbed from their temporary roost trees. No large roost trees would be lost during construction. There is no loss of habitat for bald eagle with the Proposed Action. There are alternate roosting sites available during the construction period and, therefore, it is concluded that there would be minor impacts to bald eagle from the Proposed Action.

Lahontan cutthroat trout are not currently in the study area except at times of high water during spring runoff. LCT occur in Walker Lake, stocked as sport fish. Those fish migrate in spring during high water years upstream as far as Weber Dam. The Proposed Action includes a fish passage structure to allow migrating fish to move upstream of Weber Dam. There is no loss of habitat from the Proposed Action. Construction best management practice would avoid impacts to water quality and other habitat alterations. In the long term there would be a benefit to LCT from fish passage.

When the dam is rehabilitated, Weber Dam would not be actively managed for a warmwater fishery. The warmwater fishery may exist from migration of species upstream of Weber Reservoir into the Reservoir itself. No warmwater species stocking is planned for Weber Reservoir. The Tribe is interested in actively pursuing LCT recovery and fishery which includes taking steps to provide that opportunity in Walker Lake and the lower Walker River as the recovery program progresses. Weber Reservoir would be managed in such a way when water is available to promote LCT passage and the LCT fishery that could develop in the entire Walker River as the recovery program progresses.

Species of concern potentially exist within the study area. White-faced ibis were observed north of the reservoir well away from the construction area during the field effort. The Proposed Action with mitigation would likely not affect species of concern and in the long run, the habitat in the study area would return to current levels.

4.6 Cultural Resources

Impacts to cultural resources would be significant if they resulted in disrupting or adversely affecting a prehistoric or historic archeological site or a property of historic or cultural significance to a community or ethnic or social group.

4.6.1 No Action

There would be no impacts under No Action.

4.6.2 Proposed Action

With the exception of the Weber Dam site itself, no direct physical impacts to known cultural resources will occur during ground-disturbing activities associated with the project. Repair of the Dam outlet works and service spillway, enlargement of the emergency spillway, flattening of the upstream slope of the embankment, and structural changes to the upstream and downstream foundations of the Dam are all expected to directly impact the Weber Dam site.

Under the Proposed Action, only one of the eligible sites, the Weber Dam site, would be directly impacted. It should be noted that the Weber Dam site has been recommended as eligible for listing under NHPA under Criterion a., and the consultation between BIA and the Nevada SHPO is underway to lessen or resolve any effect the Proposed Action would have on the historic property. The SHPO provided comments on a draft version of a Memorandum of Agreement (MOA) that was submitted by BIA to resolve the effects of the undertaking. BIA will incorporate the comments into the MOA, and those of the other consulting parties, to successfully complete the consultation process. No Traditional Cultural Properties would be affected by the Proposed Action.

4.6.3 Mitigation Measures.

Mtigation measures are unknown pending final determinations of eligibility for the historic Weber Dam site. It must be stressed, however, that the proposed borrow pit area immediately southwest of the Dam and the proposed riprap source area approximately four miles southwest of the Dam on BLM land have not yet been surveyed for cultural resources. Cultural resource inventories must be completed in these areas and any sites identified must be evaluated under the NHPA. Any eligible sites would then have to undergo treatment prior to any ground disturbing activities. If cultural resources are encountered during construction activities, the operations would cease immediately and the tribal authorities or archeologist and/or the BIA Western Regional Archeologist would be notified.

4.7 Socioeconomic

Impacts are considered significant if they would cause long-term adverse effects to tribal or Mineral County employment, income, or social services.

4.7.1 No Action

No Action would have no effect on some aspects of the social and economic environment. There would be no effect on population or demand for public services. Some aspects of the social and economic conditions on the Resevation would continue to be adversely affected by No Action. The reduced storage in Weber Reservoir would not allow full irrigation of the lands developed for irrigation. This would result in the long term loss of employment and income from those lands. In the event of Dam failure, there would be substantial costs both in terms of damages from flooding and from halting most farming operations on the Reservation. Although likely substantial, these costs have not been estimated.

4.7.2 Proposed Action

Implementation of the Proposed Action would not be expected to increase the population in the study area. The 12 to 18 month time frame for construction would not be long enough to induce workers to move permanently to the area. There are ample numbers of motels and campgrounds within a 30 to 60 minute drive to accommodate the anticipated workforce of fewer than 50 workers and the number would be reduced to some degree by hiring tribal members and local people. Consequently, it is expected that the construction crews would be partly local and partly transient, neither of which would induce a measurable amount of growth to either the Reservation or Mineral County.

Construction pay scales would be generally above the scales of many current jobs in the county or on the Reservation. Consequently, there would be a short-term positive effect on income levels in the study area during construction. The degree of benefit would depend on how many local workers would be hired and to what degree the transient workers settle in for the duration of construction.

Literature indicates that transient construction workers would spend a portion of their earnings in the local area, be it for lodging, food, entertainment, gasoline or other needs and desires. Most of these facilities and services are located off the Reservation, with the exception of a convenience mart with gasoline. Such expenditures benefit the local community in two ways: through supporting local businesses and through paying local and state sales taxes on purchased goods and services.

Completion of the Proposed Action would sustain farming on the Reservation, benefiting numerous tribal members.

As noted previously, there would be some demand for motel rooms and campgrounds in area communities to accommodate construction workers. These facilities would be located off the Reservation. The supply of such facilities is sufficient that the project-related increase should be manageable even during peak tourism season. Consequently, the demand for and expenditures on temporary lodging would be considered a positive effect.

It would be expected that a 12 to 18 month construction project might well generate some increased demand for emergency services. The local EMT service and hospitals in Hawthorne, Yerington and Fallon, with backup from Care Flight should be adequate to accommodate the needs.

4.7.3 Mitigation Measures

No monitoring or mitigation measures have been identified for socioeconomic effects of the Proposed Action and the No Action Alternatives.

4.8 Land Use

Impacts to land use would be considered significant if the following occurred:

- Substantial conflict with adopted environmental plans and community goals.
- Substantial conflict with currently established recreational (both authorized and unauthorized) educational, religious, or scientific uses of the area.
- Result in a substantial disruption or division of the physical arrangement of an established community.
- Substantial conversion of prime agricultural land to non-agricultural use or impairment of the agricultural productivity of prime agricultural land.

4.8.1 No Action

Existing land use on the Reservation could be adversely affected by No Action because it would prohibit full operation of the Reservoir and the Reservation irrigation system. No Action would reduce the amount of water that has been historically stored in Weber Reservoir. Consequently, the amount of water available to farmers in the system would be reduced, especially in dry years when the water is most needed. Without sufficient water, portions of the irrigated land might be removed from production and allowed to revert to desert.

4.8.2 Proposed Action

Implementation of the Proposed Action would have only minor effects on land use, access or recreation in the study area. Use of staging areas, borrow areas and stockpile areas would temporarily remove such areas from grazing, however, the areas involved would be a very small fraction of the total grazing land on the Reservation. No irrigated land or other high intensity use areas would be disturbed for construction of the project.

4.8.3 Mitigation Measures

Disturbed areas would be reclaimed and restored as nearly as possible to their current condition as part of construction activities, both for aesthetic reasons and to minimize erosion.

4.9 Transportation

Impacts to transportation would be considered significant if there are substantial changes to traffic volumes or traffic safety in the project area.

4.9.1 No Action

No Action would not affect traffic safety or convenience to the traveling public in the project area.

4.9.2 Proposed Action

Worker traffic to the site would likely be limited to fewer than 50 vehicle trips per day, half inbound and half outbound, based on an assumption that construction activities would employ fewer than 50 workers. There is ample unused capacity on U.S. 95 and U.S. 95A to accommodate this level of traffic safely and with no reduction in levels of service for other motorists on the road.

There is a potential for conflict with highway traffic on U.S. 95A during transport of 11,000 cubic yards of rock for riprap and slope protection from a quarry site west of the highway to the project site near the Dam. The heavy truck crossing would require flaggers to protect the traveling public and the truckers during this operation.

4.9.3 Mitigation Measures

Traffic flagmen or other equivalent traffic safety measures should be utilized during the rock hauling activity to minimize conflict and risk to motorists.

4.10 Recreation

Impacts to recreation would be considered signicant if there are substantial changes to the recreation values and experiences at Weber Reservoir and the project area.

4.10.1 No Action

No Action would likely reduce the attractiveness of Weber Reservoir for recreationists. Lower water levels could adversely affect fishing and would reduce the attractiveness of the area for campers from an aesthetic perspective as well. Although it is not possible to quantify the potential effects of reduced recreation attractiveness, they undoubtedly would occur to some degree.

4.10.2 Proposed Action

Recreation at the Reservoir would be temporarily disrupted during construction. The area might have to be closed to use during part or all of the construction period to protect the public. This would be a short-term effect; depending on what construction activity is occurring at any particular time and where it is occurring, closure may not be necessary for the duration of the construction effort. If construction activity were to be limited to five days per week, it may be possible to open the Reservoir area to recreation use on weekends during at least part of the 12 month construction period. Weber Reservor at full capacity after project completion would likely be more attractive to recreationists than No Action.

Effects on recreation facilities or activities in other parts of the Reservation or in surrounding areas would be minimal. There may be a small number of construction workers who would set up camp in Walker Lake campgrounds, but, if that becomes a problem, BLM regulations would require them to move elsewhere after a brief period of time. No camping would be allowed in riparian and bald eagle roosting areas between October and March.

4.11 Noise, Public Health and Safety

Impact would be considered significant if the following occurred:

- Substantial increase in noise levels.
- Substantial risk to public health and safety in the project area.

4.11.1 No Action

4.11.1.1 Noise

No Action would not be expected to have any measurable effect on existing noise levels in the project area. At most, it would reduce noise slightly as a result of reduced recreation at the Reservoir and reduced farming activity, absent development of an alternative source of irrigation water to replace the reduced storage currently available in Weber Reservoir.

4.11.1.2 Public Health and Safety

No Action would continue the current risk to people and property downstream of the Dam and in Schurz because the conditions that led to the existing poor overall safety rating would not be rectified. The potential for an estimated $13,719,000 in monetary damages in the event of a Dam failure from either a flood event or a seismic event would continue and would likely grow as further development occurs in the Schurz area. Likewise, the risk of loss of an estimated 50 lives as a result of Dam failure from an earthquake causing movement on the secondary fault under the Dam embankment would continue unabated.

There would be no change to existing traffic safety risk levels or trends if the proposed Weber Dam Modification Project were not implemented.

4.11.2 Proposed Action

4.11.2.1 Noise

Construction of the proposed Dam modifications would generate noise from heavy equipment operations employed to move substantial quantities of soil and rock. Although a detailed equipment roster for the project is not available, noise emissions from construction can be estimated from equipment used on other, similar types of projects. Based on similar types of projects, it is estimated that Dam construction activities would generate approximately 87 dBA at a reference distance of 50 feet. Employing noise attenuation calculations based on spreading of the sound waves over distance, the resulting noise level at the nearest residence, 3.4 miles to the south, would be 36 dBA. This level is below the estimated ambient, daytime noise in the area and would not be discernible from background noise at the residence under most circumstances.

This estimate is considered to be conservative, as it does not include noise reduction from atmospheric attenuation, ground absorption, or terrain barrier effects, all of which are likely to reduce noise propagation to some degree, especially over the distance to the nearest residences. Also, it is assumed that construction would only occur during the daytime hours from 7:00 a.m. to 7:00 p.m. so noise at night, when people are more sensitive to disturbance, would not be a consideration.

Noise levels from construction would be higher at the recreation area of the Reservoir, however, even there it is expected that construction noise would not exceed an average of approximately 59 dBA. While these levels are higher than might be desired by people seeking peace and serenity form passive recreation, they would be well below the level of danger to human hearing and would not be obtrusive to active recreationists. Construction noise would be short-term in nature, intermittent during 12 months of construction activity.

Noise from operation of the modified Dam would be minimal and essentially the same as existing operational noise. No adverse effects would be expected from operations.

4.11.2.2 Public Health and Safety

Implementation of the proposed Weber Dam Modification Project would greatly reduce the potential risk to lives from Dam or outlet structure failure. The Dam embankment would be moved off the secondary earthquake fault and new foundation material would be used that would be much less susceptible to liquefaction. Consequently, if an earthquake should occur, even at the MCE magnitude, the likelihood of Dam cracking resulting in seepage instability would be substantially lower than under existing conditions and catastrophic failure of the Dam with no warning would be highly unlikely to occur.

The likelihood of adequate warning time to evacuate people from at risk locations in the event of a PMF indicates loss of life from a hydrologic flood event is unlikely, even under existing conditions, but monetary damages from such an event would be substantial (see Section 3.8.1.3). Expansion of the emergency spillway, rehabilitation of the service spillway, and other modifications would increase the emergency capacity from the current 7 percent of PMF to 13 percent of PMF. This would notably reduce the probability of Dam failure from a flood event and would reduce the likelihood of property damage by an unquantified, but substantial, amount.

Construction traffic would increase the risk of motor vehicle accidents to a very slight degree, simply because it would add a small increment of traffic to U.S. 95A and lesser amounts to other roads in the area. The likelihood of additional accidents would be very low, however, because traffic on U.S. 95A, the primary access route, is currently very low and there are ample gaps in traffic to allow safe turns from the highway into the access road and from the access road onto the highway.

4.11.3 Mitigation Measures

4.11.3.1 Noise

All construction equipment used for the Weber Dam Modification should be equipped with proper fitting and operating mufflers to minimize noise emissions from the project. The level and degree of noise effects projected from development of the proposed project would not be sufficient to warrant additional monitoring or mitigation measures.

4.11.3.2 Public Health and Safety

No specific Dam safety mitigation or monitoring activities are recommended beyond the normal requirements of federal Dam safety regulations.

During construction, the safety of recreationists in the project area and motorists on public roadways should be a paramount consideration. Public access to construction areas should be prohibited and it may also be necessary for the recreation area at the Reservoir to be temporarily closed during construction. When heavy equipment is moved to or from the project site, flagmen should be employed at U.S. 95A to ensure the safe transition of slow-moving, oversized vehicles into or out of the highway traffic stream.

4.12 Indian Trust Assets

Impacts are considered significant if a disproportionate share of the adverse socioeconomic impacts is borne by minority and low-income communities.

4.12.1 No Action

No Action would perpetuate the existing risk to lives and property from Dam inadequacies that could lead to catastrophic Dam failure and major downstream flooding. The potential risk falls disproportionately on American Indians because they constitute a substantial majority of the population and property owners in the area that would be affected by flooding in the event of a failure.

No Action would also perpetuate the existing risk to Indian Trust Assets in the event of Dam failure.

4.12.2 Proposed Action

Implementation of the Proposed Action would benefit the American Indian population in the study area by substantially reducing the risk to life and property from potential Dam failure due to earthquakes or large flood events. No disproportionate adverse effects to human health or the human environment of the American Indian population have been identified that would result from developing the project.

An extensive effort was made to provide all interested parties in the project vicinity with access to public information and opportunities to participate in the review process for the project. In particular, representatives of the Walker River Paiute Tribe have been closely involved in planning the project and in developing the DEIS. An informational letter was sent to individuals, organizations, and state and local agencies describing the proposed project and requesting comments. Similar notices were published in newspapers in the area and public scoping meetings were held in the vicinity to inform the public about the project and to solicit public input to the process of identifying potential issues warranting consideration in the DEIS. See Chapter 1 for additional information on the public notification process. Every effort was made in the public consultation process to ensure that access to information was available to all interested parties in a non-discriminatory manner.

Constructing the proposed Dam modifications would benefit Indian Trust Assets by reducing the potential for damage to the Reservoir, irrigated lands, and downstream property from failure of the Dam due to earthquakes or major flood events.

4.12.3 Mitigation Measures

No mitigation measures have been identified as there would be no adverse effects from the proposed project on minority/low-income populations or on Indian Trust Assets.

4.13 Cumulative Impacts

NEPA requires the consideration of cumulative impacts, which are the incremental impacts of an action when added to other past, present, and reasonably foreseeable future actions (40 C.F.R. 1508.7). This cumulative impacts analysis was prepared according to those regulations and the following guidelines:

- Considerating Cumulative Effects under the National Environmental Policy Act (CEQ 1997)
- Consideration of Cumulative Impacts in EPA Review of NEPA Documents (EPA 1999)

Existing conditions were presented in Chapter 3, Affected Environment of this DEIS. Chapter 2 of this DEIS presents a complete description of the Proposed Action including a description of the repair and modification to Weber Dam and ground disturbing activities in the project area.

Cumulative impacts can result from individually minor, but collectively significant actions occurring over a period of time. These actions include both on-site and off-site projects that are within the spatial and temporal boundaries of the proposed action considered in this DEIS. The areas of analysis for cumulative impacts are based on those presented by major resource category in Section 4.13.2.

4.13.1 Reasonably Foreseeable Future Actions

Discussions were held with BIA and the Tribe to identify reasonably foreseeable actions. In addition, activities by other federal and state agencies were reviewed using internet searches of agencies internet sites and newspaper articles. Several potential future activities were identified from that process. No similar projects were identified that are funded or for which other NEPA analysis is being prepared. Other activities in the Walker River basin that could have future impacts include:

- Mediation for the settlement of tribal and other federal water claims in the Walker River Basin
- Federal and local initiatives for restoring the Walker Lake ecosystem
- LCT recovery plan activities

The Court ordered mediation is currently confidential and no information is publicly available for that ongoing activity. BLM initiated a NEPA process in early 2000 on acquiring water from willing sellers in the Walker River Basin for the benefit of Walker Lake. That effort has put on hold pending negotiations. The Walker Lake Working Group is an organization whose goal is acquisition of water for Walker Lake to restore and maintain ecosystem function to the lake.

Potential short term actions in the Walker River Basin for LCT recovery are listed in the short term action plan recently issued by FWS (USFWS 2003). This document identifies actions that will assist in the recovery of LCT in the Walker River Basin. It is a planning document, and as such, actions are identified but may or may not be funded. The majority of the actions listed in the document are activities designed to further the understanding of the conservation needs of LCT and are intended for use in refining the long term recovery strategy.

4.13.2 Resource Categories Included in the Cumulative Impact Analysis

Reasonably foreseeable future actions identified to have potential environmental impacts include the short term action plan for LCT in the Walker River Basin and the initiatives for restoring Walker Lake. No specific project details are available for either of those actions. Based on the available information regarding the intent of each of those actions, it was determined that the Proposed Action would be an incremental contribution to cumulative impacts to surface water resources and biological resources.

4.13.2.1 Surface Water Resources

The Proposed Action would not result in additional water storage beyond the current full reservoir capacity of 10,700 af, however, it would provide additional water management opportunities at the Reservoir that do not currently exist. This additional water management would provide opportunities for controlled releases to Walker Lake if water were obtained for the benefit of the lake in any of the proposed water acquisition initiatives in the Walker River basin. Entities holding decreed water rights within the Walker River basin have expressed the intent to request the use of Weber Dam and Reservoir to facilitate the movement of decreed water from the upper basin to Walker Lake. For instance, in Calendar Year 2004, the Nevada Department of Wildlife (NDOW) obtained permission from the Nevada State Engineer and the Walker Decree Court to change the place of use NDOW's decreed water from the Mason Valley Wildlife Management Area to Walker Lake. The Tribe also received approval from the Walker Decree Court to transfer a portion or all of the Tribe's decreed right to Walker Lake as a result of a Reservation fallowing program. NDOW, the BIA, and the tribe worked out an operational plan forWeber Dam and Reservoir to collect, store, and release NDOW's decreed water to maximize delivery to Walker Lake. Completion of the safety of dams repair work on Weber Dam would expand the ability of BIA, the Tribe, and other decreed water users in the basin to use Weber Dam and Reservoir for similar purposes.

The Proposed Action would not provide additional water to the lower Walker River or to Walker Lake. Existing hydrologic conditions that are inimical to LCT and LCT recovery in the Walker River basin would continue in the future under any of the alternatives considered in this analysis. The Proposed Action would, however, provide opportunity to enhance flexibility of management of water currently available to the lower river for identified beneficial uses, as well as provide a passage avenue around Weber Dam should river conditions become more salutary for indigenous fish species. Benefits from future actions that increase the water supply for the lower river and Walker Lake would be enhanced as a result of modification and repair of facilities at Weber Dam through coordinated management of storage and release of lower river flows; potential enhancements include temperature modification, restoration of riparian habitat, and upstream and downstream fish passage, all of which would promote LCT recovery in the basin.

4.13.2.2 Biological Resources

The Proposed Action would affect approximately 20 acres on the Reservation and less than five acres on BLM lands. The BLM land includes the previously disturbed quarry area. Most vegetation would be removed where necessary from construction areas at Weber Dam. Reclamation activities after construction would convert most of the disturbed area back into habitat.

The Proposed Action would result in a beneficial cumulative impact to wetlands. The wetlands that have formed at the upstream end of Weber Reservoir since its initial construction in the 1930s would be maintained by the full Reservoir capacity after project completion.

The Proposed Action would result in a beneficial cumulative impact to LCT recovery efforts. The Proposed Action includes a fish passage that would allow LCT and other fish species to move upstream of Weber Dam. Lack of fish passage at dams and diversions has been identified in the Walker River LCT Recovery Implementation Short Term Action Plan as an impediment to recovery. Fish passage at Weber Dam would assist in recovery of LCT in the Walker River Basin.

4.13.2.3 Socioeconomic

The Proposed Action would allow full irrigation of approximately 2,100 acres of croplands on the Reservation. This would result in an increase in employment and economy of the Reservation and Mineral County over the long term.

4.14 Unavoidable Adverse Effects

Unavoidable adverse effects are residual effects after implementation of mitigation measures.

As defined in Section 1508.8(b) of NEPA, "[e]ffects include ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic, historic, cultural, economic, social, or health, whether direct, indirect, or cumulative. Effects may also include those resulting from actions which may have both beneficial and detrimental effects, even if on balance the agency believes that the effect will be beneficial."

4.14.1 Geology, Minerals and Soils Resources

No adverse effects related to geology and seismicity were identified for the Proposed Action or No Action. No adverse effects would occur to soils after implementation of mitigation measures for erosion control, as described in Chapter 4.

4.14.2 Surface Water Resources

No adverse effects were identified for the Proposed Action or No Action related to surface water hydrology that would occur after implementation of mitigation measures for spill prevention and containment, stormwater pollution prevention, and compliance with Sections 404 and 401 of the Clean Water Act, as described in Chapter 4.

4.14.3 Groundwater Resources

No adverse effects related to groundwater resources were identified for the Proposed Action or No Action.

4.14.4 Air Quality

Implementation of the Proposed Action would result in an increase of air pollutants during construction (Chapter 4). No adverse effects would occur after implementation of the following mitigation measures: reducing construction equipment emissions; minimizing fugitive dust emissions during and after construction activities. If No Action were selected, impacts related to air quality would not occur.

4.14.5 Visual Resources

During construction at the Proposed Action site, the view from Highway 95 would be altered by equipment moving, earthmoving activities, and slight clouding from fugitive dust emissions. Measures to minimize fugitive dust emissions during and after construction activities are described in Chapter 3.

If No Action were selected, impacts related to visual resources would not occur.

4.14.6 Noise

No adverse effects related to noise were identified for the Proposed Action or No Action.

4.14.7 Land Use

If No Action were selected, changes in land use may occur if lands developed for irrigation could not be supplied with full irrigation deliveries. No adverse effects related to land use were identified for the Proposed Action.

4.14.8 Cultural Resources

No adverse effects resulting from the Proposed Action related to cultural resources would occur after the implementation of mitigation measures for cultural resources, as described in Chapter 4.

If No Action were selected, impacts related to cultural resources would not occur.

4.14.9 Paleontologic Resources

No adverse effects resulting from the Proposed Action related to paleontologic resources would occur after the implementation of mitigation measures for paleontologic resources, as described in Chapter 4.

If No Action were selected, impacts related to paleontologic resources would not occur.

4.14.10 Socioeconomics

No adverse effects related to socioeconomics were identified for the Proposed Action. Implementation of the Proposed Action would have a beneficial impact on Tribal economic development.

No Action would result in an unavoidable adverse effect from loss of production of agricultural lands.

4.14.11 Environmental Justice

No adverse effects related to environmental justice were identified for the Proposed Action or No Action. Implementation of the Weber Dam safety modifications would not have any disproportionately high and adverse human health or environmental impacts to minority or low-income populations.

4.15 Relationship between Local Short-Term Uses of the Environment and the Maintenance and Enhancement of Long-Term Productivity

For the purpose of this analysis, "short-term" is defined as the period during construction and shortly thereafter, and "long-term" is defined as the life of the Proposed Action. The repair and modification to Weber Dam should have a life expectancy of approximately 50 years. The Proposed Action would require short-term use of the environment for construction.

Potential impacts associated with implementation of the Proposed Action Alternative are discussed in Chapter 4 of this DEIS; potential impacts are short term and mitigable. Cumulative impacts associated with the Proposed Action Alternative are discussed in Section 4.12 of this DEIS.

4.15.1 Short-Term Uses

Most environmental resources would undergo short-term impacts, mostly due to construction activities. These effects include use of local soils, temporary increased erosion potential, and commitment of habitat. Cultural and paleontological resources are nonrenewable, and degradation or destruction of these resources through direct impacts of construction would be permanent, if not mitigated. Potential effects on air quality would be short-term and mainly localized as the result of construction activities, which would create fugitive dust as well as vehicle and equipment engine emissions.

Short-term impacts on visual resources include construction-generated dust. Increased noise would occur. The Proposed Action would result in disturbance of less than 4 acres of undisturbed terrain for project use. Regional and tribal economies could be expected to experience short-term benefits from related expenditures and employment opportunities during construction of the Proposed Action.

4.15.2 Maintenance and Enhancement of Long-Term Productivity

Long-term productivity related to the Proposed Action Alternative generally would reflect long-term delivery of irrigation water for the current irrigated acreage on the Reservation. The economic benefit of a long-term water supply would directly contribute to the long-term economic growth of the Tribe.

The fish passage proposed as part of the Proposed Action is consistent with the overall recovery needs for LCT. This will assist in the long-term recovery of that species. The Tribe could realize an economic benefit from the short term recovery measures as well as long-term recovery of that species.

4.16 Irreversible and Irretrievable Commitment of Resources and Indirect Effects

An irreversible commitment of resources occurs if the commitment cannot be changed once made. Irretrievably committed resources are used, consumed, destroyed, or degraded during construction, operation, and maintenance of a project and could not be reused or recovered for the lifespan of the project and beyond.

4.16.1 No Action

There would not be any irreversible or irretrievable commitments of resources with No Action.

4.16.2 Proposed Action

Resources committed to the Proposed Action would be material, environmental, and financial. Construction of the Proposed Action would result in several irreversible and irretrievable commitments, including labor, capitol, and some construction materials, fuels, and water. Construction materials such as sand, gravel, cement, and other materials would be consumed. Other materials, such as metal, could be recycled and therefore would not be irretrievable. Table 4.16-1 summarizes irreversible and irretrievable commitments of resources for the Proposed Action.

Table 4.16-1. Irreversible and irretrievable commitment of resources and indirect effects.

Resource	Type of Commitment/ Reason for Commitment	Irreversible	Irretrievable	Indirect Effects
Geology	None	No	No	None
Minerals	None	No	No	None
Soils	Sands and Gravels Construction	Yes	Yes	None
Ground Water	None	No	No	None
Surface Water	Dust suppression and water for materials compaction	Yes	Yes	None
Air	Degradation of air quality during construction	Yes	Yes	None
Biological	Disturbance to and/or loss of vegetation, habitat, and wildlife species during construction	Yes	Project Lifespan	Accessibility to the area may increase human presence and may lead to the following impacts: Loss of vegetation Harassment or loss of wildlife Degradation of habitat
Cultural	Potential disturbance of sites Construction and operation	Yes	Yes	Accessibility to the area may increase human presence and cause potential disturbance of cultural resources
Paleontological	Potential disturbance of sites Construction and operation	Yes	Yes	Accessibility to the area may increase human presence and cause potential disturbance of paleontologic resources
Transporation	None	No	No	None
Visual	Viewshed intrusion Construction	Yes	Project construction	None
Noise	Noise exceeding ambient levels Construction and operation	No	Project Construction	None
Land Use	Exclusion of other uses Construction and operation	Yes	Project lifespan	None
Socioeconomic	Increased regional and local employment and revenues Construction and operation	No	Project construction	None

5 Chapter 5. Consultation and Coordination

5.1 Coordination Activities

BIA, the lead federal ageny used an inter-disciplinary team to assist in preparation of this DEIS. The team met regularly to discuss issues, review interim work products, and provide guidance and direction for the EIS. The team was formed with individuals from the following entities:

- Bureau of Indian Affairs, Western Regional Office, Phoenix, Arizona
  Western Nevada Agency, Carson City, Nevada

- Walker River Paiute Tribe, Water Resources Department, Schurz, Nevada
  Environmental Department, Schurz, Nevada

- Miller Ecological Consultants, Inc., Fort Collins, Colorado

5.1.1 Agency Coordination

The agencies listed below were contacted during the preparation of the DEIS.

- U.S. Bureau of Reclamation, Area Manager, Carson City Nevada
- U.S. Bureau of Reclamation, Sacramento, California
- U.S. Fish and Wildlife Service, Nevada State Office, Reno, Nevada
- U.S. Fish and Wildlife Service, California/Nevada Complex Manager, Sacramento, California
- U.S. Fish and Wildlife Service, Regional Director, Portland, Oregon
- U.S. Army Corps of Engineers, Sacramento, California
- U.S. Army Corps of Engineers, Reno, Nevada
- U.S. Environmental Protection Agency, Carson City, Nevada
- U.S. Bureau of Land Management, District Chief, Carson City, Nevada
- Indian Health Service, Sparks, Nevada
- U.S. Forest Service, Bridgeport, California
- U.S. Natural Resource Conservation Service, Yerington, Nevada
- Lyon County Commissioners, Yerington, Nevada
- Mineral County Commissioners, Hawthorne, Nevada
- Tribal Chariman, Yerington Paiute Tribe, Yerington, Nevada
- Nevada Department of Conservation and Natural Resources, Carson City, Nevada
- Nevada State Historic Preservation Officer, Carson City, Nevada

5.2 Consultation Activities

BIA and FWS have consulted informally regarding potential impacts to special status species which may occur as a result of the Proposed Action. The FWS was contacted for information on federally listed T&E species potentially occurring in the project area. The FWS responded in a letter dated June 18, 2001, by providing a list of species to be considered with the project. This list was updated in a letter dated Nov. 12, 2002. In both responses, the only T&E species potentially occurring in the project area are bald eagle (*Haliaeetus leucocephalus*) and LCT (*Oncorhynchus clarki henshawi*).

In addition, the Nevada Natural Heritage Program (NNHP) database was accessed to obtain records of T&E species previously observed in the project area. NNHP personnel reported the database contained no records of T&E species in the vicinity of the Weber Dam project area. The area searched for records included all 36 Sections in Township 14N and Range 28E.

A Biological Assessment to evaluate impact to listed species from the Proposed Action was prepared for use in Section 7 consultation (See Volume 2, Appendix B). A final Biological Opinion was developed and provided by USFWS for the proposed action (Volume 2, Appendix C).

6 Chapter 6. List of Reviewers and Preparers

The people identified below participated in the review and preparation of the Draft Environmental Impact Statement for the Weber Dam Repair and Modification Project.

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Amber Travsky Wildlife specialist	M.S. Zoology B.S. Wildlife Management 17 years experience	Biological Resources Threatened and Endangered Species
Wayne Erickson Vegetation and Soil Specialist	B.A. Forest Biology and Botany *23 years experience*	Vegetation Resources Soil Resources
Patrick Plumley, P.G. Geology/Groundwater specialist	M.S. Geology B.S. Geology *20 years experience*	Geology Groundwater
Bernhard Strom Senior Planner	M.C.R.P. Regional Planning B.S. Urban Planning *25 years experience*	Socioeconomics Recreation Land use Safety Environmental Justice Indian Trust assets
Ed Stoner Jr.	B.A. Anthropology *17 years experience*	Cultural Resources
A.T. Kersich, P.E. Civil Engineer	Ph.D. (Honorary) B.S. Civil Engineering *50 years experience*	Alternatives
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Brad Anderson, P.E.	M.S. Water Resources Engineering B.S. Civil Engineering *20 years experience*	Fish passage design

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8 Chapter 8. Glossary

Access (road)	Road used for passage to and along transmission line for purposes of construction and maintenance.
Acre-foot	Volume of water (43,560 cubic feet) that would cover 1 acre, 1 foot deep.
Aesthetic quality	A perception of the beauty of a natural or cultural landscape.
Affected environment	Existing biological, physical, social, and economic conditions of an area subject to change, both directly and indirectly, as the result of a proposed human action.
Aggradation	The process whereby sediment deposit in stream channels causing a rise in bed elevation.
Air quality	Measure of the health-related and visual characteristics of the air, often derived from quantitative measurements of the concentrations of specific injurious or contaminating substances.
Air quality classes	Classifications established under the Prevention of Significant Deterioration portion of the Clean Air Act that limit the amount of air pollution considered significant within an area. Class I applies to areas where almost any change in air quality would be significant; Class II applies to areas where the deterioration normally accompanying moderate well-controlled growth would be permitted; and Class III applies to areas where industrial deterioration would generally be allowed.
Alternative (action)	An option for achieving the stated purpose and need.
Alternative (route)	An optional path or direction for a transmission line.
Alluvial, alluvium	Relating to material deposited by running water, such as clay, silt, sand, and gravel. Sedimentary material transported and deposited by the action of flowing water.
Alluvial fan	Cone-shaped deposits of alluvium made by a stream. Fans generally form where streams emerge from mountains onto the lowland.
Ambient	The surrounding natural conditions (or environment) in a given place and time.
Aquatic	Growing or living in or associated with water.

Aquifer	A stratum of permeable rock, sand, etc. that contains water. Water source for a well.
Archaeology	The scientific study of the life and culture of ancient peoples, as by excavation of ancient cities, relics, or artifacts.
Area of Critical Environmental Concern	A BLM designation for an area within public lands where management attention is required to protect and prevent irreparable special damage to important historic, cultural, or scenic values, fish and wildlife resources, or other natural systems or processes, or to protect life from natural hazards.
Artifact	Any object showing human workmanship or modification, especially from a prehistoric or historic culture.
Assessment (environment)	An evaluation of existing resources and potential impacts to them from a proposed act or change to the environment.
Avifauna	Birds of a specified region or time.
Batch plant site	An area used for concrete mixing, temporary field office facility, material storage, and stations for equipment maintenance during construction of the transmission line. The area usually covers approximately two acres.
Caliche	Cemented deposit of secondary calcium carbonate found in layers or disseminated throughout the horizon of certain soils in arid or semiarid regions.
Cambrian	The earliest geologic period in the Paleozoic Era, spanning the time of 70 to 500 million years ago, and marked by a profusion of marine animals.
Candidate species	A plant or animal species not yet officially listed as threatened or endangered, but which is undergoing status review by the FWS.
Clean Water Act	Provides for pollution control activities and funding at the Federal level including grant programs, research and related programs, as well as provisions for setting standards and enforcement actions.
Council on Environmental Quality	An advisory council to the President established by the National Environmental policy Act of 1969. It reviews Federal programs for their effort on the environment studies, and advises the President on environmental matters.

Cubic feet per second	Unit of discharge, or volume rate of flow, equal to 0.0283 cubic meters per second. As a rate of streamflow, a cubic foot of water passing a referenced section in one second of time. A measure of a moving volume of water (2 cfs = 0.0283 m3/s).
Cultural resources	Areas or objects that are of cultural significance to Native Americans and other ethnic groups.
Cumulative impact	The impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 C.F.R. 1508.7).
Effect (also see Impact)	
Direct effect	Caused by the action and occur at the same time and place (40 C.F.R. 1508.8(a)).
Indirect effect	Caused by the action later in time or farther removed in distance, but still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth-rate, and related effects on air and water and other natural systems, including ecosystems.
Emergent (vegetation)	Vegetation with all or part of their vegetative and reproductive parts above the water.
Endangered species	Any species in danger of extinction throughout all or a significant portion of its range.
Endemic	Plants or animals that are native to a particular region or country.
Environment	The surrounding conditions, influences or forces that affect or modify an organism or an ecological community and ultimately determine its form and survival.
Environmental Impact Statement	A formal public document prepared to analyze the impacts on the environment of the proposed project or action and released for comment and review. An EIS must meet the requirements of NEPA, CEQ guidelines, and directives of the agency responsible for the proposed project or action.

Environmental Impact Statement, Draft	A detailed written statement as required by Section 102(2)(c) of the National Environmental Policy Act (NEPA).
Environmental Impact Statement, Final	The final version of the public document required by NEPA.
Ephemeral	Present only during a portion of the year. Generally refers to water courses.
Evapotranspiration	The combined loss of water from a given area and during a specific period of time by evaporation from the soil surface and by transpiration from plants.
Fault	A fracture or fracture zone in the earth's surface along which there has been displacement of the sides relative to one another parallel to the fracture.
Fauna	The wildlife or animals of a specified region or time.
Federal Land Policy And Management Act 1976	Public Law 94-579 signed by the President on October 21, Established public land policy for management lands of 1976 administered by the Bureau of Land Management (BLM). FLPMA specifies several key directions for the BLM, notably (1) management on the basis of multiple use and sustained yield, (2) land use plans prepared to guide management actions, (3) public lands for the protection, development, and enhancement of resources, (4) public lands retained in Federal ownership, and (5) public participation used in reaching management decisions.
Floodplain	That portion of a river or stream valley, adjacent to the river channel, which is built of sediments and is inundated with water when the stream overflows its banks.
Fossil	The remains or traces of an organism or assemblage of organisms that have been preserved by natural processes in the earth's crust; exclusive of organisms that have been buried since the beginning of historical time.
Geologic formation	A rock unit distinguished from adjacent deposits by some common character, such as its composition, origin, or the type of fossil associated with the unit.
Geology	The science that studies the earth; the materials, processes, environments, and history of the planet, especially the lithosphere, including the rocks and their formation and structure.

Habitat	The region where a plant or animal naturally grows or lives. A specific set of physical conditions that surround a single species, a group of species, or a large community. In wildlife management, the major components of habitat are considered to be food, water, cover, and home range.
Hydrology	The science that studies the properties, distribution, and circulation of natural water systems.
Impact	A modification in the status of the environment brought about by an action.
Infrastructure	The basic installations and facilities on which the continuance and growth of a community depend (i.e., roads, schools, sewers, power plants, transportation, and communication systems).
Landform	A term used to describe the many types of land surfaces that exist as a result of geologic activity and weathering (e.g., plateaus, mountains, plains, and valleys).
Liquifaction	A process whereby soils become saturated with water and in combination with earthquake tremors the ground moves as a liquid rather than a solid.
Lithic	Pertaining to stone or a stone tool (e.g., lithic artifact).
Lithology	The structure and composition of a rock formation, and the study of rocks with the unaided eye, or with little magnification.
Mesa	An isolated, nearly level land mass formed of nearly horizontal rocks, standing above the surrounding country and bounded with steep sides.
Migratory	Birds, animals, or people that migrate, or move from one region or country to another.
Mineral resource	Any inorganic or organic substance occurring naturally in the earth that has a consistent and distinctive set of physical properties. Examples of mineral resources include coal, nickel, gold, silver, and copper.
Mississippian	A period of the Paleozoic Era, spanning in time from about 345 to 320 million years ago.
Mitigate	To alleviate, reduce, or render less intense or severe.

Mitigation	Action taken to avoid, reduce the severity of, or eliminate an adverse impact.
National Ambient Air Quality Standards	Air quality standards established by the Clean Air Act. The primary NAAQS are intended to protect the public health with an adequate margin of safety; the secondary NAAQS are intended to protect the public welfare from any known or anticipated adverse effects of a pollutant.
National Environmental Policy Act of 1969	Public Law 91-190. Establishes environmental policy for the nation. Among other items, NEPA requires Federal agencies to consider environmental values in decision-making processes.
National Register of Historic Places	A listing of architectural, historical, archaeological, and cultural sites of local, state, or national significance, established by the Historic Preservation Act of 1966 and maintained by the National Park Service.
Native vegetation	Vegetation originating in a certain region or country.
Nonattainment area	An air quality control region (or portion thereof) in which the U.S. Environmental Protection Agency has determined that ambient air concentrations exceed national ambient air quality standards for one or more criteria pollutants.
One-hundred-year Flood	A flood with a magnitude that may occur once every one hundred years. A 1-in-100 chance of a certain area being inundated during any year.
Ozone	A form of oxygen, O3, produced especially when an electric spark is passed through oxygen or air.
Paleontology	The science that deals with the life of past geological ages through the study of the fossil remains of organisms.
Particulates	Minute, separate particles, such as dust or other air pollutants.
Perennial	Lasting, or active through the whole year. May refer to rivers, streams or plants.
Permeability	The measure of the ease with which a fluid can diffuse through a particular porous material.
Petroglyph	A symbolic design or drawing of an animal or human pecked or carved into a rock or cliff face – generally prehistoric.

Physiographic Province	An area characterized by distinctive topography, geologic structure, climate, drainage patterns, and other features and phenomena of nature.
Plateau	An elevated tract of relatively level land, such as a tableland or mesa.
Playa	The shallow central basin of a desert plain, in which water gathers after a rain and is evaporated.
Pleistocene	The first geologic epoch during the Quaternary period, spanning from 118 million years ago to about 9000 BC, characterized by extensive continental glaciation in the Northern Hemisphere.
Policy	A guiding principle upon which is based a specific decision or set of decisions.
Primitive	An area that is not developed, a pristine natural area.
Range	A large, open area of land over which livestock can wander and graze.
Raptor	A bird of prey.
Rare	A plant or animal restricted in distribution. May be locally abundant in a limited area or few in number over a wide area.
Reclamation	Returning disturbed lands to a form and productivity that will be ecologically balanced.
Region	A large tract of land generally recognized as having similar character types and physiographic types.
Revegetation	The reestablishment and development of self-sustaining plant cover. On disturbed sites, this normally requires human assistance such as reseeding.
Right-of-way	Strip of land acquired by legal means, over which the access roads would pass.
Scenic quality class	The designation (A, B, or C) assigned a scenic quality rating unit to indicate the visual importance or quality of a unit relative to other units within the same physiographic province (BLM designation).
Scenic quality	A portion of the landscape that displays primarily rating unit homogeneous visual characteristics of the basic landscape features (landform, water, vegetation, and structures and modifications) which separate it from the surrounding landscape.

Sediment	Solid fragmental material, either mineral or organic, that is transported or deposited by air, water, gravity, or ice.
Seismicity	The likelihood of an area being subject to earthquakes. The phenomenon of earth movements.
Semi-arid	A climate or region characterized by little yearly rainfall and by the growth of a number of short grasses and shrubs.
Sensitive species	Species whose populations are small and widely dispersed or restricted to a few localities; species that are listed or candidates for listing by the state or Federal government.
Sensitivity	The state of being readily affected by the actions of external influence.
Site	In archaeology, any locale showing evidence of human activity.
Socioeconomic	Of or involving both social and economic factors.
Species	A group of individuals of common ancestry that closely resemble each other structurally and physiologically, and in nature interbreed producing fertile offspring.
Spring	A place where ground water flows naturally onto the land surface; often the source of a stream.
Strata	Plural of stratum-horizontal layer of sedimentary rock.
Study area	A given geographical area delineated for specific research.
Subspecies	Any natural subdivision of a species that exhibits small, but persistent morphological variations from other subdivisions of the same species living in different geographical regions or times.
Substrate	Sediment that lies beneath the surface of the earth.
Talus	A pile of rock debris at the foot of a cliff or steep slope.
Threatened species	Any species likely to become endangered within the foreseeable future throughout all or a significant part of its range.
Topography	The relative positions and elevations of surface features of an area.
Traditional cultural property	A location that is valuated by some group, such as an ethnic group, because it is a place of cultural patrimony, an important place in the traditional cultural landscape.

Tributary	A stream or river that flows into a larger stream or river.
Vegetation community	Species of plants that commonly live together in the same region
View shed	Visible portion of the specific landscape seen from a specific viewpoint, normally limited by landform, vegetation, distance and existing cultural modifications.
Visual resource management class	Classification of landscapes according to the kinds of structures and changes that are acceptable to meet established visual goals.
Volatile organic	Organic compound that participates in atmospheric compound photochemical reactions.
Waters of the U.S.	All waters that are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce including adjacent wetlands and tributaries to waters of the United States; and all waters by which the use, degradation, or destruction of which would affect or could affect interstate or foreign commerce.
Wetlands	Lands or areas exhibiting hydric soils, saturated or inundated soil during some portion of the plant growing season, and plant species tolerant of such conditions (includes swamps, marshes, bogs).

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VOLUME 2

APPENDICES

FINAL ENVIRONMENTAL IMPACT STATEMENT
Weber Dam Repair and Modification Project

Prepared for:

Bureau of Indian Affairs
Western Regional Office
Phoenix, Arizona

On behalf of:

Walker River Paiute Tribe
Schurz, Nevada

Prepared by:

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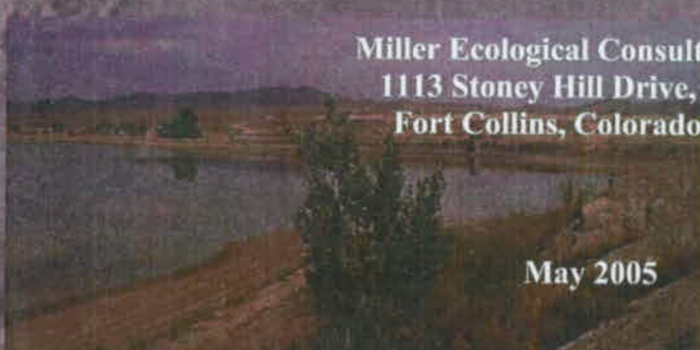

May 2005

MILLER ECOLOGICAL CONSULTANTS INC.

Appendix A – Fish Passage Design Technical Memorandum

TECHNICAL MEMORANDUM
WEBER RESERVOIR
ALTERNATIVE FISH PASSAGE
SRUCTURE EVALUATION

Prepared for:

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PROFESSIONAL ENGINEER-STATE OF NEVADA
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CIVIL
No. 12586

12/19/02

December 19, 2002

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WEBER RESERVOIR
ALTERNATIVE FISH PASSAGE STRUCTURE EVALUATION

I. General

As part of the Weber Dam Modification EIS, alternatives to the removal of Weber Dam were developed and evaluated during the Alternative Screening Analysis. Removal of Weber Dam is intended to remove the impact to passage of Lahontan Cutthroat Trout. An assessment that assumes the existing structure remains and is modified is also being conducted as part of the Weber Dam Modification EIS. Consequently, it is necessary to identify and evaluate alternative fish passage structures that promote the passage of Lahontan Cutthroat Trout under this assumption. This technical memorandum documents the evaluation, as well as the development of conceptual design information and cost estimates, for two alternative fish passage structures.

II. Data Collection and Review

All existing information pertinent to the identification, evaluation and conceptual design of the fish passage alternatives was collected and reviewed. This information included topographic mapping and survey data, hydrologic data, design and cost data for existing fish passage structures in the region, and hydraulic design criteria for Lahontan Cutthroat Trout.

Two coordination meetings were conducted with representatives of the U.S. Bureau of Reclamation (USBR) at the Water Resources Research Laboratory in Denver, Colorado. Information was obtained regarding two types of fish passage structures: (a) vertical slot-baffle structure; and (b) boulder weir-rock lined structure. Design plans of existing and proposed structures were obtained along with construction cost estimates.

Following the initial meeting with the USBR, a field trip was scheduled to collect site-specific data associated with an existing fish passage structure and a structure that was substantially complete. The fieldwork included an evaluation of the existing fish passage structure associated with Marble Dam near Reno, Nevada. This fish passage structure can be described as a vertical-slot baffled structure. Two slots were utilized in each vertical baffle to obtain the desired hydraulic conditions. Construction was near completion at the fish passage structure associated with Derby Dam, also near Reno, Nevada. This structure consisted of a boulder weir-rock lined channel. The boulder weirs were set at a distance that would promote the hydraulic conditions for fish passage for a desired range of flows. The separation between boulders in each weir was also a critical component of the design.

III. Design Criteria

The conceptual design of the fish passage structure largely focused on three criteria as indicated below:

- Swimming speed of the Lahontan Cutthroat Trout
- Range of operational flows
- Range of water surface elevations in Weber Reservoir

Based on the swimming speed of the Lahontan Cutthroat Trout and conversations with Dr. Bill Miller of Miller Ecological Consultants, Inc. and Brent Mefford of the USBR, a design velocity of approximately 4 ft/sec through a range of operational flows was selected.

The range of flows considered for design operation of the fish passage structure was determined to be a minimum of 25 cfs to a maximum of 80 cfs for the vertical slot-baffle structure. A minimum of 25 cfs to a maximum in excess of 200 cfs was selected for the boulder weir-rock lined channel structure.

Finally, a range of water surface elevations in Weber Reservoir was also determined. The water surface elevation data selected for design of the alternative fish passage structures ranged from a minimum elevation of 4200 ft to a maximum elevation of 4208 ft.

IV. Alternative Evaluation and Design

Given the design criteria, a hydraulic evaluation was completed to support the conceptual design of the alternative fish passage structures. Using the available topographic mapping along with the vertical drop from the inlet to the exit of each structure, the location, slope and alignment of each alternative was initially determined. Figure 1 presents the location and alignment of the alternative structures.

For the vertical slot-baffle structure, the results of the hydraulic evaluation provided the following design information:

- Vertical drop is 32 feet (Elev 4198 to Elev 4166)
- Depth varies from 3 feet to 9 feet over the range of flows
- Maximum height of the baffles is 9 feet
- Width of the slot is 12 inches
- Distance between baffles is 10 feet
- Width of the channel/pool between baffles is 8 feet
- Slope of the structure is 0.045 ft/ft
- Length of the structure is approximately 710 feet

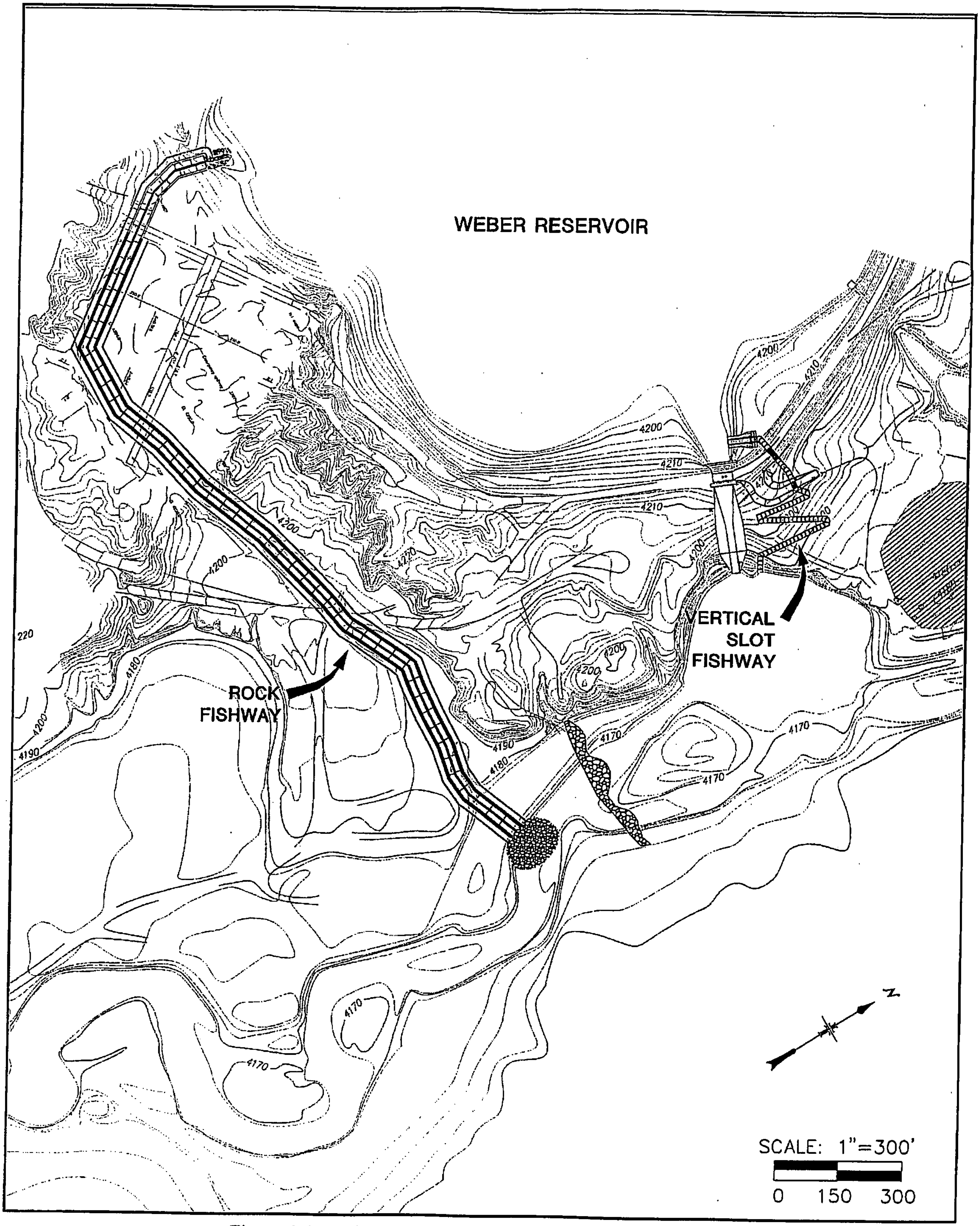


Figure 1. Location Map of Alternative Fish Passage Structures.

Design plan view, profile and detail drawings for the vertical slot-baffle fish passage structure are provided in Attachment A to this technical memorandum.

Based on the conceptual design drawings, an estimate of the construction costs for the vertical slot-baffle fish passage structure was prepared and is presented in Table 1. As indicated, the cost for construction of this structure was estimated to be approximately $2.4 million.

Table 1. Construction Cost Estimate - Vertical Slot Fishway

Item	Quantity	Unit	Unit Cost	Cost
Mobilization (5% of other Items)	1	ls	-	$91,000
Reinforced Concrete	2,389	cy	$400	$955,600
Excavation & Haul	9,597	cy	$10	$95,970
Riprap (including Bedding and Fabric)	153	cy	$70	$10,710
Steel Baffles (72 @ 1500 lbs each)	108,000	lbs	$6	$648,000
Bridges	2	ea	$15,000	$30,000
Water Control	1	ls	$50,000	$50,000
Slide Gate	1	ea	$70,000	$70,000
Total without Mobilization				$1,860,280
Total with Mobilization				$1,951,280
Contingency (25%)				$487,820
Total Project Cost				$2,439,100

For the boulder weir-rock lined fish passage structure, the results of the hydraulic evaluation provided the following design information:

- Vertical drop is 32 feet (Elev 4198 to Elev 4166)
- Slope varies from 0.013 ft/ft to 0.018 ft/ft
- Distance between boulder weirs varies from 25 feet (for a slope of 0.018 ft/ft) to 34 ft (for a slope of 0.013 ft/ft)
- Depth varies from 3 feet (corresponding to the top of the boulders and a flow of 30 cfs) to 6.5 feet (corresponding to the top of the channel and a flow of 240 cfs)
- Maximum height of the boulders above channel bed is 3 feet
- Width between the boulders varies from 1.25 to 1.5 feet
- Width of the channel is approximately 4 feet
- Length of the structure is approximately 2,100 feet

Design plan view, profile and detail drawings for the boulder weir-rock lined fish passage structure are provided in Attachment B to this technical memorandum.

Based on the conceptual design drawings, an estimate of the construction costs for the boulder weir-rock lined fish passage structure was also prepared and is presented in Table 2. As indicated, the cost for construction of this structure was estimated to be approximately $1.7 million.

Table 2. **Construction Cost Estimate - Grouted Rock Fishway**

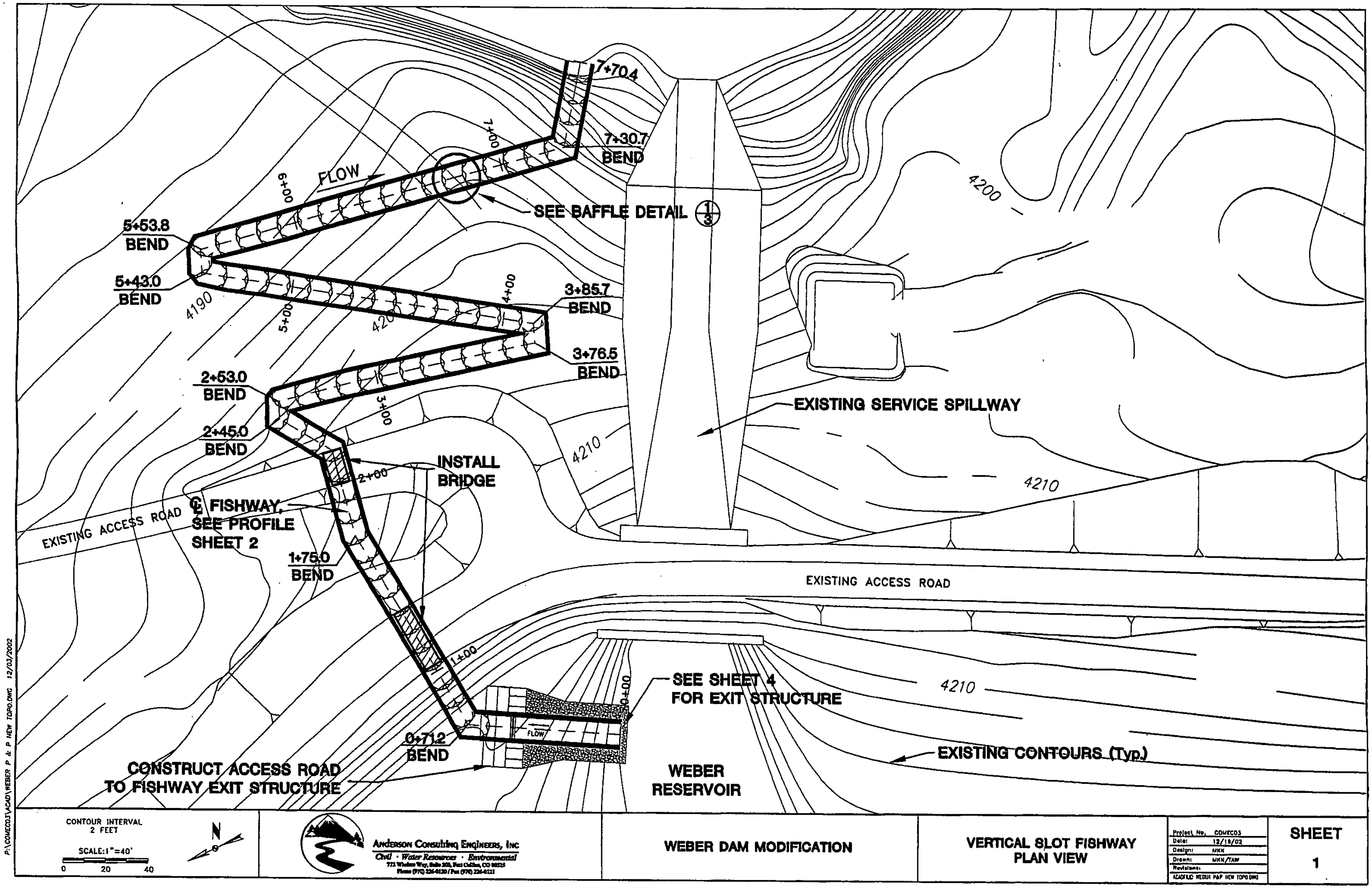
Item	Quantity	Unit	Unit Cost	Cost
Mobilization (5% of other Items)	1	ls	--	$59,100
Reinforced Concrete	514	cy	$400	$205,600
Excavation	34,920	cy	$10	$349,200
Embankment	1,270	cy	$15	$19,050
Riprap (including Bedding and Fabric)	3,964	cy	$70	$277,480
Grouted Riprap (including Bedding and Fabric)	523	cy	$140	$73,220
Boulders	310	ea	$410	$127,100
Weir in River u/s of fishway entrance	1	ls	$150,000	$150,000
Water Control	1	ls	$50,000	$50,000
Slide Gate	1	ea	$70,000	$70,000
Total without Mobilization				$1,321,650
Total with Mobilization				$1,380,750
Contingency (25%)				$345,200
Total Project Cost				**$1,725,950**

V. Conclusions

The results of the evaluation indicate that the boulder weir-rock lined fish passage structure is technically feasible and more cost effective than the more conventional vertical-slot baffle fish passage structure. Furthermore, the boulder weir-rock lined fish passage structure appears to better reflect a natural channel and may enhance the passage of the Lahontan Cutthroat Trout. Consequently, the boulder weir-rock lined fish passage structure warrants serious consideration should a fish passage structure be installed within the existing embankment of Weber Dam.

ATTACHMENT A

DESIGN DETAILS
VERTICAL SLOT FISHWAY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7+00
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5+53.8
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5+43.0
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5+00
4200
4+00
3+85.7
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4200
2+53.0
BEND
3+00
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BEND
EXISTING SERVICE SPILLWAY
4210
4210
INSTALL
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SEE PROFILE
SHEET 2
1+75.0
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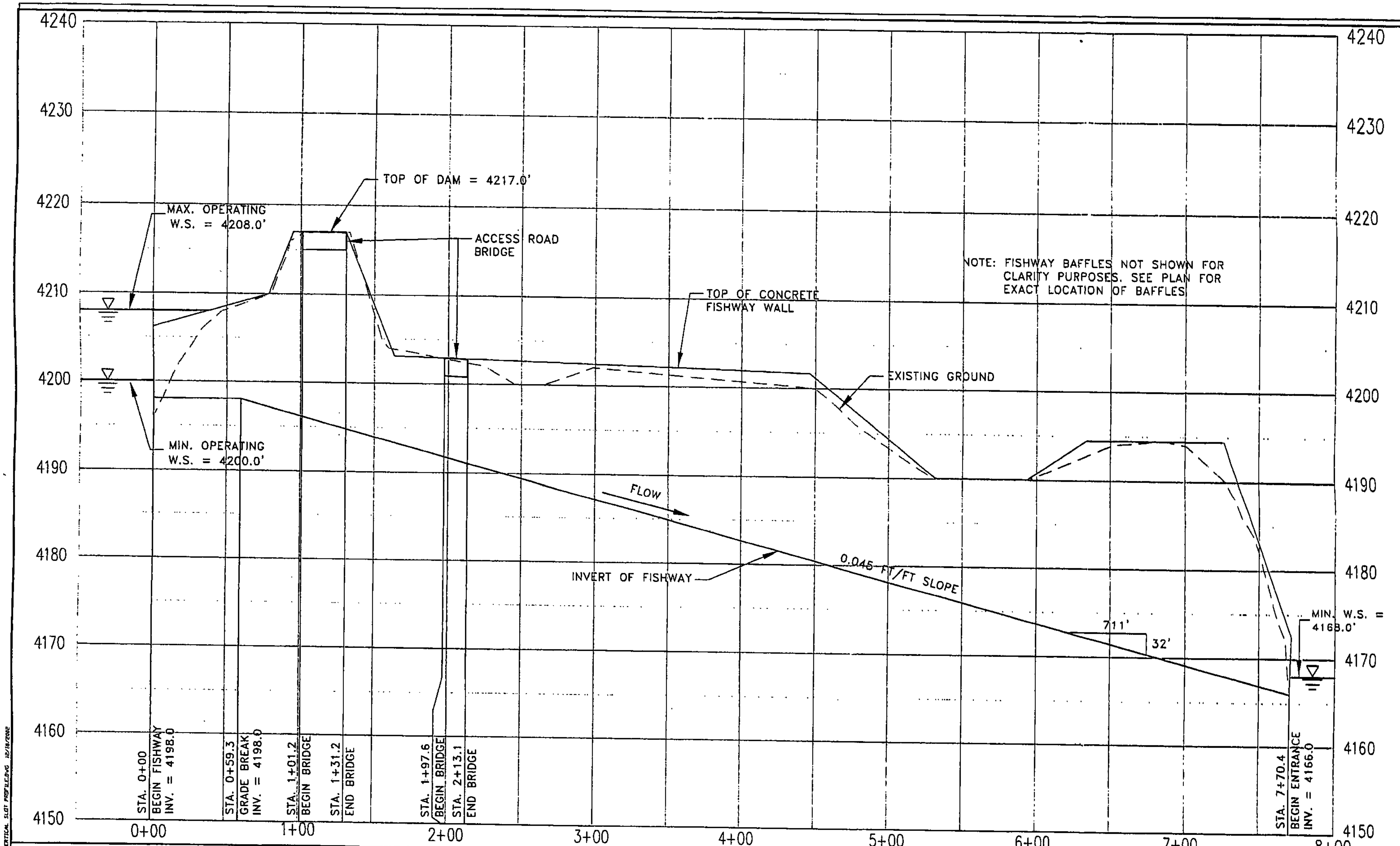
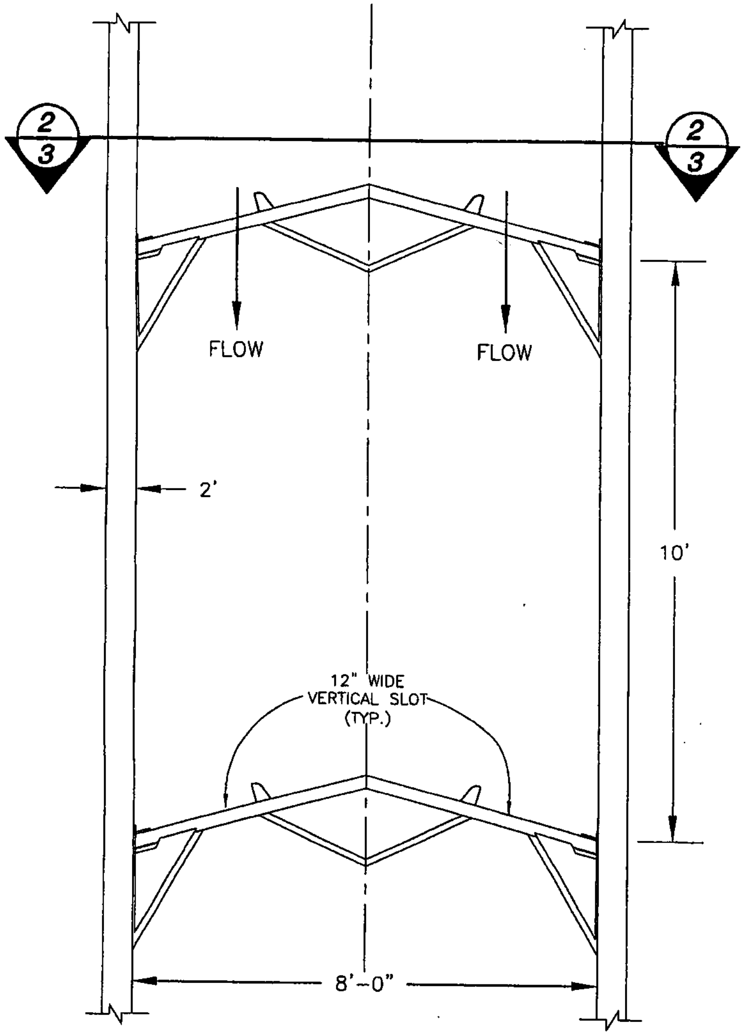
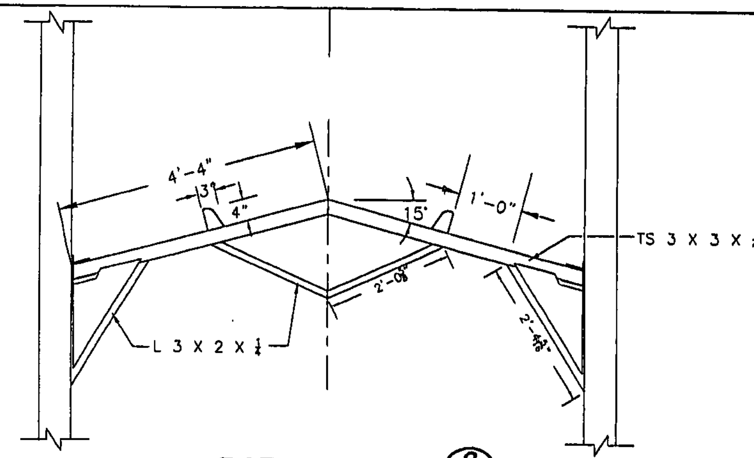
Anderson Consulting Engineers, Inc
Civil · Water Resources · Environmental
WEBER DAM MODIFICATION
VERTICAL SLOT FISHWAY
PLAN VIEW
Project No. COMEC03
Date: 12/19/02
Design: MKK
Drawn: MKK/TAW
Revisions:
SHEET
1



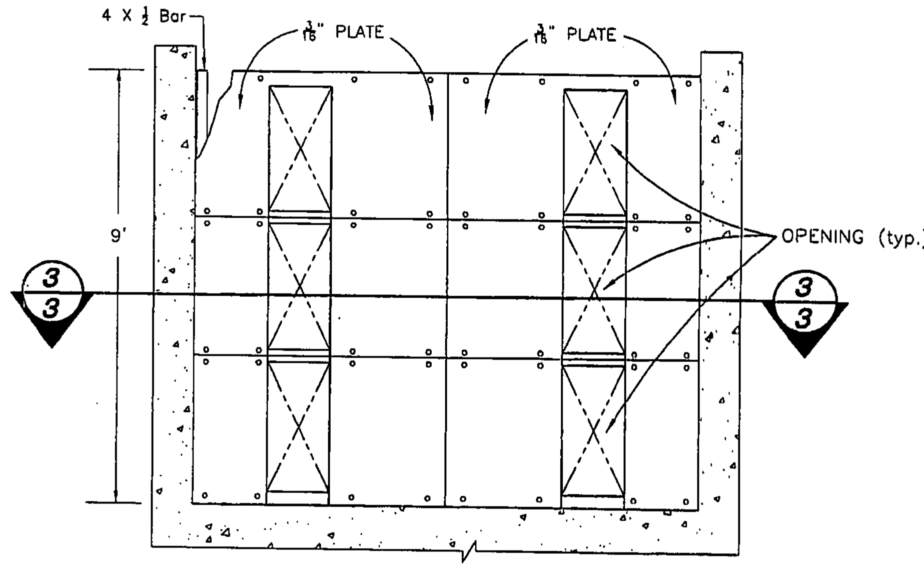
N.T.S.	Anderson Consulting Engineers, Inc Civil · Water Resources · Environmental 772 Whalers Way, Suite 200, Fort Collins, CO 80525 Phone (970) 226-0120 / Fax (970) 226-0121	WEBER DAM	VERTICAL SLOT FISHWAY PROFILE	Project No. COWEC03 Date: 12/04/02 Design: MKK Drawn: MKK/TAW Revisions: ACADFILE VERTICAL SLOT PROFILE.DWG	SHEET 2



DETAIL 1/3



BAFFLE PLAN 3/3



BAFFLE ELEVATION 2/3

N.T.S.	Anderson Consulting Engineers, Inc Civil · Water Resources · Environmental 772 Whalers Way, Suite 200, Fort Collins, CO 80525 Phone (970) 226-0120 / Fax (970) 226-0121	WEBER DAM	FISHWAY BAFFLE DETAILS	Project No. COWEC03 Date: 12/04/02 Design: MKK Drawn: MKK/TAW Revisions: ACAD\FILES ROCK FISHWAY DETAIL.DWG	SHEET 3

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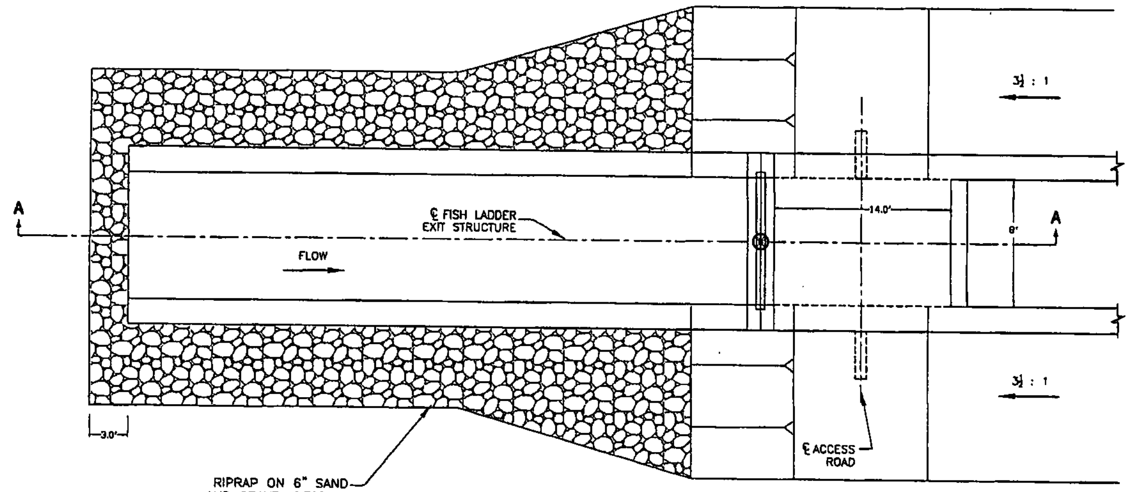
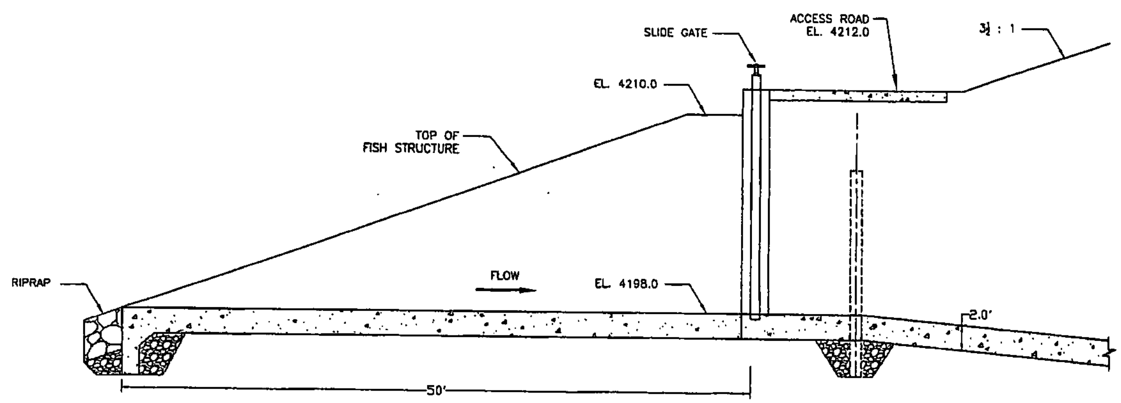


PLAN VIEW



SECTION A-A

SCALE: 1"=10'
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Anderson Consulting Engineers, Inc
Civil · Water Resources · Environmental

WEBER DAM MODIFICATION

VERTICAL SLOT FISHWAY
EXIT STRUCTURE DETAILS

Project No. COWEC03
Date: 12/16/02
Design: MKH
Drawn: MKK/TAW
Revisions:

SHEET
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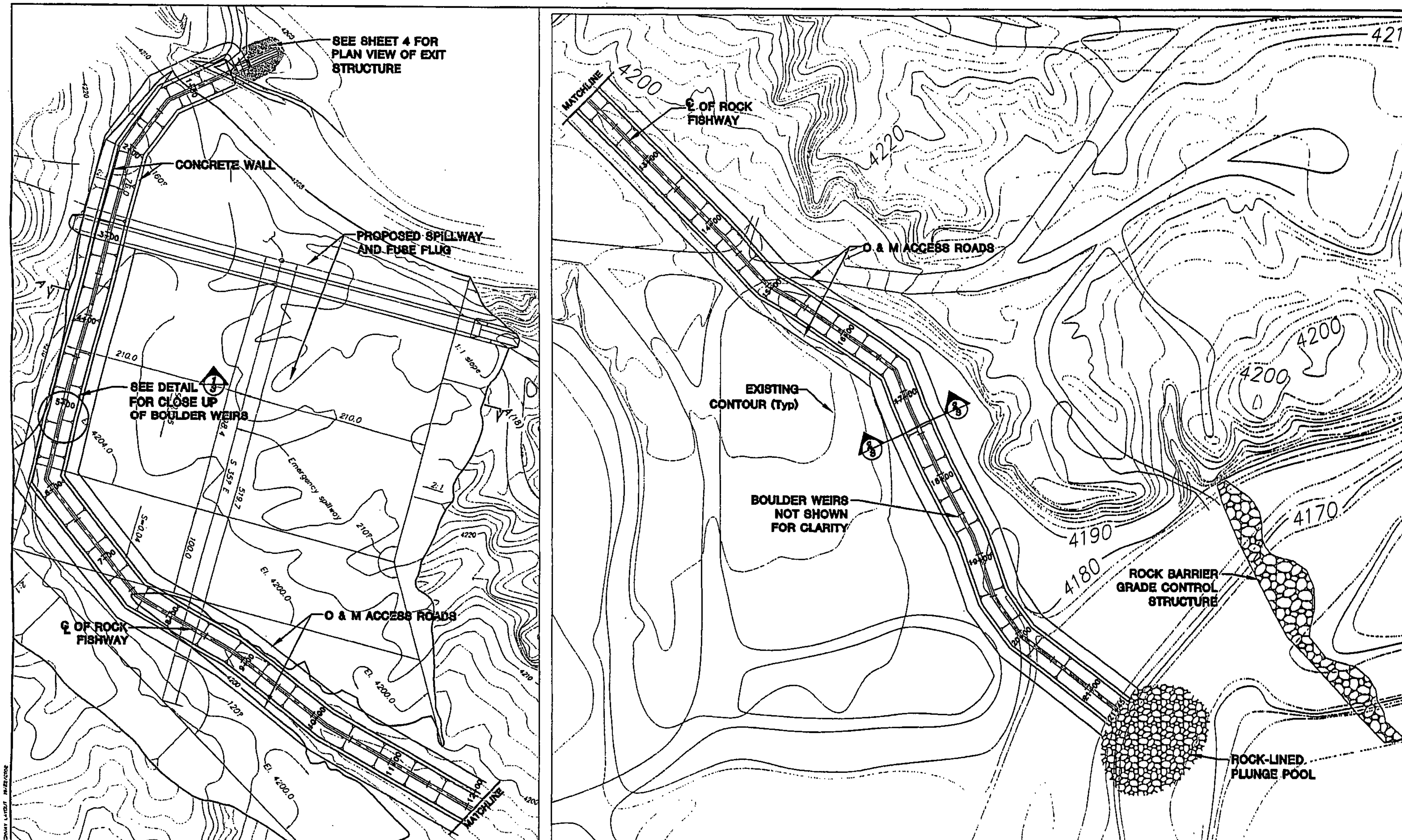
ATTACHMENT B

DESIGN DETAILS
GROUTED ROCK FISHWAY



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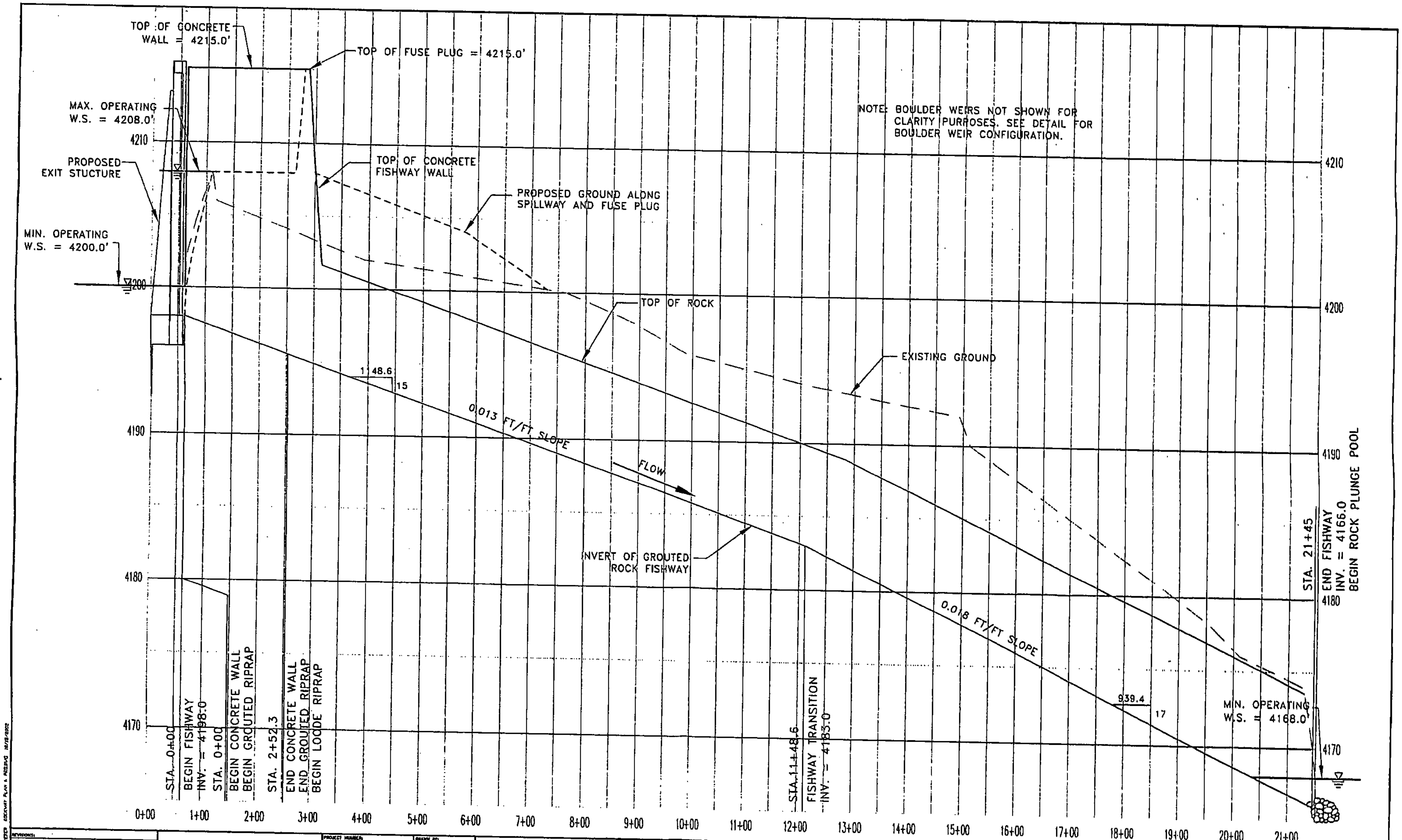

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REV6

HORIZONTAL SCALE 1"=160'
VERTICAL SCALE 1"= 6'

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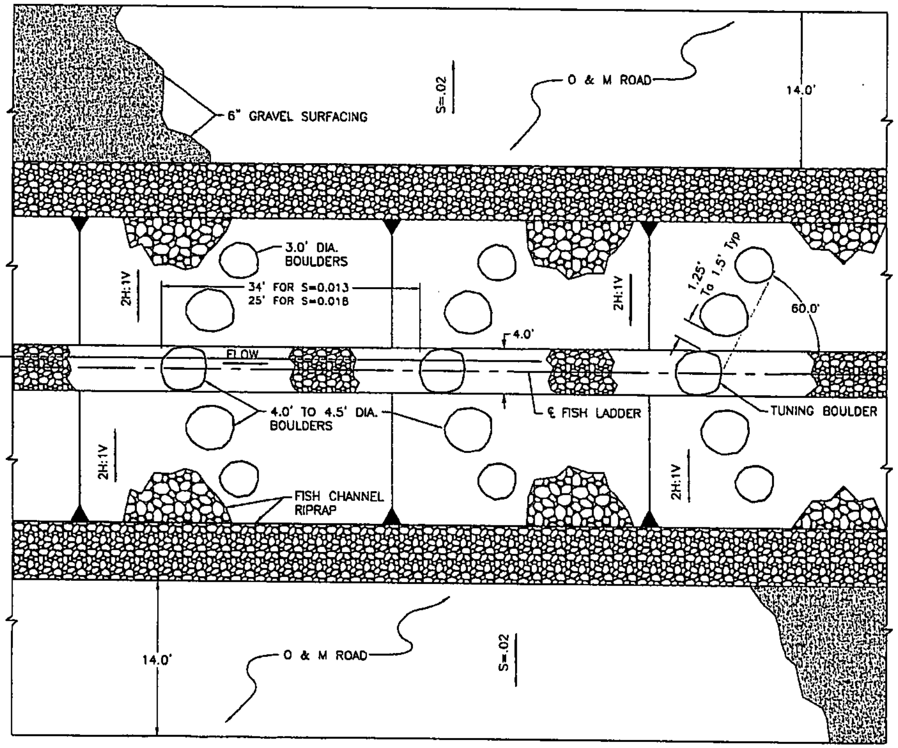
Anderson Consulting Engineers, Inc
Civil · Water Resources · Environmental

WEBER DAM MODIFICATION
BUREAU OF INDIAN AFFAIRS
WALKER RIVER INDIAN RESERVATION

ROCK FISHWAY PROFILE

SHEET 2



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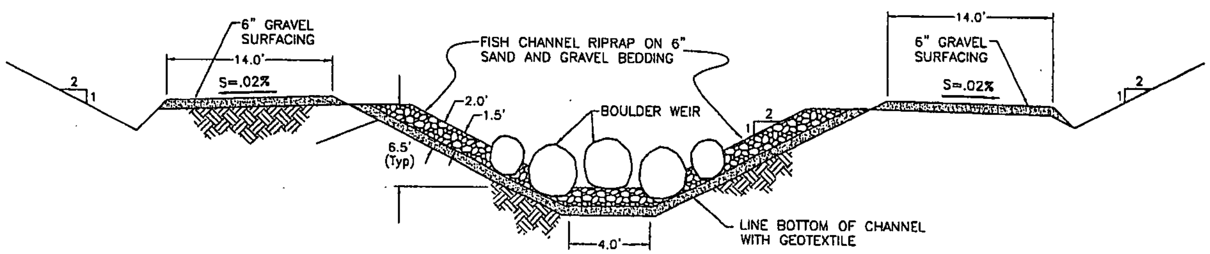

TYPICAL SECTION (2/3)

REV1 REV2 REV3 REV4 REV5 REV6	N.T.S.	COMECO3 / ROCK FISHW DETL. / 12/04/2002	TAW / MKK / DAA	Anderson Consulting Engineers, Inc — Civil · Water Resources · Environmental	WEBER DAM

ROCK FISHWAY
PLAN & PROFILE

3

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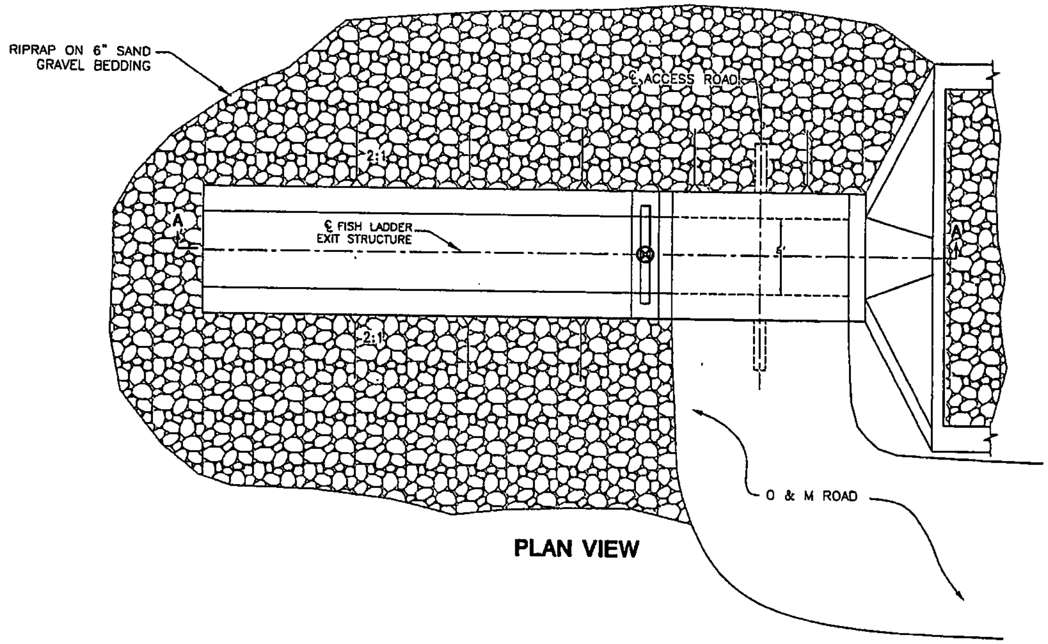
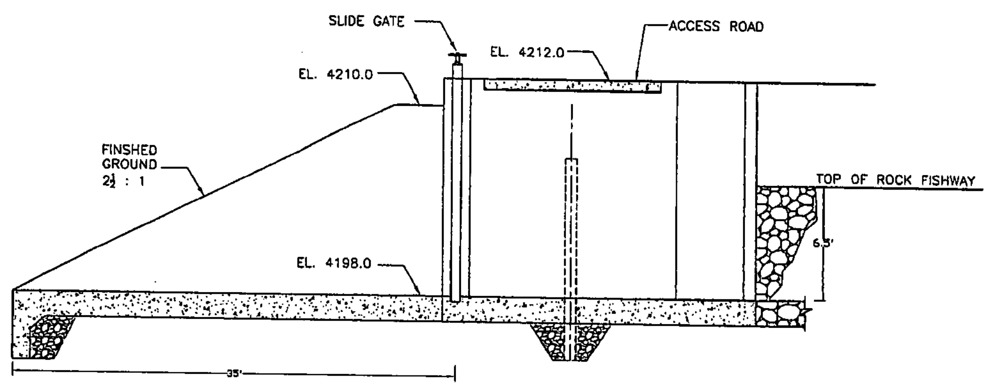


PLAN VIEW



SECTION A-A

REVISIONS:	SCALE: 1"=10'	PROJECT NUMBER: COMEC03	DRAWN BY: TAW	Anderson Consulting Engineers, Inc	WEBER DAM MODIFICATION	FISHWAY EXIT STRUCTURE	SHEET 4
REV1	0 5 10	ACAD FILE: WEBER ROCK EXIT	DESIGNED BY: MKK	Civil · Water Resources · Environmental			
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REV3							
REV4							
REV5							
REV6							

Appendix B – Weber Dam Repair and Modification Project Biological Assessment

Biological Assessment
Weber Dam Repair and Modification Project

Prepared for:

Bureau of Indian Affairs
Phoenix, Arizona

and

Walker River Paiute Tribe
Schurz, Nevada

Prepared by:

Miller Ecological Consultants, Inc.
1113 Stoney Hill Drive, Suite A
Fort Collins, Colorado 80525

October 25, 2004

MILLER ECOLOGICAL CONSULTANTS, INC.

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INTRODUCTION

Dam safety investigations in 1989 concluded Weber Dam, an earthen dam on the Walker River 4 miles upstream of Schurz, Nevada, has a high hazard rating and poor overall safety rating. This hazard rating means more than six lives could be lost should the dam fail, and the safety rating means the overall risk of overtopping by floods or structural failure during an earthquake is relatively high (USBR, 1993a). The structure is owned and operated by the United State Government, Department of the Interior, Bureau of Indian Affairs (BIA). BIA and Walker River Paiute Tribe (Tribe) propose to modify the dam to reduce both risks.

The proposed action includes the addition of a rock fishway to support passage of Lahontan cutthroat trout (LCT) between Walker Lake and upstream Walker River locations. In operating the fishway and taking other actions, BIA and the Tribe intend to work with FWS and other stakeholders in the Walker River basin in improving the basin's aquatic ecosystems. This additional feature reflects the interests of BIA and the Tribe in fulfilling their responsibilities under the Endangered Species Act of 1973, as amended (Act), and in supporting the ecosystems in both Walker Lake and Walker River.

This Biological Assessment (BA) was prepared pursuant to Section 7 of the Act to address project impacts to threatened Lahontan cutthroat trout (LCT) (Oncorhynchus clarki henshawi) and bald eagle (Haliaeetus leucocephalus). The scope of this BA covers the proposed project as described herein. The U.S. Fish and Wildlife Service (FWS) was contacted for information on federally listed threatened and endangered (T&E) species potentially occurring in the project area. FWS responded in a letter dated November 12, 2002, providing a list of species to be considered with the project (Appendix A). The only T&E species potentially occurring in the area are bald eagle and LCT. FWS was re-contacted on March 9, 2004, for an updated species list. FWS responded on March 15, 2004, with the same T&E species as those previously stated. This assessment summarizes the distribution, abundance, life requisites and potential impacts on these species and their habitat. It also proposes measures, where applicable, to minimize impacts on listed species that may be affected by the Proposed Action.

Background

Weber Dam (Dam) is a small earthen dam on the Walker River Paiute Reservation (Reservation) in western Nevada that impounds waters of the Walker River, a stream which originates in the Sierra Nevada Mountains and terminates at Walker Lake. The Dam is owned and operated by BIA to provide irrigation water to the Reservation. The water is delivered to the Reservation at a rate of 26.25 cfs for 180 days starting on April 15. The Tribe generally does not begin irrigation until the beginning to middle of May. Releases for the first irrigation (in 2004) were approximately 80 cfs for approximately 2.5 weeks and then the releases were stopped for about 1-2 weeks. The process continues for additional irrigation until water is not available. This pattern is anticipated to continue after the Project is completed in years that have similar hydrology. In wetter years, water may also be released from Weber Dam, to the extent that supplemental water is available and circumstances warrant, for downstream irrigation diversions, for the benefit of lake resources, and to support LCT spawning migration. The Dam, Reservoir, and the agricultural lands they serve lie wholly within the boundaries of the Reservation.

The Dam is located about 80 miles east of Lake Tahoe and 25 miles northwest of Walker Lake. It is about four miles upstream of the town of Schurz, Nevada, and seven miles upstream of the intersection of U.S. Highways 95 and 95A (Figure 1). The major portion of the Dam was built during 1933-35 and completed in June 1937 when the spillway gates were installed (Johnson, 1975). The crest is 16 feet wide, 1,950 feet long, at an elevation of 4,217 feet above mean sea level (msl). The structural height of the Dam, which is the distance from the base of the foundation to the crest, is 50 feet. The hydraulic height, which is the distance from the lowest point in the original streambed at the dam to the top of the spillway gates at 4,208 ft msl, is 36 feet (Carter and Heyder, 1993). The Dam has a homogeneous silty sand core with riprap protection on the upstream face, and a thin rock shell on the downstream face.

The Reservoir had a maximum surface area of about 960 acres and a storage capacity at the top of the spillway gates of 13,000 acre-feet (AF) at completion (Kronquist 1939). Current capacity is 10,700 AF (Katzer and Harmsen, 1973). Due to dam safety issues, the Interim Operating Criteria (IOC) for the Dam, adopted by BIA in February 2000 and renewed annually, now limit the maximum Reservoir elevation to 4,200[1] feet msl which provides approximately 4,766 AF of storage. Annual river discharge varies greatly from year to year, ranging from 6,664 AF to 601,218 AF for the period 1903 through 2002.

The initial proposal for repair and modification of the Dam was the result of the safety analysis conducted in 1989 under the BIA Dam Safety Maintenance and Repair Program (DSMRP), created as part of the Indian Dams Safety Act (IDSA). Under DSMRP, BIA must perform such rehabilitation work as is necessary to bring the dams identified as unsafe to a satisfactory condition and each dam located on Indian lands shall be regularly maintained by BIA. IDSA requires that work authorized shall be for the purpose of dam safety maintenance and structural repair.

Various repairs to the Dam are needed. The principal problems to be corrected are unsatisfactory static stability, potentially liquefiable materials in the lower portion of the embankment, and unsatisfactory properties with respect to seepage and rapid drawdown of the Reservoir (USBR, 1993b). The proposed modifications and repairs addressed in the DEIS and covered by this BA would be funded by BIA. This action would include realigning the north side Dam embankment, widening the existing embankment at the outlet works, rehabilitating the outlet works and service spillway, extending the outlet works tunnel, enlarging the emergency spillway, installing a fish passage facility (fishway), and constructing access roadways. The repair and modification would reduce the safety and hazard risks associated with the Dam in its present condition. An expanded view of the study area and locations of selected project components are shown in Figure 2.

[1] On an annual basis, the Tribe can request BIA to modify the IOC to allow water to be stored behind Weber Dam up to an elevation of 4,202 feet msl, or 6,083 AF, for a period not to exceed 30 days. After 30 days at elevation 4,202 feet msl, releases must be made to return the water surface to 4,200 feet msl.

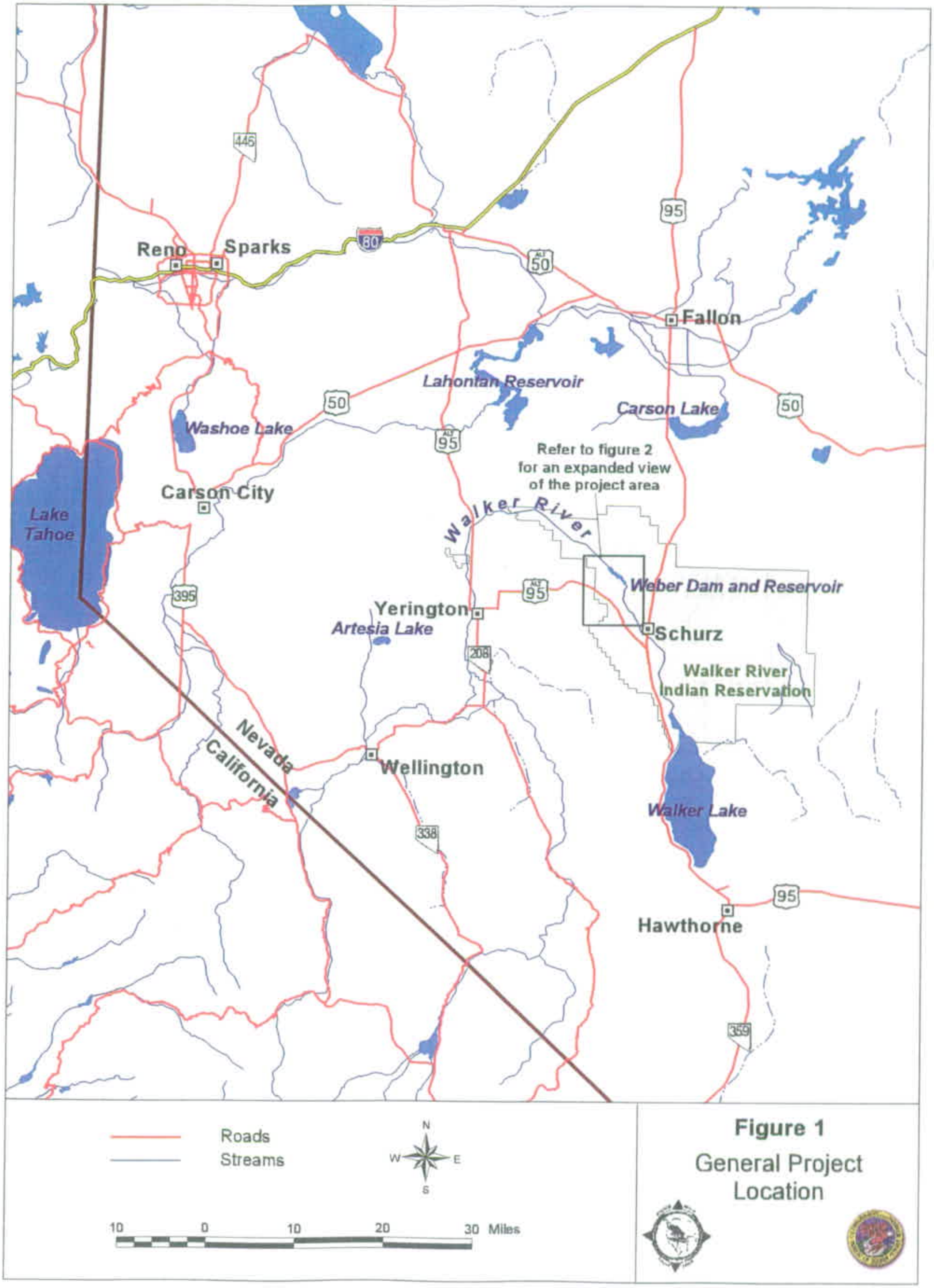

Figure 1
General Project Location

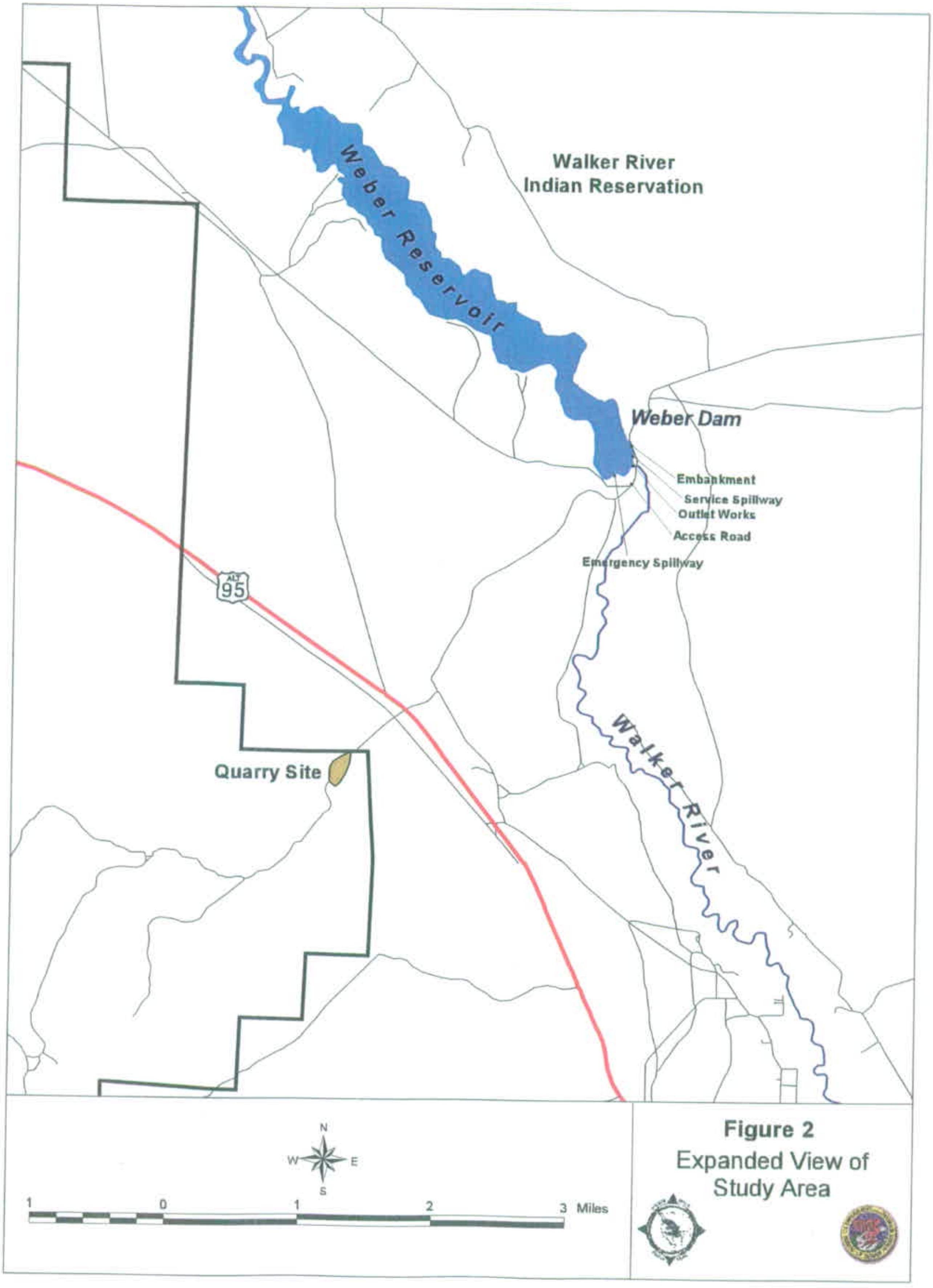

Figure 2
Expanded View of Study Area

Purpose and Need for Action

The Tribe and BIA propose to repair and modify the Dam pursuant to the IDSA, 25 U.S.C. §§ 3801-04 (Act), to reduce both risks. Funding secured under the Act is authorized only for repair and modification of existing dams on Indian lands and construction of new dams is not authorized by the Act. Therefore, the repair and modification of the Dam on the Reservation is the federal action. The Proposed Action is the repair and modification of Weber Dam owned and operated by BIA, which is an earthen Dam on the Walker River four miles upstream of Schurz, Nevada on the Walker River Paiute Indian Reservation in Nevada. As a result of Dam safety investigations conducted in 1989, the Dam was given a high hazard rating and poor overall safety rating. The hazard rating means more than six lives could be lost should the Dam fail, and the safety rating means the overall risk of overtopping by floods or structural failure during an earthquake is relatively high (USBR 1993a).

The Dam was constructed as part of the Walker River Indian Irrigation Project in the mid 1930s. Its primary use is to maintain a water supply for the irrigation of Reservation lands. It also provides other benefits including flood protection, recreation, a fishery, and historical and cultural values. The proposed repair and modification of the existing Dam are needed to provide a secure source of irrigation water for Reservation lands among other possible uses. Additionally, a need has been identified in the Walker River Basin to use Weber Dam and Reservoir to store dedicated water from upstream users and deliver such water in large blocks to Walker Lake to enhance the lake ecosystem. Weber Reservoir provides the opportunity to collect any water transferred to Walker Lake from upstream water users. Then, such water may be sent in pulses to Walker Lake to minimize delivery losses and provide additional environmental benefits.

With the Reservoir at full capacity in its current condition, movement along the existing fault could cause the outlet works to rupture. This would allow seepage to remove foundation and embankment materials. The material could pass into and through the ruptured conduit, which could lead to a breach of the embankment with a possible sudden uncontrolled release of the Reservoir. This breach could result in flooding of areas downstream from the Dam.

Regulations governing the operation and maintenance of Indian Irrigation Projects are provided in 25 C.F.R. Part 171. BIA Manual Part 55 Chapter 1 states that it is BIA policy to construct, operate, and maintain irrigation projects in accordance with applicable technical and safety standards. IDSA requires that such repair and modification work would be completed as necessary to bring the Dams identified as unsafe to a satisfactory condition.

DSMRP has ranked the Dam as number one since 1989. This ranking means that the Dam is the most unsafe BIA dam in operation. Rating factors that contribute to this ranking include seepage, hydrology, static stability, liquefaction, and dynamic stability. The potential for loss of life due to flooding and secondary faults within the foundation of the Dam results in a high hazard ranking.

PROPOSED ACTION

The Proposed Action is an integrated set of actions to ensure safe operation of the Dam while utilizing the maximum capacity of the Reservoir. The proposed repairs involve all major features of the Dam: rehabilitating of the outlet works and service spillway, modifying a portion of the existing embankment, widening a portion of the existing embankment, enlargement of the emergency spillway (Carter and Heyder, 1993), and construction of a fishway (Anderson 2002). These are described in detail below. Together, these Dam modifications would reduce the likelihood of failure during an earthquake and provide a level of protection from floods. Modifications and repairs would require approximately 12 months to complete (Table 1). Figure 3 shows the relative locations of the service spillway, outlet works, and outlet works control house and the areas subject to modification by the Proposed Action, as described below.

Table 1. Proposed schedule for Weber Dam Modification activities.

Activity	Early Start Date	Expected Completion Date	Duration
Notice to proceed	Mid April Year 1		
Mobilization	Mid April Year 1	Mid May Year 1	1 month
On ground activities	Mid May Year 1	Mid January	9 months
Major earthwork	June	Mid December	6 months
Cleanup and revegetation	January	April Year 2	4 months

Rehabilitate the Outlet Works

Deteriorated concrete would be repaired, the slide gates and operators of the outlet works rehabilitated, and a new outlet works control house would be built on the gate tower. These repairs within the downstream, and possibly the upstream, conduits would require access from the outlet works discharge portal. The removal and reinstallation of the slide gates would be through the wet wells of the gate tower, and would require equipment, such as a small crane on the Dam crest or downstream face. This would also be the area used during construction of the new outlet works control house. Repairs of the conduit upstream of the gate would require a restricted Reservoir pool (4,180 ft msl).

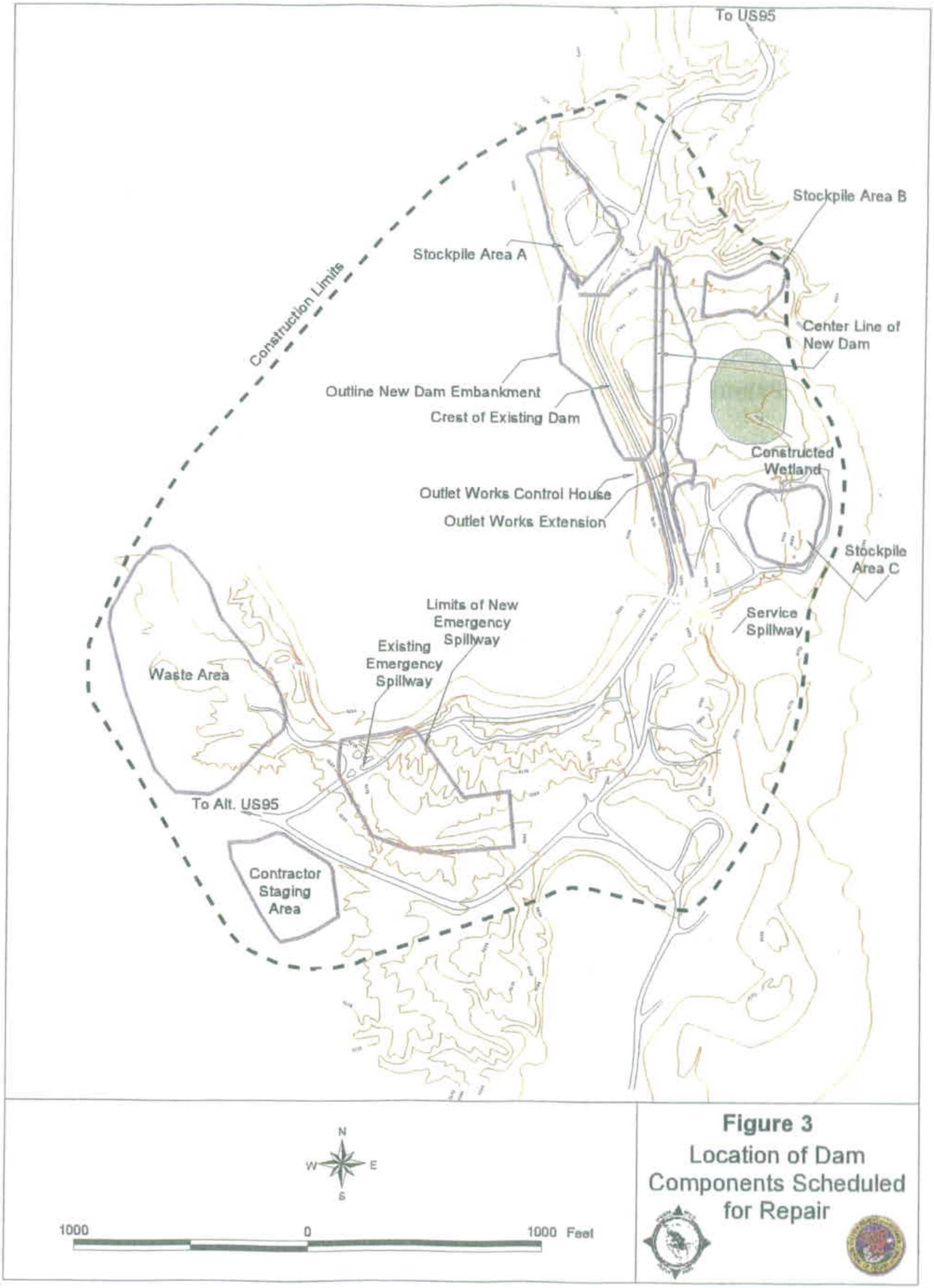

Figure 3
Location of Dam Components Scheduled for Repair

Rehabilitate the Service Spillway

Deteriorated concrete in the spillway would be replaced; the radial spillway gates would be rehabilitated. Much of the service spillway work would be within the confines of the spillway walls, but vehicle access would be required on both sides of the spillway chute and the spillway upstream approach area.

It is unknown how much of the spillway gate mechanism would be removed from the gate area during the rehabilitation, but an area large enough to work on one or both gates might be required. Large areas are available to either side of the spillway; the parking area on the south side of the spillway alone might be adequate, allowing work to be confined to one side of the spillway.

Modify a Portion of the Existing Embankment

Movement along the existing fault under the embankment potentially could cause the foundation and embankment to crack near the fault. The crack would provide an uncontrolled seepage path from the Reservoir. Excessive seepage could result in the movement of foundation and embankment materials and the subsequent breach of the embankment.

To eliminate the effects of foundation movement along the embankment, approximately 400 feet of the embankment would be relocated approximately 300 feet downstream from the current location. With this new embankment location, movement along the fault would not provide a seepage path through the embankment or the foundation. This would require removal of the existing embankment portion and removal of the liquefiable foundation materials at the downstream site.

Widen a Portion of the Existing Embankment at the Outlet Works and Extend the Outlet Works Tunnel

To prevent rupture of the outlet works and breach of the embankment during an earthquake, the downstream portion of the embankment at the outlet works conduit would be enlarged. This portion of the embankment would remain in place and prevent a sudden Reservoir release even with movement along the fault or failure of the upstream portion of embankment. To provide room for this overbuilt embankment, the outlet works conduit would be extended about 105 feet. In addition, the downstream portion of the embankment would have internal filters capable of accommodating embankment cracking that may occur during MCE. Water would be released from the reservoir to lower the elevation to 4,177 ft msl during repairs of the conduit.

Enlargement of the Emergency Spillway

The present emergency spillway, which is a naturally formed channel, would remain, and the crest of the emergency spillway would be enlarged. The 200-foot segment of roadway, which now acts as a fuse plug would be replaced by a new, longer fuse plug. A

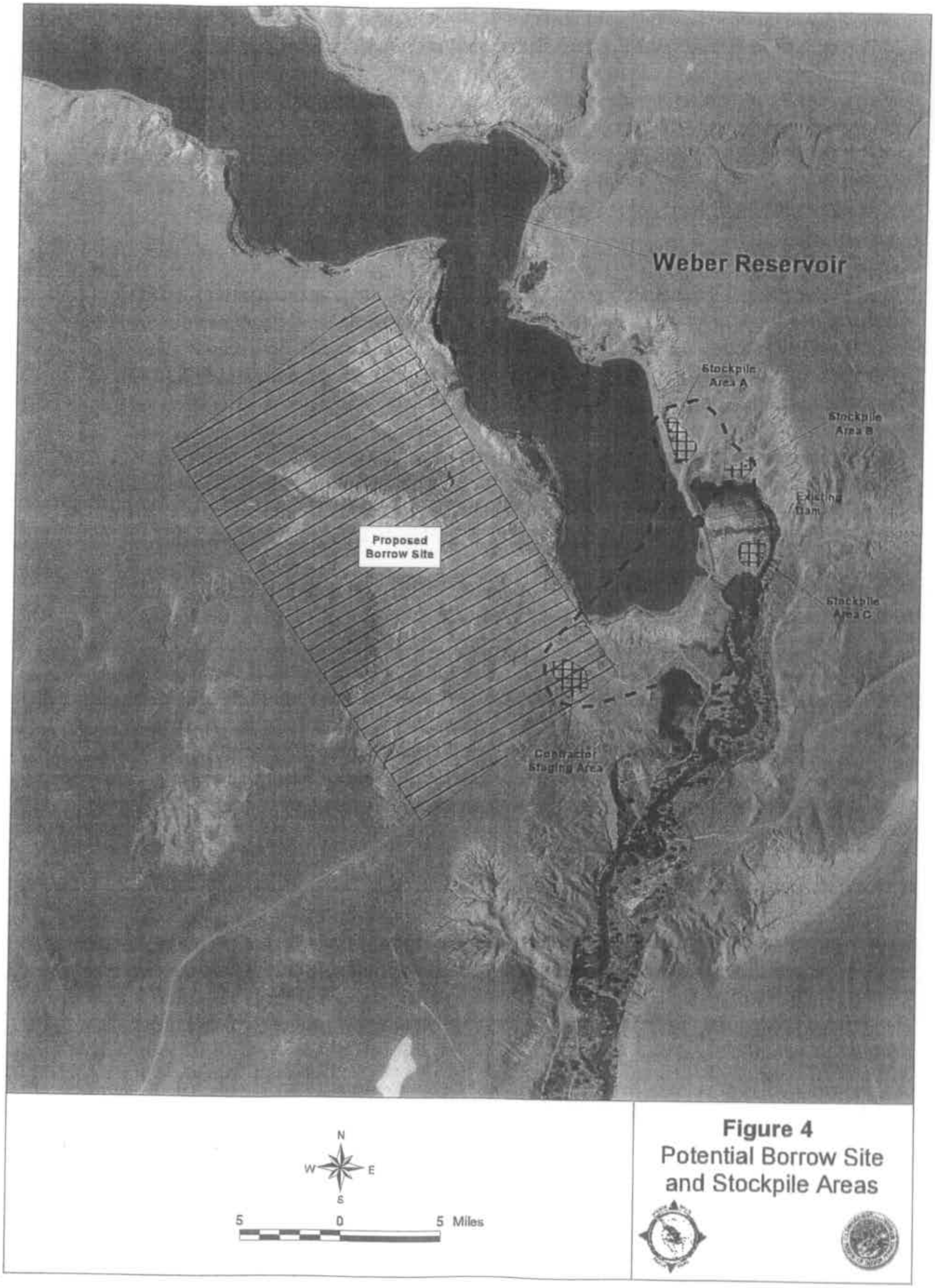

Figure 4
Potential Borrow Site and Stockpile Areas

Roadway Reconstruction

The gravel surfaced roadway crossing on the existing Dam crest would be reconstructed to cross on the new embankment crest. Realignment of the road approach on the left abutment would begin approximately 700 feet north of the left end of the new Dam embankment. To accommodate an improved road alignment and a wider roadway, the existing Dam crest to the south of the outlet works would be widened along the downstream side by approximately 8 to 15 feet. The right abutment road approach realignment would end approximately 550 feet south of the service spillway. The total length of the reconstructed road would be approximately 2,800 feet. Gravel surfacing would be placed on the entire length to a 6-inch thickness. All existing cable barrier rail would be removed and a W-beam guardrail would be erected where required.

Embankment Slope Protection Source

An area located approximately four miles southwest of the Dam at the base of White Mountain on Bureau of Land Management (BLM) administered lands would be used as a source of rock for riprap and downstream slope protection. BLM permits would be required to access the quarry and remove material. The area has been previously disturbed. This area probably was the location of the source for riprap for the original Dam construction. Development of the source and production of the riprap and downstream slope protection would require clearing, blasting, and sorting operations. Transportation of the materials to the Dam would be over an unimproved road for approximately one mile then over a gravel road for approximately three miles to the Dam (Figure 2). Approximately 6,000 cu yd of rock for riprap and approximately 5,000 cu yd of downstream slope protection would be needed to construct the Dam modifications.

Contractors' Staging Area

There are four potential staging areas (Figures 3 and 4). These are:

- The flat area southeast of the waste area.
- The area immediately north of the proposed area for the constructed wetland.
- The flat area between the spillway and the river outlet works.
- The area above the left abutment immediately north of the existing embankment.

Borrow Pits and Stockpile Areas

An area of previously disturbed terrain southwest of the Dam could be used as a source of material for the embankment, if needed. Material removed from the Dam, but intended for reuse, would either be stockpiled on the slopes of the Dam itself, in one of the stockpile areas (Figure 3), or in unused portions of the borrow areas.

Safety

Traffic on the road across the Dam is very light, and could be readily accommodated during construction. If necessary, traffic could be controlled by flagmen and warning signs, or the road could be temporarily closed. The existing Dam would serve to keep boaters out of the construction area.

Fishway

As part of the EIS, alternatives to the modification and repair of Weber Dam were developed and evaluated during the Alternative Screening Analysis. An assessment of impacts to LCT included the evaluation of fish passage. The fish passage structure (i.e., fishway) presented here is intended to remove the impact of the existing dam, restore connectivity in the lower river, and allow LCT migration. The full documentation of the fishway evaluation is presented in Anderson (2002). (See Appendix C.)

A fishway would be constructed along the emergency spillway west of Weber Dam as part of the Proposed Action and operated to allow upstream and downstream movement of local fish species, particularly LCT. The structure would be a boulder weir-rocked lined fishway similar to the fishway recently constructed by BOR at Derby Dam on the Truckee River. Figure 5 illustrates the proposed location and alignment of the structure. Figure 6 shows a cross-section of the channel with the boulder alignment. The fishway is separated from the spillway to achieve the design criteria for fish passage. While final design has not been completed, FWS would be invited to comment on design drawings as they become available to optimize the design for LCT passage.

The fishway is designed to provide velocity of approximately 4 feet per second through a range of operational flows (between 25 cfs and no greater than 200 cfs) and operate at a Reservoir elevation range of 4,200 to 4,208 feet msl. A manually-operated control gate at the upper end of the passage would regulate flow. Design specifications are as follows:

- Length of channel – 2,100 feet
- Bottom width of channel – 4 feet
- Water depth – 3 to 6.5 feet
- Vertical drop – 32 feet (elevation 4,198 feet msl to 4,166 feet msl)
- Slope – varies from 0.013 to 0.018 feet per feet
- Distance between boulder weirs – 25 to 34 feet
- Maximum height of boulders above channel bed – 3 feet
- Width between boulders – 1.25 to 1.5 feet

The rock fishway entrance from Walker River includes a small area of cobbles and large gravel that would be placed in the river for protection of the river bottom and bank. On the river, upstream of the fishway entrance, a large cobble and small boulder structure would be placed to direct fish to the fishway instead of to the spillway pool. This structure would be designed to deter fish from going to the spillway pool and direct them to the fishway when it is operating. The fishway would allow passage of fish both in the upstream and downstream direction. BIA and the Tribe would work with FWS to ensure that the fishway construction adequately addresses LCT conservation needs.

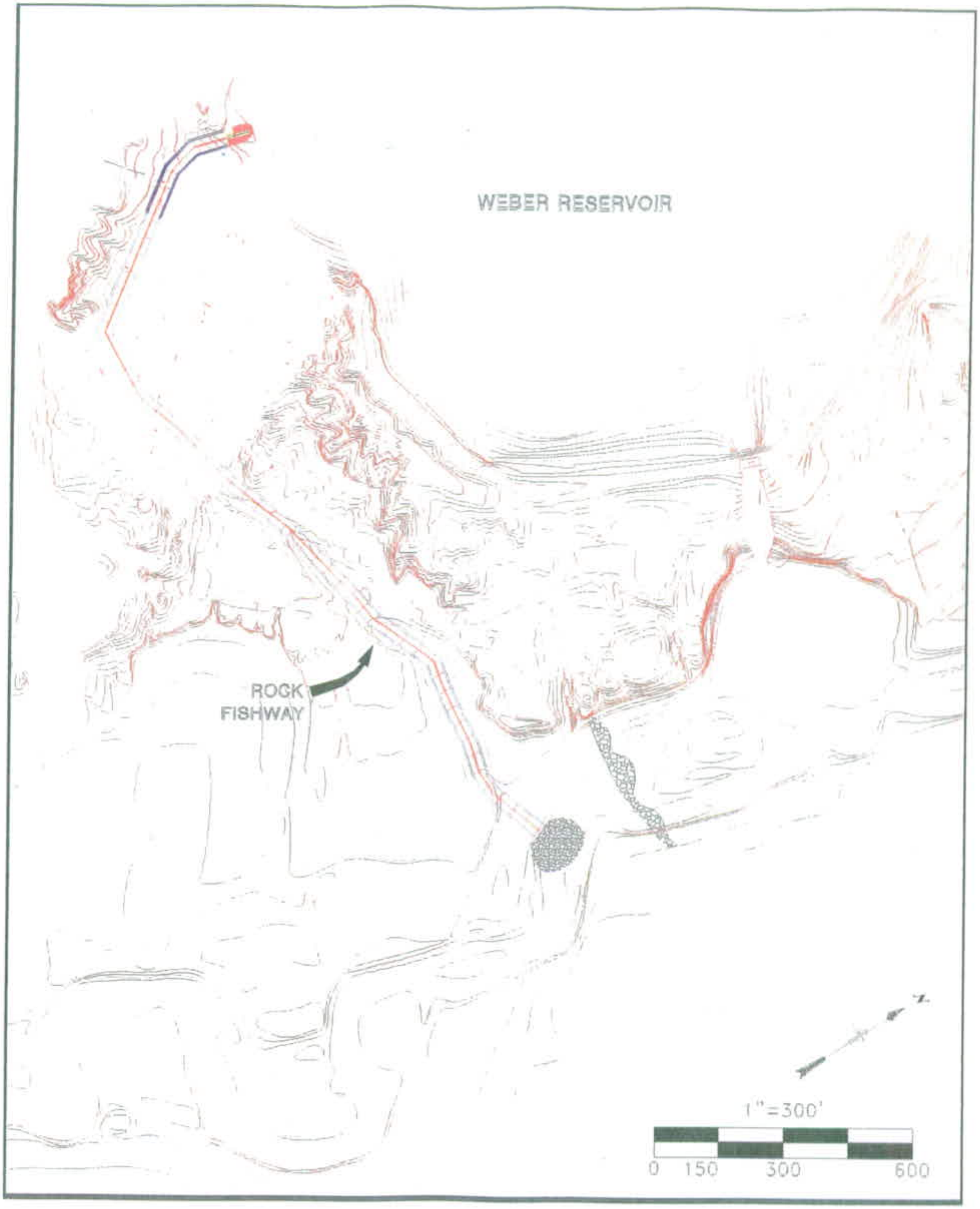

Figure 5. Location Map of Fish Passage Structure.

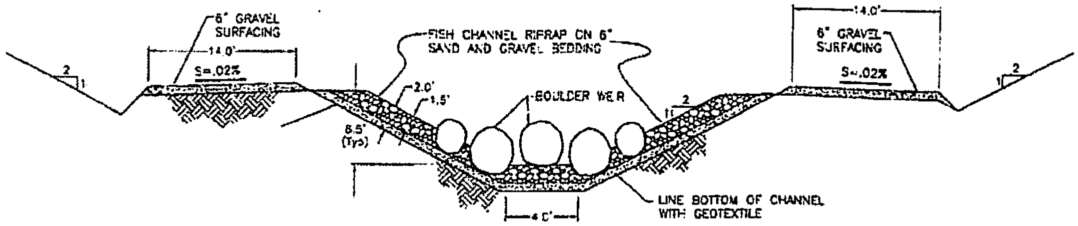

Figure 6. Cross Section of Fish Passage.

Fishway Operation. The operation of the fishway would be determined in coordination with FWS and the recovery efforts for LCT. The gate at the top of the fish passage allows the fish passage to be operated in coordination with the spillway on Weber Reservoir. Operational range for the fish passage to meet the design criteria is in the range of 25 to 200 cfs. Any releases that are made from Weber Reservoir within that discharge range could be made through the fish passage instead of the spillway. The timing of fish passage releases would be determined in coordination with FWS, the Tribe, and the recovery efforts for LCT to best benefit the species. The fishway would be operational as needed when LCT are migrating, provided sufficient water is available for release.

The fishway is not anticipated to operate during the first years after its construction due to the lack of water available for use in the fishway before the irrigation season. At some point, BOR's Desert Terminal Lakes Program and/or other activities may provide transfers of water that could be used in the fishway. In 2004, BIA and the Tribe worked with BOR and NDOW to facilitate the transfer of water from the Mason Valley Wildlife Area to Walker Lake by retaining water behind Weber Dam until sufficient quantities had been collected to support a pulse of water that would flow all the way to Walker Lake. While this transfer occurred in the summer, future transfers may allow timing of releases to support LCT migration. Once the fishway is completed, BIA and the Tribe would continue to facilitate such short-term or long-term transfers through use of Weber Dam and the fishway.

The fishway would eliminate the critical first barrier to upstream LCT migration. Structures upstream of Weber Reservoir, however, would continue to block migration to spawning areas. Ultimate success of the fishway would depend on activities of other – particularly upstream – parties, which are beyond the scope of this project and outside the jurisdiction of BIA and the Tribe.

To determine when and how the fishway operates, FWS, BIA and the Tribe propose holding a meeting in January of each year. Invitees would include the Nevada Department of Wildlife (NDOW), and other agency fishery biologists as part of LCT recovery efforts in the Walker River basin. The issues for discussion may include LCT status at Walker Lake, hydrological conditions, availability of water for use in the fishway, irrigation season coordination, and upstream conditions (e.g. access to spawning areas). BIA and the Tribe, however, would retain the authority to decide how best to operate Weber Reservoir and the fishway, considering the Tribe's needs for irrigation water and its interest in supporting LCT recovery.

To minimize any take of LCT, measures would be taken to minimize mortality, injury, harm, and harassment of LCT upstream, within, and downstream of the fish passage structure at Weber Dam. BIA and the Tribe would minimize such potential take by implementing the following actions:

Consistent with the annual discussions with FWS, NDOW and certain other biologists, the fish passage shall operate at various river flows. It shall remain open as much as possible during periods designated during the annual discussions, provided that water is available, either through transfers to Walker Lake or excess flows. Should the fish passage require closing during a designated period, BIA or the Tribe would contact FWS and allow salvage of any fish in the fishway before any closure occurs.

The anticipated fishway design would create a boulder weir rock-lined structure, which would produce a drop in water surface of about 32 feet, with a slope varying between 0.013 and 0.018 feet per feet. Flow depth would vary between 3 and 6.5 feet. Velocity within the fishway would be between 2 and 6 feet per second and not exceed 8 feet per second.

Velocities and flow patterns in the fish passage shall be determined under various discharges to determine the range of operational conditions. This assessment shall be done jointly with FWS through the annual discussions.

BIA shall be responsible for the maintenance, inspection, and repair of the fish passage structure. All maintenance shall be completed by February of each year. The fishway would be operated as scheduled unless catastrophic natural events occur, beyond BIA's control, that delay the maintenance schedule.

Should the proposed fish passage not operate as designed, BIA shall initiate corrective actions immediately for any and all problems until the structure functions as intended. When the fishway is operated, the following measures would be used to minimize stranding of LCT at the end of the annual operation period.

- The control gate would be set at the minimum operating discharge.
- A block net would be placed across the downstream entrance to the fishway.
- The fishway would be inspected for LCT in the structure and any LCT remaining would be captured and removed from the fishway. LCT would be transferred to Walker River or Walker Lake depending on the hydrologic conditions at the time of fishway closure.
- The control gate would be completely closed.
- When the fishway is dewatered, the blocknet would be removed.
- Upon locating dead, injured, or sick LCT, BIA would have the responsibility to ensure that information relative to the date, time, and location of the listed species

when found and possible cause of injury or death of each individual be recorded and provided to FWS.

River Diversions During Construction

During construction the original dam would be used as the coffer dam and river flows would be stored behind it in accordance with the Interim Operating Criteria. During this time releases would be made through either the service spillway or existing outlet works depending on the reservoir level. However, there would be times when the crest of both, new and old, embankments would be below the original crest elevation of 4,217. In addition, a cofferdam would be constructed around the inlet to the existing outlet works and have a crest elevation of 4,201. Diversion of flood protection was determined to be a 25-year event and this size flood was used to determine the crest elevation of the cofferdam. When possible all releases would be made through the service spillway and the outlet works. If irrigation releases are required, and the reservoir level is not high enough to allow the releases to be made through the service spillway, the existing outlet would be used and the flows would be diverted around the new conduit sections. To the extent possible the reservoir would be operated as it has been during recent irrigation seasons under IOC.

To protect the work during periods of high flow, early releases would be made to evacuate the reservoir thereby allowing peak flows to be stored and prevent damage to the construction in progress. The timing of these evacuation releases (primarily in January) would avoid periods when LCT may try to migrate upstream. The river downstream from the Dam would be monitored to determine that LCT are not attracted upstream during the construction period. During these times the reservoir would be operated to minimize damage to the construction and downstream areas.

Environmental Commitments for the Proposed Action

Water Quality and Fish Protection

A water quality control plan would be implemented. The contractors would employ construction methods that would prevent accidental spillage of solid matter, contaminants, debris or other pollutants into flowing streams, dry watercourses, or Weber Reservoir. Excavated materials would not be stockpiled or deposited on or near streambanks, or in other locations where the material could be washed away by high water or storm runoff.

The contractor would be required to comply with applicable Federal and Tribal laws, permits, orders, regulations, and water-quality standards concerning the control and abatement of water pollution to protect water quality and fish resources. The contractor's methods of dewatering, unwatering, excavating, or stockpiling of earth and rock materials would include appropriate measures to control siltation. Wastewater from general construction activities, such as drainwater collection, drilling, grouting, or other construction operations would not be permitted to enter watercourses without the use of approved turbidity control methods. These methods may include, but are not restricted to, interception ditches, settling ponds, gravel-filter entrapment dikes, flocculating processes, recirculation, or combinations thereof.

Upland and Riparian Vegetation/Wildlife Protection and Mitigation

Where possible, construction activities including staging, storage, excavation, and movement of borrow material would be in areas of previous disturbance.

Willows and other riparian native vegetation would be replanted to replace vegetation lost due to modification of the toe drainage channel area located on the southern side of the downstream parking area.

Where disturbance of the seep area near the Dam is unavoidable, the loss would be compensated by creating a wetland area near the river. The loss of existing wetlands would be 1.6 acres and would be replaced as specified by U.S. Army Corps of Engineers 404 permit. The draft wetland design specifies construction of a two-acre wetland as mitigation. A detailed riparian restoration plan would be prepared. The plan would include the restoration of grades, and the reestablishment of native vegetation consistent with the specific community type. Containerized plants and seeding could be used to replace shrubs in riparian habitats, and perhaps in all habitats. Seeding may be used to restore grasses and other herbaceous plants (Figure 3).

The project would comply with the Migratory Bird Treaty Act. Construction would avoid destroying active nests of birds breeding in the area. If construction is planned during the summer, a biologist would survey for active bird nests in the area to be disturbed. If nesting birds are present in these areas, the work would not begin until two weeks after young birds have fledged.

SPECIES ACCOUNTS

Bald Eagle (Haliaeetus leucocephalus)

Distribution

Bald eagle (Haliaeetus leucocephalus) is associated with aquatic ecosystems throughout its range, which formerly included most of the North American continent. Populations declined and range diminished in the lower 48 states through the 1970's and the species was listed as endangered on February 14, 1978, except in Minnesota, Wisconsin, Michigan, Oregon, and Washington, where it was classified as threatened (43 Fed.Reg. § 6233). Factors affecting this decline included human harassment, prey reduction, habitat loss, and reproductive impairment caused by environmental contaminants resulting in egg shell thinning and hatching failure.

Since the banning of DDT in 1972 and the initiation of intensive protection efforts, the number of breeding pairs has increased from an estimated 400 in the lower 48 states in the early 1960's to over 2,660 nesting pairs in 1989. The number of known occupied territories doubled between 1982 and 1990 when bald eagles were reported nesting in all but five of the 50 states (Hunt et al. 1992). The largest breeding populations are now concentrated in southern Alaska, British Columbia, along the coast of Washington, around the Great Lakes, the Chesapeake Bay, and in Florida (USFWS 1982; Peterson 1986; USFWS 1986). Smaller breeding populations are found in the northern Rocky Mountain States primarily associated with large lakes and rivers. Breeding in the southwestern U.S. has been restricted to the Salt and Verde River systems in Arizona, although in some areas a slow increase in resident bald eagle activity has been observed.

On July 12, 1994, FWS proposed downlisting the endangered populations to "threatened" except those in the Southwestern Recovery Region. A 32 percent increase in occupied breeding areas was noted since 1990 and recovery goals had been exceeded in the Chesapeake, Southeastern, Pacific and Northern Recovery Regions. However, downlisting was not proposed for the Southwestern Region (southeastern corner of California, Arizona, New Mexico, west Texas, and the Oklahoma panhandle) because numbers remained low and breeding populations localized. Low adult survival rates and threats to riparian areas from human activity created a need for intensive management, especially at nest sites (USFWS 1994).

On March 23, 1995, FWS reopened the comment period for downlisting citing new information to indicate that southwestern bald eagles are unlikely to be reproductively isolated from other populations. Although threats to riparian areas remain in the southwest, new evidence indicates immigration to the population. FWS issued a final rule to list all bald eagles in the lower 48 states as threatened, but leaves conservation measures in place (USFWS 1995a).

The bald eagle is a federally threatened species known to overwinter in the Walker River riparian corridor downstream from Weber Dam (USBR 1994) where large Fremont cottonwoods provide roosting habitat. Moreover, Weber Reservoir has an abundant population of warm water fishes which along with injured or sick waterfowl provides a food base. Bald eagle foraging ranges may be influenced by such factors as the distribution of strategic perches and isolation from disturbance (Hunt et al. 1992; Hunt 1993). Bald eagles prefer to perch near food sources (Sabine 1987; Stalmaster 1987; Harmata 1993) on sturdy branches that permit good visibility and unobstructed flight (Stalmaster 1987). Primary bald eagle wintering areas are typically associated with concentrations of food sources along major rivers that remain unfrozen where fish and waterfowl are available, and near ungulate winter ranges that provide carrion (Steenhof et al. 1980). Wintering bald eagles are also known to roost in forests with large, open conifers and snags protected from winds by ridges, often near concentrations of domestic sheep and big game (Anderson and Patterson 1988).

Real West Natural Resource Consulting (Real West) conducted surveys for roosting bald eagles on February 1 and 2, 2002. During those surveys, one bald eagle was observed on the site, north of the dam and adjacent to the reservoir. It was perched in a large cottonwood tree, located approximately 1.5 miles upstream of the dam. A bald eagle was observed only once during the two-day survey, which suggested that the location was a temporary roost site. There was no evidence of a traditional roost site in the project area.

Bald eagles generally arrive in the project area during November, and leave the Walker River area during February. All major construction activity is scheduled to be completed by December 15. The majority of the disturbance activity takes place outside of the November through February time period.

Impacts of the Proposed Action

While bald eagles may temporarily roost and forage in the area in the winter, there are no concentrated roosting sites. There are two important habitat features to consider with this species within the project area including:

Because there is little, if any, riparian vegetation that would be affected by project implementation, roosting and nesting habitat (large Freemont cottonwoods) would not be affected. Equipment use and camping restrictions, as specified below, would insure avoidance of these riparian areas and their protection.

Reservoir draw-down during dam modifications has both potentially positive and negative effects on bald eagles. During draw-down, forage fishes would be confined to a very small pool area immediately upstream of Weber Dam. Fish prey would be concentrated in one location with limited options for escape, making foraging easier for eagles. Concurrently, personnel and heavy equipment would be working on the dam faces adjacent to the drawn down pool. This combination of factors with considerable construction noise occurring near a large concentration of forage fishes might place unusual stress on these raptors, but presence of extensive foraging areas should remain in the three to four miles of old river channel that would be exposed upstream of the dam at the upper end of Weber Reservoir. In addition, construction activity timing would take place mainly during early fall prior to arrival of eagles to further avoid conflict with this species.

The following protective measures and monitoring would be implemented during construction:

1. Document the date of arrival and numbers of bald eagles in the area stretching from the Dam for 6 miles upstream along the Reservoir and river.
2. Document whether and where foraging is occurring at Weber Reservoir or in adjacent upland areas.
3. Monitor use of communal night roost and diurnal perch trees in the vicinity of the Dam and Reservoir. Monitoring shall occur from no less than a quarter of a mile away.
4. No large cottonwood trees would be removed or damaged by the project. Protection of perch and roost sites would occur with equipment use and camping restrictions for avoidance of riparian areas. No camping in these areas would occur between October and March.
5. Documentation/reports of bald eagle activity, if occurring, would be provided to FWS every two weeks during project construction.
6. If disturbance of bald eagles occur due to the project, the factors (i.e. noise, disturbance at roost or perch trees, loss of prey species from Reservoir,

disturbance during foraging at Reservoir, etc.) which caused the disturbance would be noted and BIA would reinitiate formal consultation.

There may be short-term disturbance to bald eagles at temporary roost sites; however this impact would be minor since there are alternate roost sites in the area. The proposed action would not result in any long-term loss of roosting habitat.

Lahontan Cutthroat Trout (Oncorhynchus clarki henshawi)

Historical Distribution and Abundance

One federally listed threatened species, LCT formerly occurred in the Walker River from Walker Lake and its tributaries upstream to the east and west forks in California (USFWS 1995b). Spawning runs had begun to decline by 1860 as agriculture was developed within the watershed in Nevada. In 1948 the Nevada Game and Fish Commission removed the last large trout from the river downstream from Weber Dam for use as brood stock in a hatchery program that continues today. The lake remains a put, grow and take fishery.

The earliest settlers and emigrants documented that Walker Lake and the Walker River system contained large numbers of native trout. Annual runs of LCT ascended the Walker River in early spring and if flow conditions were adequate, migrated into the headwater region of the West and East Walker Rivers (Gold Hill News, 1874). During the early 1860's, major irrigation projects were implemented in Mason and Smith Valleys with numerous diversion ditches and dams constructed (Horton, 1996). Habitat modifications to the Walker River and its two major forks have persisted since that time. Irrigation diversions along all reaches of the river system and channelization, primarily for flood control, have eliminated the potential of the main Walker River and greatly reduced the potential of the East and West Walker rivers to sustain trout populations.

This fact was recognized as early as 1877 when the Nevada State Legislature passed "An Act to provide for the preservation of fish in the waters of this state" (Parker, 1881). This Act established the position of Fish Commissioner and enacted regulations concerning the harvest of fish and the alteration of their habitats. It also required all controlling parties of dams and obstructions on rivers or streams to construct and maintain fish passage structures. The enforcement of this provision was delegated to local sheriffs and District Attorneys who failed to enforce this provision of the law the majority of the time (Parker, 1877). With the demand for more food fish in the waters of Nevada and the decreasing numbers of native fish, the priority of the Fish Commissioner was the introduction of new food fish species.

To supplement the native trout in the western Nevada rivers, hundreds of thousands of rainbow, brook trout, salmon and whitefish as well as carp, catfish, bass and perch were stocked during the late 1800's. Nevada identified the need to augment populations of "black spotted trout" (LCT) in the three river systems of western Nevada in the early 1900's (Mills, 1909). During 1910, approximately 1.3 million LCT were stocked throughout northern Nevada waters. The source of the eggs for these stockings was the

Truckee River (Mills, 1911) where fish traps were constructed just east of Reno. From 1905 through 1925, more than 11 million Truckee River LCT were stocked into the waters of 14 of the 17 Nevada counties, and several hundred thousand given to California Fish and Game for stocking in their waters (Biennial Reports of the State Fish Commission, 1907-1925).

From 1911 through 1925, approximately 1 million LCT were stocked into Walker Lake, main Walker River and the East and West Walker Rivers. These stockings of wild fish contributed greatly to the fishery in Walker Lake and Walker rivers for years after the upper river habitat and stream flows had been greatly altered and the natural reproduction potential severely lessened. For the period 1926 until 1946, no additional LCT were stocked into Walker Lake, (Biennial Reports of the State Fish and Game Commission, 1927-28 to 1946-48) resulting in the loss of that fishery.

Current Distribution and Abundance

With the creation of the new State of Nevada, Fish and Game Commission on July 1, 1947, a fishery biologist was appointed and a long-range fishery program was developed. One objective of the fishery program was to investigate the possibility of repopulating depleted bodies of water such as Pyramid Lake and Walker Lake with their original species of fish life (Wheeler, 19461948). Since 1946, annual stockings of LCT into Walker Lake have restored and maintained the lake's fishery. However, large upstream diversions of river flows have placed the lake in jeopardy again. Except for a limited number of above normal water years, the lake has shown a continual decline in elevation.

From 1947 to the present, studies have been conducted on the main Walker River as well as on the East and West Walker rivers in Nevada and California. Annually, large numbers of reared rainbow and brown trout are stocked into the upper Nevada reaches of the East and West Walker rivers to maintain a sport fishery because natural recruitment is so limited.

Available information indicates that LCT is not present in the lower Walker River without sufficient spring runoff to reach Walker Lake. Water years with sufficient runoff allow trout from Walker Lake to move up the river to the base of Weber Dam (C. Drake, Nevada Division of Wildlife personal communication). These trout move during the spring spawning migration and are not present on a year round basis. LCT generally spawn from April through July depending on streamflow, elevation and water temperature.

Habitat Conditions and Fish Population Data - Walker River

The main Walker River extends from Walker Lake upstream approximately 60 miles to the confluence of the East and West Walker Rivers. In addition to Weber Dam on the lower reach of the river, numerous small diversion dams have been constructed to supply irrigation water throughout Mason Valley (Table 2). The largest diversion structure is the Yerington Weir which is located several miles downstream from the town of Yerington, which diverts water to the agricultural areas of northern Mason Valley. Even during high flows, this structure is a barrier to upstream fish passage.

The lower Walker River is a very low gradient stream with a low pool to riffle ratio. The substrate is composed primarily of fines and sand, with little gravel or rock/rubble habitat making the riparian zone highly erodible. The absence of large canopy cover contributes to high summer water temperatures.

Stream flow varies considerably depending upon time of year. The entire Walker River system discharge pattern is highly regulated by major dams on each fork and diversion structures along its entire length to meet adjudicated water rights. During normal water years, summer flows upstream of the Yerington Weir range between 100 and 200 cfs, and are generally less than 60 cfs downstream and late summer flows of 5-25 cfs are not uncommon (Water Resources Data for Nevada). There also have been numerous days when water temperatures were over the lethal limits for LCT.

Because of low river flow and the degraded nature of the river and riparian canopy, summer water temperatures throughout the Walker River are lethal to trout species. Water temperatures recorded at the Wabuska Gage (April-September) during a normal water year (1979) ranged from 17.5 to 27.0°C (63 to 79°F) (Water Resources Data for Nevada, Water Year, 1979). Water temperatures upstream of the reservoir reached 35°C in the summer of 1999 (Miller et al. 2001). These temperature data document that conditions in the Walker River upstream of Weber Reservoir would be lethal to LCT in the summer (Table 3).

There are many species of warm water fish that currently inhabit the lower 30 miles of the Walker River that can compete with LCT. Game fish species include channel catfish, black and brown bullheads, green and bluegill sunfish, white crappie and largemouth bass. Other species present are carp, and possibly tui chub, Tahoe sucker, redside shiner and speckled dace. Periodically during large discharges from Weber Reservoir in the spring, LCT have been found in the reach of river immediately downstream from the dam. NDOW Fisheries Management Objective for the river is to maintain a warmwater species fishery from the upper boundary of the Walker River Indian Reservation to the confluence of the East and West Walker Rivers (Sevon, NDOW, personal comm., 1999).

Habitat Conditions and Fish Population Data - West Walker River

The West Walker River originates in the Sierra Nevada Mountain Range in California and flows northeast where it enters Nevada. Water is diverted into Topaz Reservoir through a canal and later discharges from the reservoir back to the West Walker River.

Table 2. Summary of dams and diversion structures on Walker, East Walker and West Walker Rivers.

Walker River – Walker Lake upstream to confluence of East and West Walker Rivers

Map I.D.	Description	Location
Schurz NV	Flume (supplies lateral 2-A)	R28E,T13N,Sec. 36
Weber Dam NV	Weir (supplies canals No. 1 and No. 2)	R28E,T13N,Sec 36
Mason Butte NV	Dam (supplies Sand Ridge ditch, Spragg-Alcorn-Bewley ditch, and West Highland ditch)	R25E,T13N,Sec 2
Yerington NV	(4) Weirs (supplies Campbell ditch, Joggles ditch and one other no name ditch)	R25E,T13N,Sec 33

East Walker to Bridgeport Reservoir

Map I.D.	Description	Location
Yerington S.E.	Weir (supplies Hall Ditch)	R26E,T12N,Sec 30
Yerington S.E.	Weir (supplies High Ditch)	R26E,T12N,Sec 32
	Weir (supplies an unnamed ditch)	R26E,T11N,Sec 15
	Weir	R27E,T10N,Sec 6
	Upper Charlebois Ditch	R27E,T10N,Sec 8
	Ditch	R27E,T10N,Sec 17
	Ditch	R27E,T10N,Sec 28
	Ditch	R27E,T10N,Sec 33

West Walker to headwaters

Map I.D.	Description	Location
	Weir (supplies ditch)	R25E,T11N,Sec 4
	Weir	R25E,T11N,Sec 9
	Weir	R25E,T11N,Sec 16,9
	(6 canals near town of Smith)	R24E,T11N,Sec 17,18,13,24
	Weir	R23E,T10N,Sec 2
	Weir	R23E,T10N,Sec 2
Long Dry Canyon	Weir	R23E.T10N,Sec 10
Topaz Lake	East Slough	R23,T9N,Sec 12
Coleville	Swager Ditch	R22E,T9N,Sec 36
Coleville	Headgate	R22E,T8N,Sec 2

Source: USGS 7.5 minute series topographic maps

The main channel of the West Walker River flows for about 5 miles between Topaz Diversion Canals. From Topaz Reservoir the river flows approximately 35 miles where it joins the East Walker River to form the main Walker River in Mason Valley. Numerous rock diversion structures are found throughout the river in Nevada and California. Several concrete diversions are present that may block passage.

The physical characteristics of the West Walker vary from a low gradient river in Mason Valley and Smith Valley to a higher velocity, steeper gradient river through Wilson and Hoye Canyons. The substrate of the river where it runs through the agricultural valleys is very similar to the main Walker River, however, through Wilson and Hoye Canyon a rock/rubble substrate exists. River flows at Wellington during the irrigation season generally fluctuate between 400 and 600 cfs while the remainder of the year flows are regulated to 20 to 40 cfs (Sollberger, NDOW, 1999).

The Nevada Department of Wildlife's fisheries management program consists of annual trout stocking in the Topaz Canal, Hoye and Wilson Canyons. Annual allocation of catchable rainbow and brown trout averages 20,000 trout per year. Subcatchable cutthroat have also been released into these sections of river.

Fish population sampling conducted periodically throughout the West Walker River in Nevada have shown no evidence of natural rainbow or brown trout propagation (Sollberger, NDOW, 1999), however, limited brown trout production has been documented in the upper California reach of the river.

Habitat Conditions and Fish Population Data - East Walker River

The East Walker River originates along the eastern slope of the Sierra Nevada Mountain Range in California. Bridgeport Reservoir, located seven miles upstream of the Nevada-California border, is the largest storage reservoir on the Walker River system and is used primarily to supply irrigation water in Nevada. From Bridgeport Reservoir the river flows approximately 60 miles to the main Walker River.

Stream channel habitat characteristics vary considerably from reach to reach downstream from Bridgeport Reservoir with the upper 15 miles considered excellent trout habitat while the next 10 miles is suitable for put-and take trout stocking with the remainder generally unsuitable for a coldwater fishery during normal water conditions. Water delivery for irrigation generally begins April 1 and ends November 1 and flows typically run from 200 to 500 cfs during this period (Sollberger, NDOW, 1999). The California State Water Board requires a minimum reservoir discharge of 20 cfs; if the air temperature falls below 0^{o}F, minimum flows must be increased to 30 cfs. Minimum flows are designed to reduce anchor ice and provide riffle and deep pool habitats required for brown trout survival.

Fishery management objectives of California and Nevada were based on the potential of each reach of river and the status of public access to the reach. From Bridgeport Reservoir downstream (lower boundary of Rosaschi Ranch) approximately 15 miles both states manage this reach as a wild trout fishery with restrictive harvest regulations. From the Elbow downstream to Zanis Ranch, approximately 14,000 catchable size rainbow and 20,000 subcatchable size brown trout have been stocked annually in order to maintain a sport fisheries (Sollberger, NDOW, 1998, 1999). Below this point downstream to the confluence of the Walker River, habitat conditions make this reach unsuitable for a coldwater trout fishery.

Annually since the early 1970's, population surveys have been conducted from the Zanis Ranch area to the Nevada-California border by the Nevada Division of Wildlife and periodically from the state line to Bridgeport Reservoir by California Department of Fish and Game. Evidence of limited natural brown trout production has been documented for years from the Elbow area upstream to Bridgeport Reservoir; however, evidence of rainbow trout production has only been documented recently during the past several years of above normal water conditions. Fewer small fish (both rainbow and brown trout), less than 9.0 inches were found in March, 1997 than in November 1996, suggesting winter mortality of age 0 trout (Sollberger, NDOW, 1998).

Life History Requisites

Historically, LCT were found in a wide variety of cold-water habitats: large terminal alkaline lakes (e.g., Pyramid and Walker Lakes); oligotrophic alpine lakes (e.g., Lake Tahoe and Independence Lake); slow meandering low-gradient rivers (e.g., Humboldt River); moderate-gradient montane rivers (e.g., Carson, Truckee, Walker, and Marys Rivers); and small headwater tributary streams (e.g., Donner and Prosser Creeks).

Generally LCT in small streams remain in areas with cool water, pools in close proximity to cover and velocity breaks, well vegetated and stable river banks, and relatively silt free, rocky substrate in riffle-run areas. In large rivers, LCT generally prefer rocky areas, riffles, deep pools, and habitats near overhanging logs, shrubs, or banks (McAfee 1966; Sigler and Sigler 1987). Aspects of LCT life history are shown in Table 3.

LCT inhabiting small tributary streams within the Humboldt River basin have tolerated temperatures exceeding 27°C (80°F) for short periods of time and daily fluctuations of 14 to 20°C (25 to 35°F fluctuation) (Coffin 1983; French and Curran 1991). Intermittent tributary streams are occasionally utilized as spawning sites by LCT, and fry remain until flushed into the main stream during higher runoff (Coffin 1981; Trotter 1987).

Lacustrine LCT populations have adapted to a wide variety of lake habitats from small alpine lakes to large desert waters. Unlike most freshwater fish species, some LCT tolerate alkalinity and total dissolved solid levels as high as 3,000 mg/L and 10,000 mg/L, respectively (Koch et al. 1979). Galat et al. (1983) indicated that LCT in lakes where total dissolved solids and sulfates equal or exceed 5,000 mg/L and 2,000 mg/L, respectively would develop slight to moderate hyalin degeneration in kidney tubules. Walker Lake, Nevada is the most saline-alkaline water maintaining a LCT sport fishery. In Walker Lake, total alkalinity exceeded 2,800mg/L $HCO3$ in 1975 and total dissolved solids exceeded 11,000 mg/L in 1982 (Sevon 1988).

Table 3. Summary of aspects of Lahontan cutthroat trout life history.

Aspect of Life History	Information	As Cited In	Source
Migratory	Yes, lacustrine populations		USFWS 1995
Spawning Migration Temperature	5°to 16°C	A	Lea 1968; USFWS 1977; Sigler et al. 1983; Cowan 1983
Migration period	April-May (Pyramid Lake population)		Sigler et al. 1983
Spawning Period	April-July	A	Calhoun 1942; La Rivers 1962; McAfee 1966; Lea 1968; Moyle 1976
Age of Maturity	Females 3 or 4, Males 2 or 3		USFWS 1995
Consecutive Year Spawning by Individuals	"Uncommon"		USFWS 1995
	Doesn't occur (Pyramid Lake population)		Sigler et al. 1983
Post-spawn Mortality	60-70% females, 85-90% males		Cowan 1982
Fecundity	600-8,000 eggs/female (lacustrine)	A	Calhoun 1942; Lea 1968; Cowan 1983; Sigler et al. 1983
	100-300 eggs/female (fluvial headwaters)	A	Coffin 1981
Water Temperature Range for High Egg Hatching Success	5°-13.3°C (salmonids)	B	Leitritz and Lewis 1976
	7.8°-13.3°C (rainbow trout)	B	Kuntzelman pers. Comm
Mean Upper Lethal Temperature (juveniles)			Vigg and Koch 1980
Pyramid Lake water (Alkalinity=1487)			
Marble Lake Strain LCT	19.4°C		
Summit Lake Strain LCT	19.9°C		
Dunn Hatchery water (Alkalinity=357)			
Marble Lake Strain LCT	20.9°C		
Summit Lake Strain LCT	21°C		
Truckee River water (Alkalinity=69.3)			
Marble Lake Strain LCT	22.3°C		
Summit Lake Strain LCT	22.6°C		
Upper Temperature Tolerance (Humboldt Strain)	27°C	A	Coffin 1983; French and Curran 1991
Daily Temperature Fluctuation Tolerance (Humboldt Strain)	14°-20°C fluctuations	A	Coffin 1983; French and Curran 1991

Note: An "A" indicates information that appears as cited in U.S. Fish and Wildlife Service (1995). Note: A "B" indicates information that appears as cited in Hoffman and Scoppettone (1988).

Typical of cutthroat trout subspecies, LCT is an obligatory stream spawner. Spawning occurs from April through July, depending on stream flow, elevation, and water temperature (Calhoun 1942; La Rivers 1962; McAfee 1966; Lea 1968; Moyle 1976). Females mature at 3 to 4 years of age, and males at 2 to 3 years of age. Consecutive-year spawning by individuals is uncommon. King (1982) noted repeat rates of 3.2 and 1.6 percent for LCT spawners returning in subsequent migrations 1 and 2 years later. Cowan (1982) noted post-spawning mortality of 60 to 70 percent for females and 85 to 90 percent for males, and spawner repeat rates of 50 and 25 percent for surviving females and male spawners, respectively. Others (Calhoun 1942; Lea 1968; Sigler et al. 1983) observed that most repeat spawners return after 2 or more years.

Fecundity of 600 to 8,000 eggs per female has been reported for lacustrine populations (Calhoun 1942; Lea 1968; Cowan 1983; Sigler et al. 1983). By contrast, only 100 to 300 eggs were found in females collected from small Nevada streams (Coffin 1981). Fecundity and egg size are positively correlated with length, weight, and age (Sigler et al. 1983).

Lake residents migrate up tributaries to spawn in riffles or tail ends of pools. Distance traveled varies with stream size and race of cutthroat trout. Populations in Pyramid and Winnemucca Lakes reportedly migrated over 100 miles up the Truckee River into Lake Tahoe (Sumner 1940; La Rivers 1962).

Spawning behavior of LCT is similar to other stream-spawning trout. They pair up, display courtship, lay eggs in redds dug by females, and chase intruders away from the nest. LCT generally spawn in riffle areas over gravel substrate.

LCT spawning migrations have been observed in water temperature ranging from 5 to 16°C (41 to 61°F) (Lea 1968; USFWS 1977; Sigler et al. 1983; Cowan 1983). Eggs generally hatch in 4 to 6 weeks, depending on water temperature, and fry emerge 13 to 23 days later (Calhoun 1942; Lea 1968; Rankel 1976). Progeny of Summit Lake LCT spawners generally begin moving out of tributaries shortly after emergence (Cowan 1991). Fry movement is density-dependent and correlated with fall and winter freshets (Johnson et al. 1983). Some riverine fish remain for 1 or 2 years in nursery streams before emigrating in the spring (Rankel 1976; Johnson et al. 1983; Coffin 1983).

Riverine LCT are opportunistic feeders, with diets consisting typically of terrestrial and aquatic insects in the drift (Moyle 1976; Coffin 1983). In lakes, small LCT feed on insects and zooplankton (Calhoun 1942; McAfee 1966; Lea 1968), and larger LCT feed on fish. In Pyramid Lake, fish become diet items when LCT reach 200 millimeters (mm) in length, comprise over 50 percent of the diet at 300 mm, and fish represent almost 100 percent of the diet when LCT are over 500 mm (Sigler et al. 1983). Invertebrates are the major food source for all sizes of LCT in a few lakes, presumably because potential prey fishes never existed, or inhabit different areas than trout (Calhoun 1942; Rankel 1976).

Growth rate varies, with faster growth occurring in larger, warmer waters, and particularly where forage fish are utilized. Mean fork lengths for Pyramid Lake LCT were 217, 291, 362, and 431 mm at ages 1, 2, 3, and 4 years, respectively (Sigler et al. 1983). By contrast, LCT mean fork lengths from the small oligotrophic Blue Lake in California, were 66, 180, 307, and 378 mm for ages 1, 2, 3, and 4 years, respectively (Calhoun 1942).

Growth rate for stream dwelling LCT is fairly slow. Mean fork lengths of LCT from six Sierra Nevada streams averaged 89, 114, 203, and 267 mm at ages 1, 2, 3, and 4 years, respectively (Gerstung 1986). Stream-dwelling LCT are generally less than 5 years of age. In lakes, LCT may live 5 to 9 years (Sumner 1940; Lea 1968; Rankel 1976; Coleman and Johnson 1988).

Current Recovery Efforts

Recent LCT recovery efforts in the Walker River Basin have been focused on development and implementation of a short-term action plan for recovery actions. The Walker River Recovery Implementation Team (WRIT), which includes the Tribe, FWS, BIA and other state and federal agencies, has been leading these recovery efforts. The Walker River Basin short-term actions identified by the WRIT were grouped into five categories: 1) General integrating issues; 2) genetics and population dynamics; 3) physical habitat and environment; 4) biological and limnilogical; and 5) recreational fisheries (WRIT 2003). The Proposed Action would potentially affect item 3- Physical habitat and environment. In that category, the recovery effort specifically lists the tasks of: 1) Identify and evaluate fish passage and existing barriers within Walker River Basin and 2) Recommend passage and barrier activities. The Proposed Action includes fish passage at Weber Dam. This is the only known fish passage barrier on the Reservation. The Proposed Action with fish passage would assist in accomplishing the recovery activities for this category on the Reservation lands.

In addition, the Tribe would manage the reservoir releases for LCT recovery consistent with the WRIT Plan as that program progresses. Through the use of adaptive management techniques, the Tribe has been and would continue to work with the recovery effort for LCT in the Walker River and Walker Lake.

Impacts of the Proposed Action

During normal and dry years, very little flow would reach Weber Dam and Walker Lake and LCT are unlikely to inhabit the river downstream from Weber Dam. The timing of operations for the reservoir modification are planned to begin in April and extend through December (Table 1). Reservoir releases for downstream irrigation diversions would occur during modification from April through September , which includes the spawning period. Excess flow could convey down Walker River to Walker Lake and result in an upstream migration of LCT. Reservoir operation under IOC is expected during construction. Water storage is not anticipated until the Dam repair is complete (approximately mid-December).

Construction activities could affect LCT that migrate to the base of the dam if precautions are not taken to exclude the fish from that area. As currently proposed, a small coffer dam would be constructed downstream from the outlet works but upstream of the spillway pool for use in dewatering the excavation area for the new embankment. This feature would exclude LCT from the excavation area. The contractor would prepare a water quality plan, which would include provision for sediment retention due to any construction activities. Construction would be excluded from the active river channel by the coffer dam and therefore the sediment generated should be kept from entering the Walker River (Weber Dam Modification Solicitations/Specifications Volume 1, Page 2-1). Further, the majority of the earth-moving activities are scheduled to take place between June and December when LCT would not be in the river. Therefore, there should be no impact to the species from sedimentation. Major construction activities, including embankment excavation and placement are expected to be complete no later than mid December.

The construction activity itself does not preclude any of the activities listed in the LCT recovery plan from occurring. The fish passage at Weber Dam is consistent with the both short-term and long-term recovery measures identified for LCT. Removal of instream barriers to fish passage is one of several measures identified to assist with recovery of LCT. Impacts to LCT from the proposed project construction would be minimal due to the proposed construction schedule and mitigation measures. Potential risks of impacts to LCT (e.g. accidental sediment spills or wet-year attraction flows) would be slight.

Fishway Operation. Similar to water and fish passage facility management for cui-ui spawning in the Truckee River basin, a modified Weber Dam with a fish ladder would be operated to promote fish passage when hydrologic conditions are forecast to be adequate to satisfy LCT life history requirements or to inhibit or prevent passage or river access when conditions would be inimical to target fish species.

The annual timing of the fishway operation would determine its success. Depending on numerous factors – particularly annual hydrological conditions – it may be possible to minimize any conflicts between LCT migration and the Tribe's irrigation diversions. Therefore, the proposed annual coordination meeting would allow development of an effective plan for fishway operation that reflects the unique conditions of each year.

The annual meeting also would allow BIA and the Tribe to address and minimize any other potential and unintended impacts to LCT. For example, if the fishway were not operated during a particular period, but water nevertheless reaches Walker Lake and attracts LCT upstream to the Dam, fish may be blocked from further migration. Or, injury or mortality may occur in the fishway or dam facilities. The risk of such unintended events exists, but is relatively small.

Delays in upstream and downstream migration also is a potential impact from the Proposed Action. Information on migrations of LCT through reservoirs the size of Weber Reservoir (approximately 3 miles long) is not available, however, there is information on migration of other salmonids through small reservoirs.

Available information on salmon smolt migration in the Columbia River system shows that they migrate approximately 21 to 37 kilometers per day at low- and mid-flows, respectively (Raymond 1968). That investigation looked at downstream Chinook smolt migration through the Ice Harbor, McNary, and John Day reservoirs. With the exception of McNary Reservoir, the times for migration through reservoir or free-flowing areas did not differ, and the migration rate of the smolts was correlated with river discharge. Raymond concluded that the delay in McNary Reservoir was likely due to the lower water velocity in that impoundment as compared to the remainder of the river. Water velocities in McNary Reservoir are approximately 30% of the velocity downstream of McNary Reservoir. This reduction in velocity directly correlates with the delay in migration time.

There was no mention in the literature of small reservoirs delaying migration. Most of the studies on both upstream and downstream migration have focused on reservoirs that are several kilometers to over 100 kilometers in length. Although information from the large Columbia River system reservoirs does not apply directly to the Proposed Action, we have inferred the implications on the migration of fish from those studies.

Raymond (1968, 1969) stated that large reservoirs, in particular McNary Reservoir, on the Columbia River delayed downstream migration of smolts. The distance traveled by smolts through the long reservoirs (> 100 km) was approximately one-third the distance traveled in free-flowing sections of the Columbia River. Bentley and Raymond (1976) confirmed such delays on the lower Snake River caused by the large reservoirs on that river. This type of delay was not apparent in small reservoirs (i.e., several kilometers in length, similar to Weber Reservoir).

Hansen et al. (1984) showed that Atlantic salmon smolts traveled approximately 1.3 kilometers per day through a short reservoir. They stated that the smolts traveled in the direction and at the approximate speed of the surface water. Thorpe et al. (1981) calculated travel time of smolts at 5 to 8 kilometers per day. Aarestrup et al. (1999) calculated travel time through a 12-kilometer-long reservoir at 0.165 kilometer per hour (4 kilometers per day).

Gowans et al. (1999) reported upstream travel times of adult salmon through a 4-kilometer-long reservoir as short as 3 hours, a speed of approximately 1.3 kilometers per hour. The longest travel time in that same study was 39 hours, approximately 0.1 kilometer per hour. From the above information on small reservoirs, it is concluded that Weber Reservoir should cause little, if any, delay in upstream or downstream migration.

When the dam is rehabilitated, Weber Reservoir would not be actively managed for a warmwater fishery. No warmwater species stocking is planned for Weber Reservoir. The warmwater fishery may exist from migration of species upstream of Weber Reservoir into the Reservoir itself. Potentially predatory warmwater species, such as bass and catfish, exist in a 30-mile stretch of Walker River upstream of Walker Reservoir. The proposed project (i.e., dam rehabilitation and fishway addition) would have no effect on the conditions for these warmwater predator species. Moroever, until LCT again spawn upstream of Weber and migrate down to Walker Lake, these warmwater predators have no opportunity to consume LCT. (Predators are unlikely to consume full-size LCT migrating upstream.) If and when upstream spawning returns, reducing the risks of LCT predation from these species would require a basin-wide solution involving the WRIT. The Tribe therefore is interested in actively pursuing LCT recovery, which includes taking steps to provide beneficial habitat conditions for LCT in Walker Lake and the lower Walker River as the recovery program progresses. Weber Reservoir would be managed to promote LCT passage and minimize predation to the extent reasonably possible.

Weber Reservoir, as modified, may provide valuable assistance in recovering Walker River basin LCT by facilitating water deliveries to Walker Lake. Weber Dam and Reservoir's downstream location provides a location to support a pulse flow to Walker Lake. In addition, the fishway would allow passage at Weber Dam for migrating LCT. The fishway at Weber Dam would therefore provide a beneficial impact to LCT by removing the migration barrier at Weber Dam. Both the reservoir and fishway would be managed in coordination with WRIT and FWS to promote recovery of LCT in the Walker River.

In addition to upstream passage barriers, there are issues of water quality and river flow that would need to be addressed as part of the recovery effort. Water temperatures upstream of Weber Reservoir at Wabuska exceed 34°C during the summer months whereas maximum temperatures downstream from Weber are generally about 6 to 8°C less during that same time period (Table 4, Miller et al. 2001). The high upstream temperatures are likely due to the lowered discharge and also the ambient air conditions that exist during the summer months. It is unknown if the same temperature conditions existed prior to the major water development in the upper and middle basin of the Walker River. Other than water temperature, water quality conditions should be suitable for LCT in the river upstream of Weber Dam and Reservoir. Water quality in the reservoir is sufficient for survival of LCT.

Very little water quality information is available for Weber Reservoir. BIA and the Tribe therefore would continue collecting water quality data at the Wabuska USGS gauge, which is part of the USGS National Stream Quality Accounting Network. In addition, the Tribe collects certain water quality data on the Reservation consistent with its water quality plan.

Table 4. Walker River water temperature (°C) May 25 through August 25, 1999 (Miller et al. 2001)

	Wabuska	Downstream from Weber
Maximum	34.6	26.4
Average	19.9	22.0
Minimum	9.4	14.8

SPECIES OF CONCERN

FWS also maintains a list of species classified as Species of Concern. These species do not fall under the jurisdiction of the Act but there is evidence from State and Federal agencies as well as private sources that the species may be at risk. By considering these species and exploring management alternatives early in the planning process, it may be possible to provide long-term conservation benefits for these species and avoid future conflicts.

Wildlife Species of Concern identified by FWS as potentially occurring in the project area are listed in Table 5. The table also includes the preferred habitat for each species and the potential for their occurrence on the project area.

Of the species listed, only one was observed on the project area. A flock of approximately 30 white-faced ibises was observed in marsh habitat on the north end of the reservoir on May 3, 2001. It is likely the birds were migrating through the area and using the reservoir as a brief stopover site.

Pygmy rabbits could, potentially occur on the site due to the shrub habitat surrounding the reservoir. However, their occurrence is unlikely due to the low density of the shrubs.

Of the bat species listed, only the fringed myotis and long-legged myotis potentially roost in the area for any duration. Both species might utilize rock crevices for roosting and such habitat is present, although it is not extensive, on the project area. Habitat for use as winter hibernacula or summer nursery areas is not present on the main project area. However, at the borrow area, located west of U.S. Highway Alternate 95, abandoned mine features are present including mine tunnels and shafts. The tunnels could provide roosting habitat for any of the eight bat Species of Concern.

Black terns and least bitterns have the potential to occur on the project area but, as with the white-faced ibis, such occurrences would be expected during migration through the area. It is unlikely that they would nest in the area.

The potential impact to Species of Concern mammals is in the quarry and potential borrow areas. The proposed quarry area does not include caves and tunnels, the main habitat for the bat and myotis species. The impact, if any, would be short term disturbance from noise with no expected loss of habitat. The bird Species of Concern may be temporarily displaced from shoreline areas near the Dam during construction. The remainder of the Reservoir shoreline would be undisturbed. The shoreline area near the Dam would be available to these species after construction. Therefore, no impact to Species of Concern is expected from the Proposed Action.

Table 5. Likelihood of occurrence of Species of Concern in the vicinity of the proposed Weber Dam project.

Species	Scientific Name	Preferred Habitat	Potential on Site
Mammals			
Pygmy rabbit	Brachylagus idahoensis	Basin-prairie and riparian shrub.	Unlikely
Pale Townsend's big-eared bat	Corynorhinus townsendii pallescens	Roosts in caves and abandoned mines.	Unlikely
Pacific Townsend's big-eared bat	Corynorhinus townsendii townsendii	Uses cliffs, caves, and old mines for roosting, nursery, and hibernation.	Unlikely except borrow area
Spotted bat	Euderma maculatum	Roosts in cliff faces and rock crevices.	Unlikely except borrow area
Small-footed myotis	Myotis ciliolabrum	Prefers caves and abandoned mine shafts.	Unlikely except borrow area
Long-eared myotis	Myotis evotis	Roosts in small colonies in caves, buildings and under tree bark.	Unlikely except borrow area
Fringed myotis	Myotis thysanodes	Roosts in caves, mine tunnels, rock crevices, and old buildings.	Possible
Long-legged myotis	Myotis volans	Roosts in buildings, cliff crevices, and hollow trees.	Possible
Yuma myotis	Myotis yumanensis	Roosts in caves, abandoned mine tunnels, and buildings.	Unlikely except borrow area
Birds			
Northern goshawk	Accipiter gentiles	Conifer and deciduous forests	Unlikely
Western burrowing owl	Athene cunicularia hypugea	Open, dry grasslands, and desert habitats often associated with burrowing animals	Unlikely
Black tern	Chlidonias niger	Lakes, pond, and marshes. Nest in higher elevated areas surrounded by water.	Possible
Least bittern	Ixobrychus exilis hesperis	Emergent vegetation in freshwater marshes	Possible
White-faced ibis	Plegadis chihi	Marshes, wet meadows	Observed during migration

Conclusions

Listed species that potentially occur within the study area are bald eagle and LCT. Species of Concern include several wildlife species and bird species.

The proposed project may affect but is not likely to adversely affect the bald eagle because: 1) bald eagle do not nest in the area; 2) utilization of roost and perch trees appear to occur several miles upstream of the dam and reservoir; 3) large cottonwood trees located downstream of the dam that could provide roost and perch sites would not be impacted; and, 4) foraging by bald eagles does not appear to occur at Weber Reservoir. Were bald eagles to use the reservoir for foraging, the drawdown would likely benefit the species by concentrating fish prey. Construction activities are temporary and short-term. To ensure project impacts do not adversely impact the bald eagle, several protective measures and monitoring efforts as mentioned earlier would be implemented.

Lahontan cutthroat trout are only found in the study area occasionally during spring runoff of high water years. LCT occur in Walker Lake, stocked as sport fish. Those fish migrate in spring during high water years upstream as far as Weber Dam. The Proposed Action includes a fishway to allow migrating fish to move upstream of Weber Dam. There is no loss of habitat from the Proposed Action. Construction best management practice would avoid impacts to water quality and other habitat alterations. In the long run, there would be a benefit to LCT from fish passage.

When the dam is rehabilitated, Weber Dam would not be actively managed for a warmwater fishery. The warmwater fishery may exist from migration of species upstream of Weber Reservoir into the Reservoir itself. No warmwater species stocking is planned for Weber Reservoir. The Tribe is interested in actively pursuing LCT recovery and fishery which includes taking steps to provide that opportunity in Walker Lake and the lower Walker River as the recovery program progresses. Weber Reservoir can be managed in such a way to promote LCT passage and the LCT fishery that could develop in the entire Walker River in coordination with the LCT recovery program. Completion of the proposed project, therefore, would benefit LCT by removing the first major barrier to migration in the Walker River, which has existed since the 1930's. This project would assist in restoring river connectivity for LCT in the Walker River Basin.

Construction of the proposed project may affect and is likely to adversely affect individual LCT because LCT may be present in the project area, although the risk of such presence (only in high water years) is relatively small. The proposed action is not likely to jeopardize LCT at the population level. Construction activities would not be scheduled to occur during the spawning or migration period for LCT. During high water years, LCT are able to reach Weber Dam during spring and early summer. While best management practices would be employed to minimize risks, sedimentation and pollution spills could occur, which would impact individual LCT in the project area or downstream in the river or lake. Although these risks of adverse impact are relatively small, BIA requests incidental take coverage for its construction activities.

While completion of a fishway with appropriate operations would benefit LCT populations by removing a migration barrier, there is a risk that long-term operations of the facility may affect and would be likely to adversely affect individual LCT. The fishway design follows current state of the art practices with regard to minimizing risk to fish using the facility. There is a very small risk of harm or mortality to individual LCT using the fishway. Individuals may become stranded due to flow changes or crowded within the fishway. During the first years and later during rare instances, the fishway may be closed or inoperable during LCT migration. If this occurs after barriers upstream of Weber Reservoir are removed, LCT would be prevented from accessing spawning and rearing habitat. LCT may fall over or go through the outlet works/service spillway. The continued presence of Weber Reservoir may cause a delay in migration because of its length or may lead to water quality issues adverse to various LCT life stages. Nonnative fish species that invade the reservoir may prey on LCT early life stages after upstream spawning areas become accessible and juvenile fish migrate downstream to Walker Lake. Despite the fact that these risks may have only a small likelihood of occurrence, BIA and the Tribe request incidental take coverage for the operation of the dam and fishway, pursuant to Section 7 of ESA.

Operation of the fishway would offer the opportunity for a beneficial impact to LCT survival. There is a risk that take of an LCT may occur in the fishway. BIA, therefore, requests that FWS provide incidental take coverage for operation of the fishway, particularly in its transmission of waters transferred downstream to Walker Lake.

Species of Concern potentially exist within the study area. None was observed during the field effort. The Proposed Action with mitigation would likely not affect Species of Concern and, in the long run, the habitat in the study area would return to current conditions.

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APPENDICES

APPENDIX A

SPECIES AND ENDANGERED/THREATENED SPECIES CORRESPONDENCE

UNITED STATES DEPARTMENT of the INTERIOR

TAKE PRIDE IN AMERICA

FISH AND WILDLIFE SERVICE
Nevada Fish and Wildlife Office
1340 Financial Boulevard, Suite 234
Reno, Nevada 89502-7147
(775) 861-6300 ~ Fax: (775) 861-6301

March 15, 2004
File No. 1-5-04-SP-084

Memorandum:

To: Superintendent, Bureau of Indian Affairs, Western Nevada Agency, Carson City, Nevada

From: Field Supervisor, Nevada Fish and Wildlife Office, Reno, Nevada

Subject: Species List for the Weber Dam Repair and Modification Project, Lyon and Mineral Counties, Nevada

This responds to your request received March 9, 2004, requesting an updated species list for the proposed Weber Dam Repair and Modification project, located on the Walker River Paiute Reservation. The most recent list, dated June 18, 2001, was provided to your office (File No. 1-5-01-SP-201). The following federally listed and candidate species may occur in the modified subject project area.

- Bald eagle (*Haliaeetus leucocephalus*), threatened
- Lahontan cutthroat trout (*Oncorhynchus clarki henshawi*), threatened

This list fulfills the requirement of the Fish and Wildlife Service to provide information on listed specie: pursuant to section 7 (c) of the Endangered Species Act of 1973 (Act), as amended, for projects that are authorized, funded, or carried out by a Federal agency.

Attachment A provides a discussion of the responsibilities Federal agencies have under section 7 of the Act and the conditions under which a biological assessment (BA) must be prepared by the lead Federal agency or its designated non-Federal representative. If it is determined by the responsible Federal agency that a listed or proposed species may be affected by the proposed project, then consultation should be initiated pursuant to 50 CFR § 402.14. Informal consultation may be utilized prior to a written request for formal consultation to exchange information and resolve conflicts with respect to listed species. If a BA is required, and it is not initiated within 90 days of your receipt of this letter, you should informally verify the accuracy of this list with our office. If, through informal consultation or development of a BA, it is determined that a proposed action is not likely to adversely affect the listed species, and the Service concurs in writing, then the consultation process is terminated and formal consultation is not required.

Your proposed project is located within potential and existing metapopulations for Lahontan cutthroat trout (LCT), and as such, the area is necessary for the species' recovery. The LCT Walker River Recovery Implementation Team (WRIT) has finalized its Short-term Action Plan (2003) for the species (available at http://nevada.fws.gov/lctrit/WRITfinalSept22.pdf). This Short-Term Action Plan identifies priority areas with current or potential opportunities to support LCT or important habitats that would sustain various life history stages within the Walker River basin. Under the Act, completed projects should not preclude future recovery and survival of this species. We recommend that projects be reviewed for all direct and indirect impacts that they may have on riparian and aquatic habitats as they relate to LCT, and that you consult with the Service accordingly under section 7 of the Act.

The Nevada Fish and Wildlife Office no longer provides species of concern lists. Our concerns about these former species of concern are encompassed in the sensitive species list for Nevada maintained by the State of Nevada's Natural Heritage Program (Heritage). Instead of maintaining our own list, we are now adopting Heritage's sensitive species list and partnering with them to provide distribution data and information on the conservation needs for sensitive species to agencies or project proponents. The mission of Heritage is to continually evaluate the conservation priorities of native plants, animals, and their habitats, particularly those most vulnerable to extinction or are in serious decline. Consideration o these sensitive species and exploration of management alternatives early in the planning process can provide long-term conservation benefits and avoid future conflicts. For a list of sensitive species by county, visit Heritage's website at www.heritage.nv.gov. For a specific list of sensitive species that ma occur in the project area, you can obtain a data request form from the website or by contacting Heritage at 1550 East College Parkway, Suite 137, Carson City, Nevada 89706, (775) 687-4245. Please indicate on the form that your request is being obtained as part of your coordination with the Service under the Endangered Species Act. During your project analysis, if you obtain new informatior or data for any Nevada sensitive species, we request that you provide the information to Heritage at the above address.

We are concerned that the project may impact the pygmy rabbit (*Brachylagus idahoensis*), a species petitioned for listing under the Act. In Nevada, the Bureau of Land Management (BLM) includes this species on their sensitive species list. Also, the BLM State Director for Nevada has directed all Field Office staff to make it a priority to address the pygmy rabbit in all of their upcoming Land Use Plan revisions. At present, a multi-party effort is underway to develop range-wide survey guidelines for this species. We encourage you to survey the proposed project area for pygmy rabbits prior to any ground disturbing activity and to consider the needs of this species as you complete project planning and implementation.

Memorandum File No. 1-5-04-SP-084

We are also concerned that the project may impact the sage-grouse (*Centrocerius urophasianus*), a species listed as sensitive under the Heritage Program. The Western States Sage and Columbian Sharp-tailed Grouse Technical Committee, under the direction of the Western Association of Fish and Wildlife Agencies, has developed and published guidelines to manage and protect sage-grouse and their habitats in the Wildlife Society Bulletin (Connelly *et al.* 2000). We ask that you consider incorporating these guidelines (available at http://ndow.org/wild/sg) into the proposed project. Consideration of this species during project planning may assist species conservation efforts and may prevent the need for future listing actions.

Because wetlands, springs, or streams occur in the project vicinity, we ask that you be aware of potential impacts project activities may have on these areas. Discharge of fill material into wetlands or waters of the United States is regulated by the U.S. Army Corps of Engineers (Corps) pursuant to section 404 of the Clean Water Act of 1972, as amended. We recommend you contact the Corps' Regulatory Section [300 Booth Street, Room 2103, Reno, Nevada 89509, (775) 784-5304 regarding the possible need for a permit.

Based on the Service's conservation responsibilities and management authority for migratory birds under the Migratory Bird Treaty Act (MBTA) of 1918, as amended (16 U.S.C. 703 *et. seq.*), we are concerned about potential impacts the proposed project may have on migratory birds in the area. Given these concerns, we recommend land clearing or other surface disturbance associated with proposed actions within the project area be timed to avoid potential destruction of bird nests or young, or birds that breed in the area. Such destruction may be in violation of the MBTA. Under the MBTA, nests (nests with eggs or young) of migratory birds may not be harmed, nor may migratory birds be killed. Therefore, we recommend land clearing be conducted outside the avian breeding season. If this is not feasible, we recommend a qualified biologist survey the area prior to land clearing. If active nests are located, or if other evidence of nesting (*i.e.*, mated pairs, territorial defense, carrying of nesting material, transporting food) is observed, a protective buffer (the size depending on the requirements of the species) should be delineated and the entire area avoided to prevent destruction or disturbance to nests until they are no longer active.

Please reference File No. 1-5-04-SP-084 in future correspondence concerning this species list. If you have any questions or require additional information, please contact me or Marcy Haworth at (775) 861-6300.

Jody E. Brown

for Robert D. Williams

Attachment

United States Department of the Interior
BUREAU OF INDIAN AFFAIRS
WESTERN NEVADA AGENCY
1677 HOT SPRINGS ROAD
CARSON CITY, NEVADA 89706

IN REPLY REFER TO:
Water Rights Settlement
(775) 887-3505

RECEIVED
OCT 28 2002
BY:

OCT 25 2002

Robert Williams, Field Supervisor
Nevada Fish and Wildlife Office
1340 Financial Blvd., Suite 234
Reno, Nevada 89502-7147

Subject: Endangered/Threatened Species List Request for Weber Dam Repair and Modification Project, Lyon and Mineral Counties, Nevada

Dear Mr. Williams:

The Bureau of Indian Affairs (BIA), with the cooperation of the Walker River Paiute Tribe (Tribe), is preparing an Environmental Impact Statement (EIS) for the Weber Dam Repair and Modification Project four miles upstream of the town of Schurz, Nevada on the Walker River Paiute Reservation pursuant to the Indian Dams Safety Act (Act). As a result of dam safety investigations conducted in 1989, the dam was given high hazard and poor overall safety ratings.

The dam, constructed in the late 1930's, is used to maintain a water supply for the irrigation of Reservation lands. It also provides other benefits including flood control, recreation, a fishery, and historical and cultural values. The proposed repair and modification are needed to continue to provide a secure source of irrigation water for Reservation lands and reduce the safety risks associated with the dam in its present condition. This action would include realigning the north side dam abutment, widening the existing embankment at the outlet works, rehabilitating the outlet works, extending the outlet works tunnel, enlarging the emergency spillway, constructing access roadways, reestablishing a wetlands area, and would address removing the impediment to upstream and downstream passage of Lahontan cutthroat trout.

Pursuant to regulations for the Endangered Species Act of 1973, as amended, we are requesting an updated list of Federally listed or proposed endangered, threatened, and candidate species and any Critical Habitat that could occur in the project area. The project area considered in this EIS document is the Walker River from the upstream end of Weber Reservoir to Walker Lake.

Should you require additional information, please contact Tom Strekal of my staff at 775/887-3505 (phone) or 775/887-3531 (fax).

Sincerely,

Acting Superintendent

cc: BIA Western Regional Office (Water Resources/Environmental Quality Services)
Walker River Paiute Tribe
Alice Walker
Bill Miller

United States Department of the Interior
FISH AND WILDLIFE SERVICE
Nevada Fish & Wildlife Office
1340 Financial Blvd., Suite 234
Reno, Nevada 89502
(775) 861-6300 ~ Fax: 775-861-6301

November 12, 2002
File No. 1-5-03-SP-019

Memorandum

To: Acting Superintendent, Bureau of Indian Affairs, Carson City, Nevada (Attn: T. Strekal)

From: Field Supervisor, Nevada Fish and Wildlife Office, Reno, Nevada

Subject: Species List for the Proposed Weber Dam Repair and Modification Project, Lyon and Mineral Counties, Nevada

This responds to your letter received on October 28, 2002, requesting an updated species list for the proposed Weber Dam Repair and Modification project in Lyon and Mineral counties, Nevada. A species list was previously provided on June 18, 2001 (1-5-01-SP-201). Although the species included on the list have not changed, we have enclosed an updated list of threatened species which may be present within the vicinity of the proposed project area (Attachment A). The list fulfills the requirement of the Fish and Wildlife Service (Service) to provide species lists pursuant to section 7 (c) of the Endangered Species Act of 1973 as amended (Act), for projects that are authorized, funded, or carried out by a Federal agency. Attachment B provides a discussion of the responsibilities Federal agencies have under section 7 of the Act and the conditions under which a biological assessment (BA) must be prepared by the lead Federal agency or its designated non-Federal representative. A list of published references dealing with the distribution, life history, and habitat requirements of the listed species is also enclosed (Attachment C). This information may be helpful in preparing a BA for the proposed project, if one is required, or other environmental documentation.

Your proposed project occurs within an area necessary for the recovery of Lahontan Cutthroat Trout (LCT) in the Walker River basin. The Walker River Recovery Implementation Team (WRIT) has been formed to facilitate the restoration and recovery of LCT populations in this area. The WRIT will be evaluating areas within this basin which could support LCT. Although a reproducing population of LCT is not currently present in the project area, under the Act, completed projects should not preclude future recovery and survival of this species. We recommend that you review your project for all direct and indirect impacts that they may have on riparian and aquatic habitats as they relate to LCT, and that you consult with the Service accordingly under section 7 of the Act.

For your consideration, Attachment A also contains a list of other species of concern to the Service that may occur in the project area. The Service has used information from State and Federal agencies and private sources to assess the conservation needs and status of these species. Further biological research and field study are needed to resolve their conservation status. By considering these species and exploring management alternatives early in the planning process, it may be possible to provide long-term conservation benefits for these species and avoid future conflicts that could otherwise develop. We recommend that you contact the Nevada Natural Heritage Program [1550 East College Parkway, Suite 145, Carson City, Nevada 89710, (775) 687-4245] and the appropriate regional office of the Nevada Division of Wildlife, as well as other local, State, and Federal agencies for data on distribution and conservation needs for these and other species of concern.

Because wetlands or streams are known to occur in the project vicinity, we ask that you be aware of potential impacts project activities may have on these areas. Discharge of fill material into wetlands or waters of the United States is regulated by the U.S. Army Corps of Engineers (Corps) pursuant to section 404 of the Clean Water Act. We recommend you contact the Regulatory Section of the Corps' Reno Field Office [300 Booth Street, Room 2103, Reno, Nevada 89509, (775) 784-5304] regarding the possible need for a permit.

We recommend that any land clearing or other surface disturbance associated with the proposed action within the project area be timed to avoid potential destruction of active bird nests or young of birds that breed in the area. Such destruction may be in violation of the Migratory Bird Treaty Act (MBTA) (15 U.S.C. 701-718h). Under the MBTA, active nests (nests with eggs or young) of migratory birds may not be harmed, nor may migratory birds be killed. Therefore, we recommend land clearing be conducted outside the avian breeding season. If this is not feasible, we recommend a qualified biologist survey the area prior to land clearing. If active nests are located, or if other evidence of nesting (mated pairs, territorial defense, carrying of nesting material, transporting food) is observed, a protective buffer (the size depending on the requirements of the species) should be delineated and the entire area avoided to prevent destruction or disturbance to nests until they are no longer active.

Please reference File No. 1-5-03-SP-019 in future correspondence concerning this species list. If you have any questions or require additional information, please contact me or Marcy Haworth at (775) 861-6300.

Sincerely,

Robert D. Williams
Field Supervisor

Attachments

ATTACHMENT A
LISTED SPECIES AND SPECIES OF CONCERN
THAT MAY OCCUR WITHIN THE VICINITY OF
THE WEBER DAM REPAIR AND MODIFICATION PROJECT
MINERAL AND LYON COUNTIES, NEVADA

File Number: 1-5-03-SP-019; November 12, 2002

Threatened Species

Bird
Bald eagle — *Haliaeetus leucocephalus*

Fish
Lahontan cutthroat trout — *Oncorhynchus clarki henshawi*

Species of Concern

Mammals
Pygmy rabbit — *Brachylagus idahoensis*
Pale Townsend's big-eared bat — *Corynorhinus townsendii pallescens*
Pacific Townsend's big-eared bat — *Corynorhinus townsendii townsendii*
Spotted bat — *Euderma maculatum*
Small-footed myotis — *Myotis ciliolabrum*
Long-eared myotis — *Myotis evotis*
Fringed myotis — *Myotis thysanodes*
Long-legged myotis — *Myotis volans*
Yuma myotis — *Myotis yumanensis*

Birds
Northern goshawk — *Accipiter gentilis*
Western burrowing owl — *Athene cunicularia hypugea*
Black tern — *Chlidonias niger*
Least bittern — *Ixobrychus exilis hesperis*
White-faced ibis — *Plegadis chihi*

Plants
Eastwood's milkvetch — *Asclepias eastwoodiana*
Nevada oryctes — *Oryctes nevadensis*
Nevada blue beardtongue — *Penstemon arenarius*

ATTACHMENT B

FEDERAL AGENCIES' RESPONSIBILITIES UNDER SECTIONS 7 (a) AND (c)
OF THE ENDANGERED SPECIES ACT

SECTION 7 (a): Consultation/Conference
Requires:

1) Federal agencies to utilize their authorities to carry out programs to conserve endangered and threatened species;

2) Consultation with the Fish and Wildlife Service (Service) when a Federal action may affect a listed endangered or threatened species to insure that any action authorized, funded or carried out by a Federal agency is not likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of critical habitat. The process is initiated by the Federal agency after determining the action may affect a listed species or critical habitat;

3) Conference with the Service when a Federal action is likely to jeopardize the continued existence of a proposed species or result in destruction or adverse modification of proposed critical habitat.

SECTION 7 (c): Biological Assessment - Major Construction Activity 1/
Requires Federal agencies or their designees to prepare a Biological Assessment (BA) for major construction activities. The BA analyzes the effects of the action on listed and proposed species. The process begins with a Federal agency requesting from the Service a list of proposed and listed threatened and endangered species. The BA should be completed within 180 days after its initiation (or within such a time period as is mutually agreeable). If the BA is not initiated within 90 days of receipt of the list, the accuracy of the species list should be informally verified with the Service. No irreversible commitment of resources is to be made during the BA process which would foreclose reasonable and prudent alternatives to protect endangered species. Planning, design, and administrative actions may proceed; however, no construction may begin.

We recommend the following for inclusion in the BA:

1. An onsite inspection of the area affected by the proposal which may include a detailed survey of the area to determine if the species or suitable habitat are present.

2. A review of literature and scientific data to determine species distribution, habitat needs, and other biological requirements.

3. Interviews with experts, including those within the Service, State conservation departments, universities, and others who may have data not yet published in scientific literature.

4. An analysis of the effects of the proposal on the species in terms of individuals and populations, including consideration of cumulative effects of the proposal on the species and its habitat.

5. An analysis of alternative actions considered.

6. Documentation of study results, including a discussion of study methods used, any problems encountered, and other relevant information.

7. Conclusion as to whether or not a listed or proposed species will be affected.

Upon completion, the BA should be forwarded to our office with a request for consultation, if required.

1/ A construction project (or other major undertaking having similar physical impacts) is a major Federal action significantly affecting the quality of the human environment as referred to in NEPA (42 U.S.C. 4332 (2) C).

ATTACHMENT C-1

BALD EAGLE, *HALIAEETUS LEUCOCEPHALUS*

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ATTACHMENT C-2

Lahontan cutthroat trout (*Oncorhynchus clarki henshawi*)
Revised August 17, 1992

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APPENDIX B

ENVIRONMENTAL COMMITMENT LIST

The following is the environmental commitment list in the original 1994 environmental assessment with the addition of environmental commitment number 20. These commitments also apply to the revised project.

1. The contractor's construction activities would be performed by methods that would prevent entrance or accidental spillage of contaminants, debris, or other pollutants into streams, flowing or dry watercourses, or the waters of Weber Reservoir.

2. Excavated materials would not be stockpiled or deposited near or on streambanks or in other locations where the material could be washed away by high water or storm runoff, although up to

3. 2.5 af of material would be spread across the reservoir surface above the waterline then present.

4. The contractor's methods of dewatering, unwatering, excavating, or stockpiling of earth and rock materials would include appropriate measures to control siltation. Wastewater from general construction activities such as drainwater collection, drilling, grouting, or other construction operations would not be permitted to enter watercourses without the use of approved turbidity control methods. These methods may include, but are not restricted to, interception ditches, settling ponds, gravel-filter entrapment dikes, flocculating processes, recirculation, or combinations thereof.

5. The contractor would be required to comply with applicable Federal and State laws, orders, regulations, and water quality standards concerning the control and abatement of water pollution.

6. Where possible, construction activities including staging, storage, and excavation and movement of borrow material, would be in areas of previous disturbance.

7. Willows and other riparian vegetation would be replanted to replace vegetation lost due to relocating the embankment.

8. Wetlands destroyed by the relocating the embankment downstream of the existing embankment would be replaced by enlarging the present frog pond or other methods as appropriate based on Agency input.

9. Construction would avoid destroying active nests of birds breeding in the area. If construction is planned during the summer, a biologist will survey for active bird nests in the area to be disturbed. If nesting birds are present in these areas, the work would not begin until 2 weeks after young birds have fledged.

10. Traffic on the road across the dam would be controlled by flagmen and warning signs during the construction period if traffic war-rants. The road would be temporarily closed as necessary. Boaters would not be allowed to travel close to the dam.

11. In the unlikely occurrence that cultural resources are encountered after the project has begun, the procedures in 36 CFR 800. 11 would be followed. The contractor would cease work at that location and notify the Tribal Chairman. An archeologist would assess the nature and value of the site, and would recommend to the SHPO a course of action. Appropriate mitigation as determined through negotiations with SHPO would be completed for any significant sites.

12. Recommendations to avoid or minimize adverse impacts to fish, wildlife, and vegetation are based upon proposed dam modification alternatives provided by Reclamation. Mitigation may be required by the Service or Corps. State regulatory and resource agencies have no authority on the Reservation except as delegated by the Federal Government, and impacts caused by the project should not occur beyond Reservation boundaries. Therefore no laws and regulations are mandatory.

13. The extent of disturbance would be minimized in all locations. Where possible, construction activities including staging, storage, and excavation and movement of borrow material would be in areas of previous disturbance.

14. Large cottonwood trees adjacent to and below the dam would not be disturbed to ensure that roosting, habitat for over-wintering bald eagles is not eliminated.

15. Trees and shrubs in the project area may provide nesting, roosting, and feeding habitat for loggerhead shrikes. Efforts would be taken to minimize disturbance of these habitats. Areas that do not need to be disturbed would be clearly' marked or fenced to prevent inadvertent damage during construction activities.

16. Within the designated borrow area, certain habitat would be avoided These habitats are the tops and upper slopes of badland bluffs where cactus occur, and badland cliffs that have been eroded and show evidence of bur-rows, caves, or crevices or other use by animals.

17. The paleontological site in the -borrow area would be marked, and a 50 meter (150) feet buffer zone established around it if the borrow area were to be used. If construction activities come within 150 meters (500 feet), then a series of lath and flagging shall be placed to mark the area.

18. If any additional paleontological finds are discovered during excavation activities, all activity in the area of the find would be halted, and the Tribal Chairman contacted.

19. The seepage area to the southwest of Weber Dam and below Lie emergency spillway would be avoided during construction.

20. The Corps would be contacted before the frog pond to the southeast and immediately below Weber Dam is covered or dewatered. Also, the Service would be contacted regarding the need for mitigation, and any necessary plans would be formulated for implementation of mitigation. The Tribal Office of the Reservation would be contacted if restoration of disturbed wetlands necessitates increased use of water for that purpose.

21. Areas disturbed during any phase of construction activities, with the exception of active borrow sites, roads and parking lots, would be restored according to a detailed restoration plan. The plan would include the restoration of grades and the reestablishment

of native vegetation consistent with the specific community type.

22. All adverse environmental impacts identified by the BLM permitting process would be addressed in accordance with the requirements of the BLM.

APPENDIX C

FISH PASSAGE TECHNICAL MEMORANDUM

TECHNICAL MEMORANDUM
WEBER RESERVOIR
ALTERNATIVE FISH PASSAGE
SRUCTURE EVALUATION

Prepared for:

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PROFESSIONAL ENGINEER-STATE OF NEVADA
BRADLEY A. ANDERSON
Exp: 12/31/02
CIVIL
No. 12586

12/19/02

December 19, 2002

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WEBER RESERVOIR
ALTERNATIVE FISH PASSAGE STRUCTURE EVALUATION

I. General

As part of the Weber Dam Modification EIS, alternatives to the removal of Weber Dam were developed and evaluated during the Alternative Screening Analysis. Removal of Weber Dam is intended to remove the impact to passage of Lahontan Cutthroat Trout. An assessment that assumes the existing structure remains and is modified is also being conducted as part of the Weber Dam Modification EIS. Consequently, it is necessary to identify and evaluate alternative fish passage structures that promote the passage of Lahontan Cutthroat Trout under this assumption. This technical memorandum documents the evaluation, as well as the development of conceptual design information and cost estimates, for two alternative fish passage structures.

II. Data Collection and Review

All existing information pertinent to the identification, evaluation and conceptual design of the fish passage alternatives was collected and reviewed. This information included topographic mapping and survey data, hydrologic data, design and cost data for existing fish passage structures in the region, and hydraulic design criteria for Lahontan Cutthroat Trout.

Two coordination meetings were conducted with representatives of the U.S. Bureau of Reclamation (USBR) at the Water Resources Research Laboratory in Denver, Colorado. Information was obtained regarding two types of fish passage structures: (a) vertical slot-baffle structure; and (b) boulder weir-rock lined structure. Design plans of existing and proposed structures were obtained along with construction cost estimates.

Following the initial meeting with the USBR, a field trip was scheduled to collect site-specific data associated with an existing fish passage structure and a structure that was substantially complete. The fieldwork included an evaluation of the existing fish passage structure associated with Marble Dam near Reno, Nevada. This fish passage structure can be described as a vertical-slot baffled structure. Two slots were utilized in each vertical baffle to obtain the desired hydraulic conditions. Construction was near completion at the fish passage structure associated with Derby Dam, also near Reno, Nevada. This structure consisted of a boulder weir-rock lined channel. The boulder weirs were set at a distance that would promote the hydraulic conditions for fish passage for a desired range of flows. The separation between boulders in each weir was also a critical component of the design.

III. Design Criteria

The conceptual design of the fish passage structure largely focused on three criteria as indicated below:

- Swimming speed of the Lahontan Cutthroat Trout
- Range of operational flows
- Range of water surface elevations in Weber Reservoir

Based on the swimming speed of the Lahontan Cutthroat Trout and conversations with Dr. Bill Miller of Miller Ecological Consultants, Inc. and Brent Mefford of the USBR, a design velocity of approximately 4 ft/sec through a range of operational flows was selected.

The range of flows considered for design operation of the fish passage structure was determined to be a minimum of 25 cfs to a maximum of 80 cfs for the vertical slot-baffle structure. A minimum of 25 cfs to a maximum in excess of 200 cfs was selected for the boulder weir-rock lined channel structure.

Finally, a range of water surface elevations in Weber Reservoir was also determined. The water surface elevation data selected for design of the alternative fish passage structures ranged from a minimum elevation of 4200 ft to a maximum elevation of 4208 ft.

IV. Alternative Evaluation and Design

Given the design criteria, a hydraulic evaluation was completed to support the conceptual design of the alternative fish passage structures. Using the available topographic mapping along with the vertical drop from the inlet to the exit of each structure, the location, slope and alignment of each alternative was initially determined. Figure 1 presents the location and alignment of the alternative structures.

For the vertical slot-baffle structure, the results of the hydraulic evaluation provided the following design information:

- Vertical drop is 32 feet (Elev 4198 to Elev 4166)
- Depth varies from 3 feet to 9 feet over the range of flows
- Maximum height of the baffles is 9 feet
- Width of the slot is 12 inches
- Distance between baffles is 10 feet
- Width of the channel/pool between baffles is 8 feet
- Slope of the structure is 0.045 ft/ft
- Length of the structure is approximately 710 feet

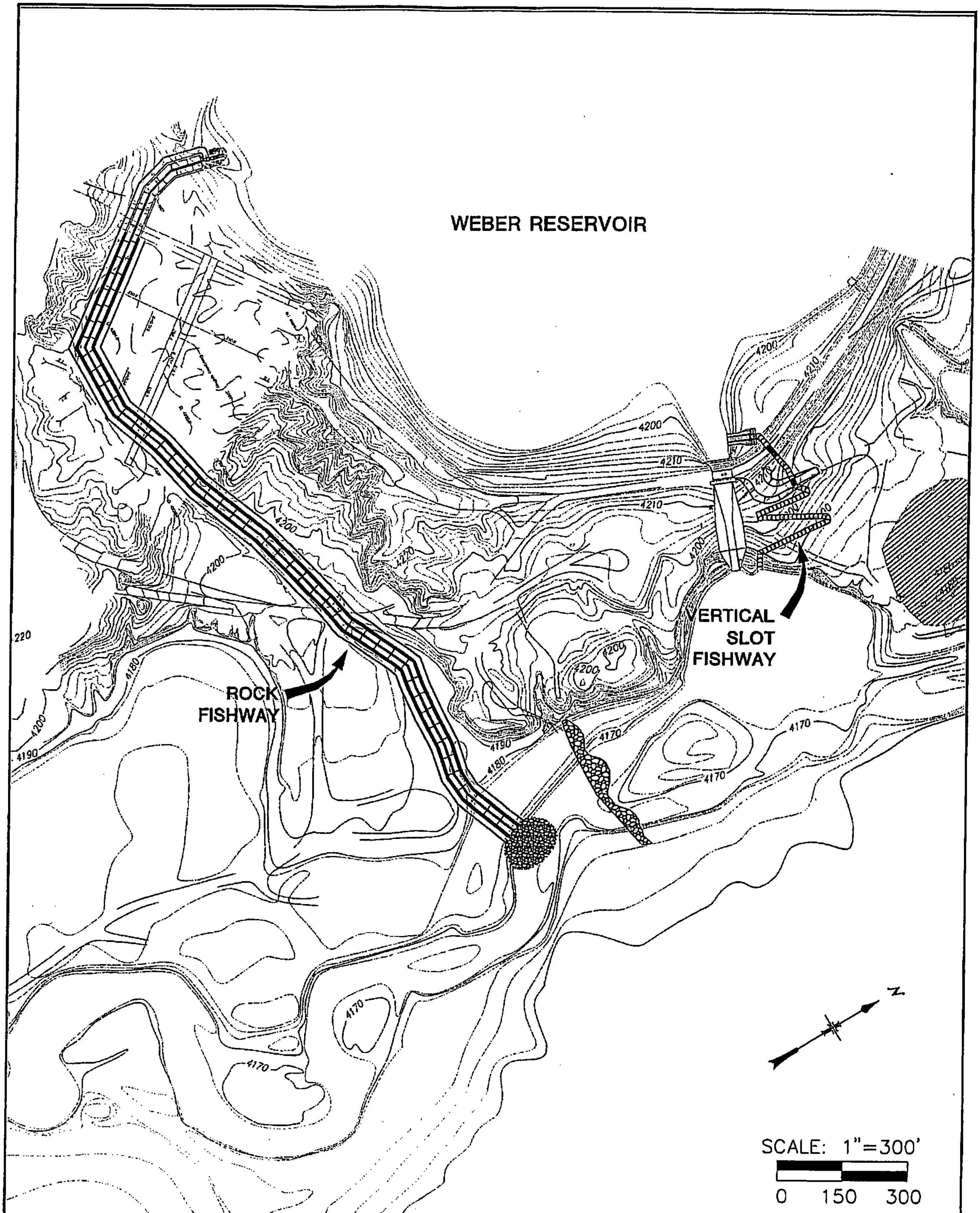


Figure 1. Location Map of Alternative Fish Passage Structures.

Design plan view, profile and detail drawings for the vertical slot-baffle fish passage structure are provided in Attachment A to this technical memorandum.

Based on the conceptual design drawings, an estimate of the construction costs for the vertical slot-baffle fish passage structure was prepared and is presented in Table 1. As indicated, the cost for construction of this structure was estimated to be approximately $2.4 million.

Table 1. Construction Cost Estimate - Vertical Slot Fishway

Item	Quantity	Unit	Unit Cost	Cost
Mobilization (5% of other Items)	1	ls	-	$91,000
Reinforced Concrete	2,389	cy	$400	$955,600
Excavation & Haul	9,597	cy	$10	$95,970
Riprap (including Bedding and Fabric)	153	cy	$70	$10,710
Steel Baffles (72 @ 1500 lbs each)	108,000	lbs	$6	$648,000
Bridges	2	ea	$15,000	$30,000
Water Control	1	ls	$50,000	$50,000
Slide Gate	1	ea	$70,000	$70,000
Total without Mobilization				$1,860,280
Total with Mobilization				$1,951,280
Contingency (25%)				$487,820
Total Project Cost				$2,439,100

For the boulder weir-rock lined fish passage structure, the results of the hydraulic evaluation provided the following design information:

- Vertical drop is 32 feet (Elev 4198 to Elev 4166)
- Slope varies from 0.013 ft/ft to 0.018 ft/ft
- Distance between boulder weirs varies from 25 feet (for a slope of 0.018 ft/ft) to 34 ft (for a slope of 0.013 ft/ft)
- Depth varies from 3 feet (corresponding to the top of the boulders and a flow of 30 cfs) to 6.5 feet (corresponding to the top of the channel and a flow of 240 cfs)
- Maximum height of the boulders above channel bed is 3 feet
- Width between the boulders varies from 1.25 to 1.5 feet
- Width of the channel is approximately 4 feet
- Length of the structure is approximately 2,100 feet

Design plan view, profile and detail drawings for the boulder weir-rock lined fish passage structure are provided in Attachment B to this technical memorandum.

Based on the conceptual design drawings, an estimate of the construction costs for the boulder weir-rock lined fish passage structure was also prepared and is presented in Table 2. As indicated, the cost for construction of this structure was estimated to be approximately $1.7 million.

Table 2. Construction Cost Estimate - Grouted Rock Fishway

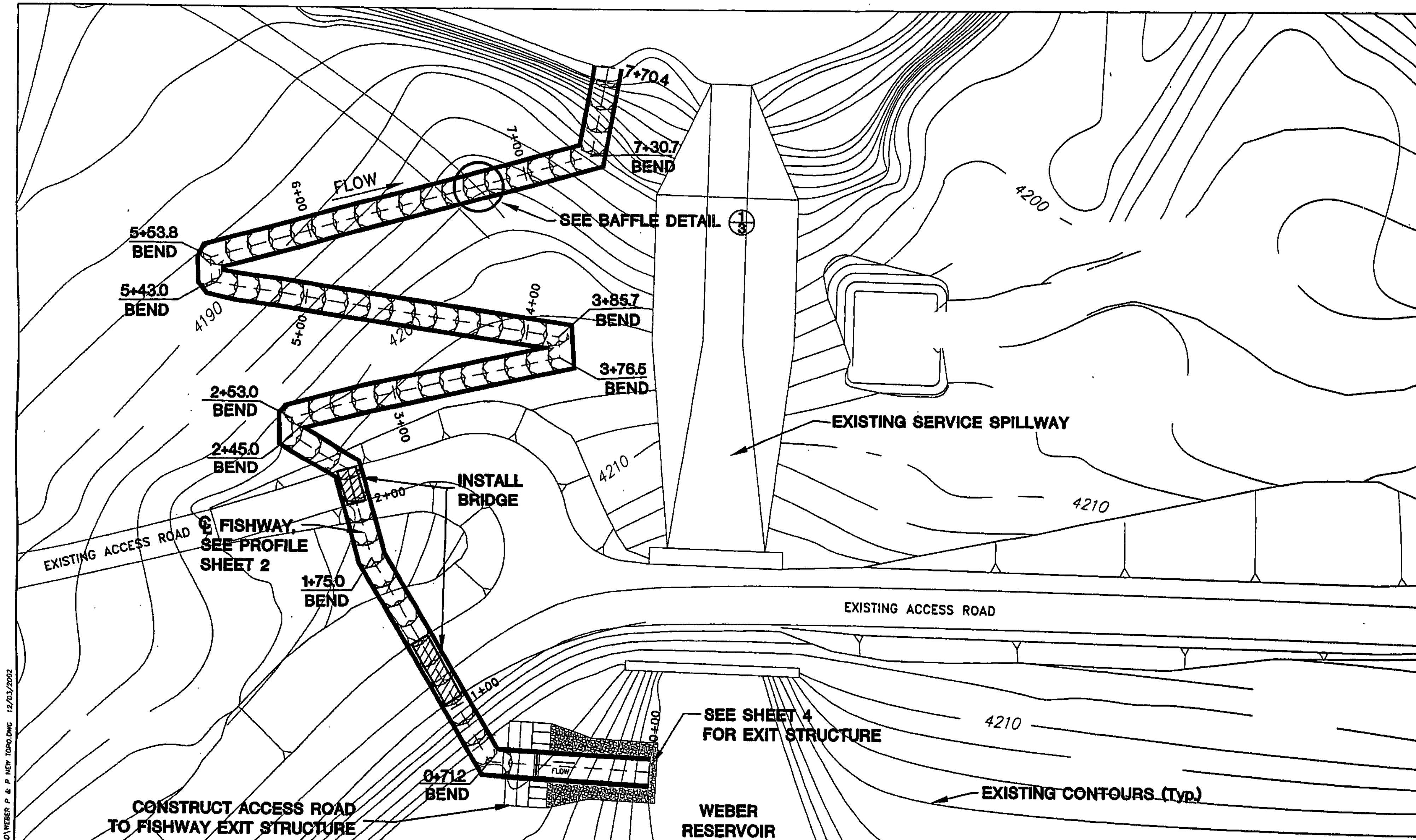
Item	Quantity	Unit	Unit Cost	Cost
Mobilization (5% of other Items)	1	ls	--	$59,100
Reinforced Concrete	514	cy	$400	$205,600
Excavation	34,920	cy	$10	$349,200
Embankment	1,270	cy	$15	$19,050
Riprap (including Bedding and Fabric)	3,964	cy	$70	$277,480
Grouted Riprap (including Bedding and Fabric)	523	cy	$140	$73,220
Boulders	310	ea	$410	$127,100
Weir in River u/s of fishway entrance	1	ls	$150,000	$150,000
Water Control	1	ls	$50,000	$50,000
Slide Gate	1	ea	$70,000	$70,000
Total without Mobilization				$1,321,650
Total with Mobilization				$1,380,750
Contingency (25%)				$345,200
Total Project Cost				**$1,725,950**

V. Conclusions

The results of the evaluation indicate that the boulder weir-rock lined fish passage structure is technically feasible and more cost effective than the more conventional vertical-slot baffle fish passage structure. Furthermore, the boulder weir-rock lined fish passage structure appears to better reflect a natural channel and may enhance the passage of the Lahontan Cutthroat Trout. Consequently, the boulder weir-rock lined fish passage structure warrants serious consideration should a fish passage structure be installed within the existing embankment of Weber Dam.

ATTACHMENT A

DESIGN DETAILS
VERTICAL SLOT FISHWAY



P:\COMEC03\ACAD\WEBER P & P NEW TOPO.DWG 12/03/2002

CONTOUR INTERVAL
2 FEET

SCALE: 1"=40'
0 20 40

N

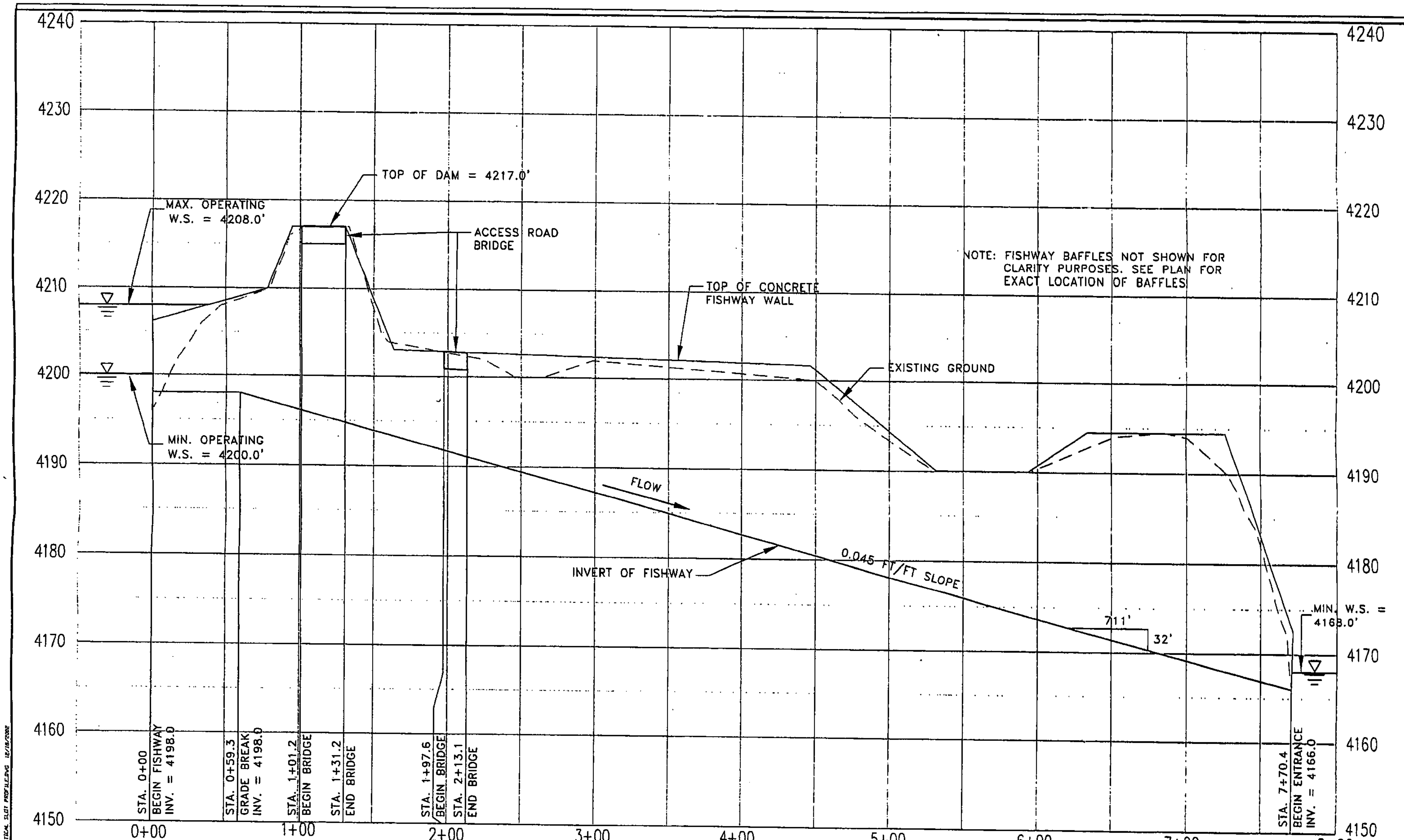
Anderson Consulting Engineers, Inc
Civil · Water Resources · Environmental
772 Whalers Way, Suite 200, Fort Collins, CO 80525
Phone (970) 226-0120 / Fax (970) 226-0121

WEBER DAM MODIFICATION

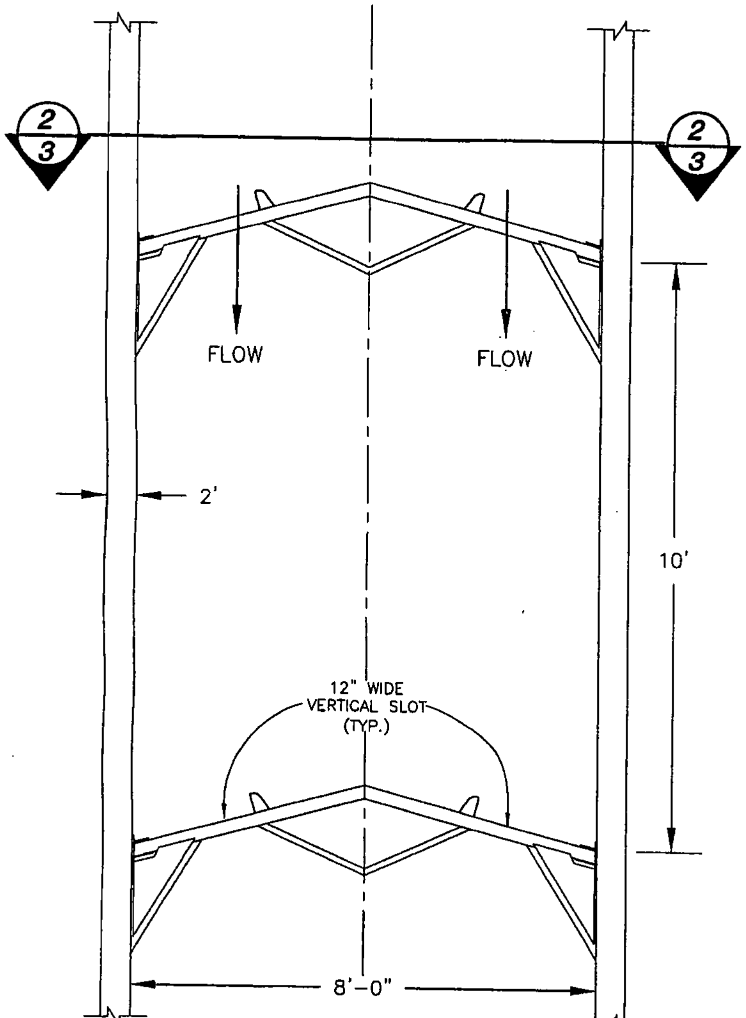
VERTICAL SLOT FISHWAY
PLAN VIEW

Project No.	COMEC03
Date:	12/16/02
Design:	MKK
Drawn:	MKK/TAW
Revisions:	
ACAD\RJD REGUI P&P NEW TOPO.DWG	

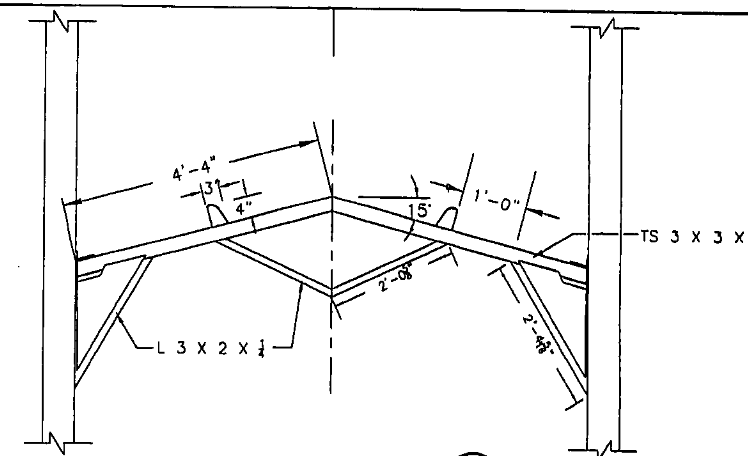
SHEET
1



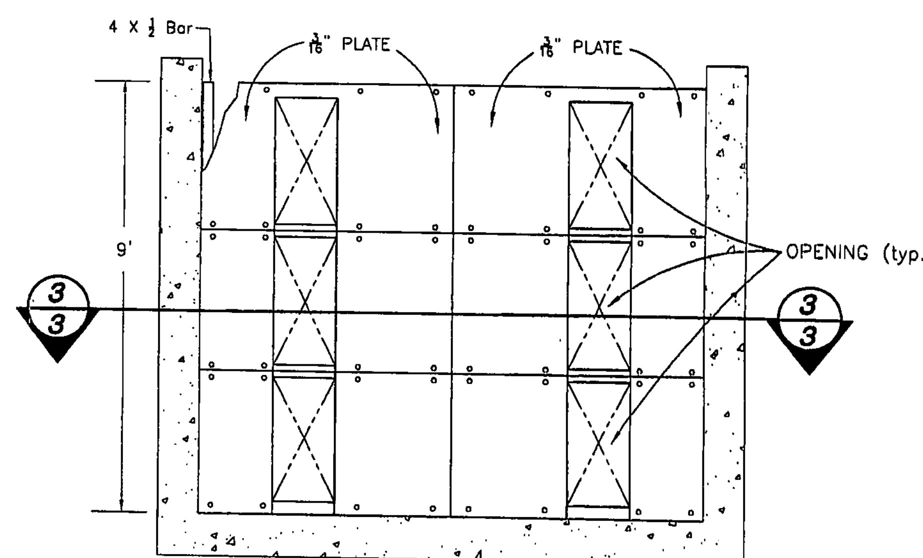
N.T.S.	Anderson Consulting Engineers, Inc — Civil · Water Resources · Environmental	WEBER DAM	VERTICAL SLOT FISHWAY PROFILE	Date: 12/04/02; Design: MKK; Drawn: MKK/TAW	SHEET 2



DETAIL 1/3



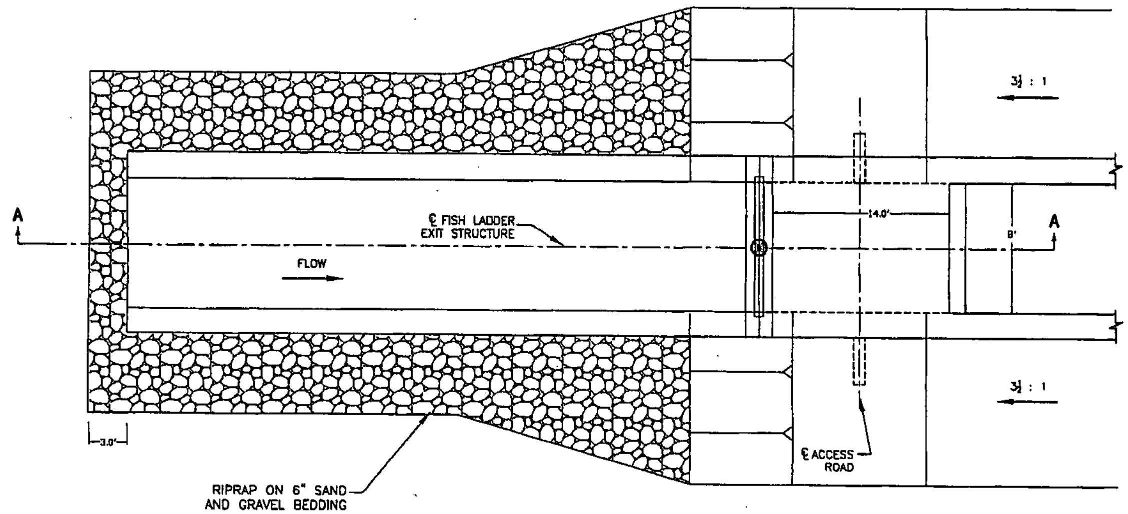
BAFFLE PLAN 3/3



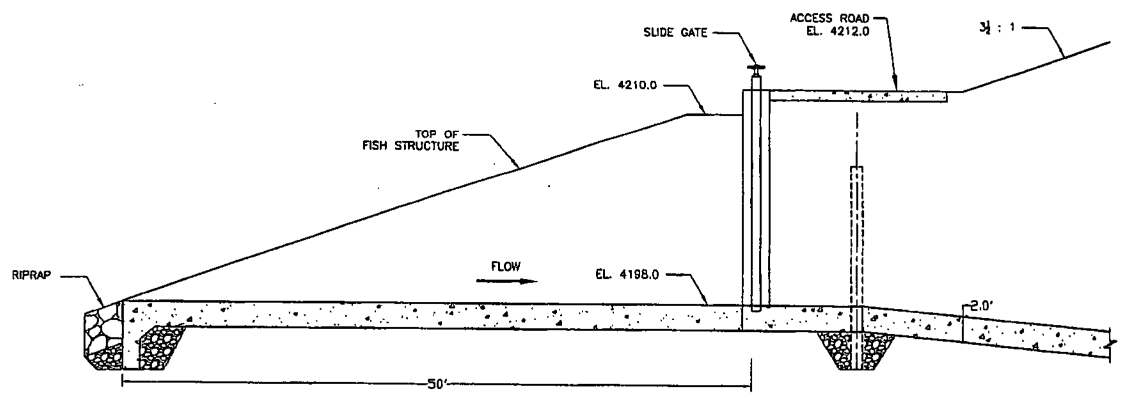
BAFFLE ELEVATION 2/3

P:\CONEC03\ACAD\ROCK FISHWAY DETAIL.DWG 12/03/2002

N.T.S.	Anderson Consulting Engineers, Inc Civil · Water Resources · Environmental 772 Whalers Way, Suite 200, Fort Collins, CO 80525 Phone (970) 226-0120 / Fax (970) 226-0121	WEBER DAM	FISHWAY BAFFLE DETAILS	Project No. CONEC03 Date: 12/04/02 Design: MKK Drawn: MKK/TAW Revisions: ACAD\FILE: ROCK FISHWAY DETAIL.DWG	SHEET 3



PLAN VIEW



SECTION A-A

P:\COMEC03\ACAD\WEB VERTICAL SLOTEXIT.DWG 12/04/2002

SCALE: 1"=10'
0 5 10

Anderson Consulting Engineers, Inc
Civil · Water Resources · Environmental
Phone (970) 226-0120 / Fax (970) 226-0121

WEBER DAM MODIFICATION

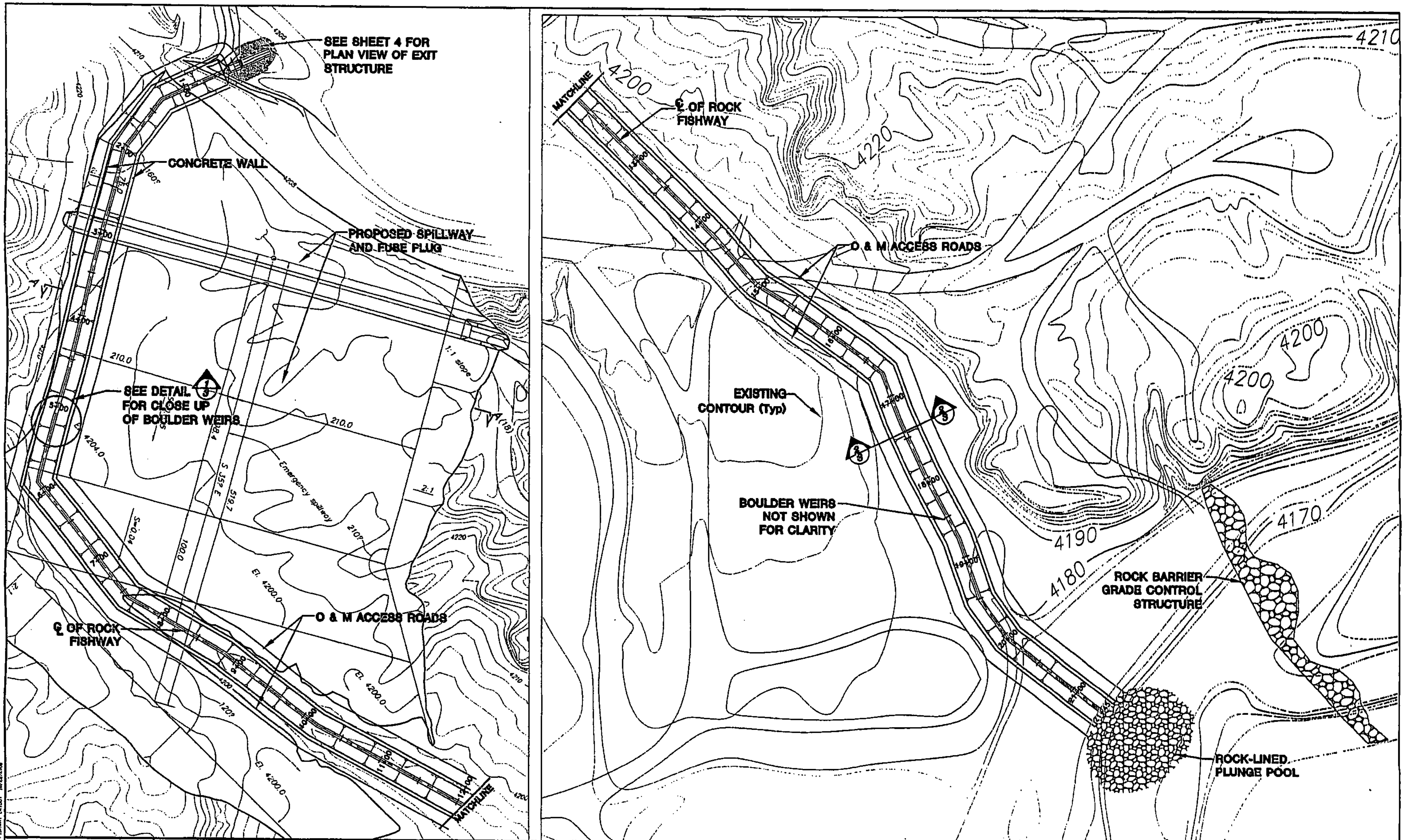
VERTICAL SLOT FISHWAY EXIT STRUCTURE DETAILS

Project No.	COMEC03
Date:	12/16/02
Design:	MKK
Drawn:	MKK/TAW
Revisions:	

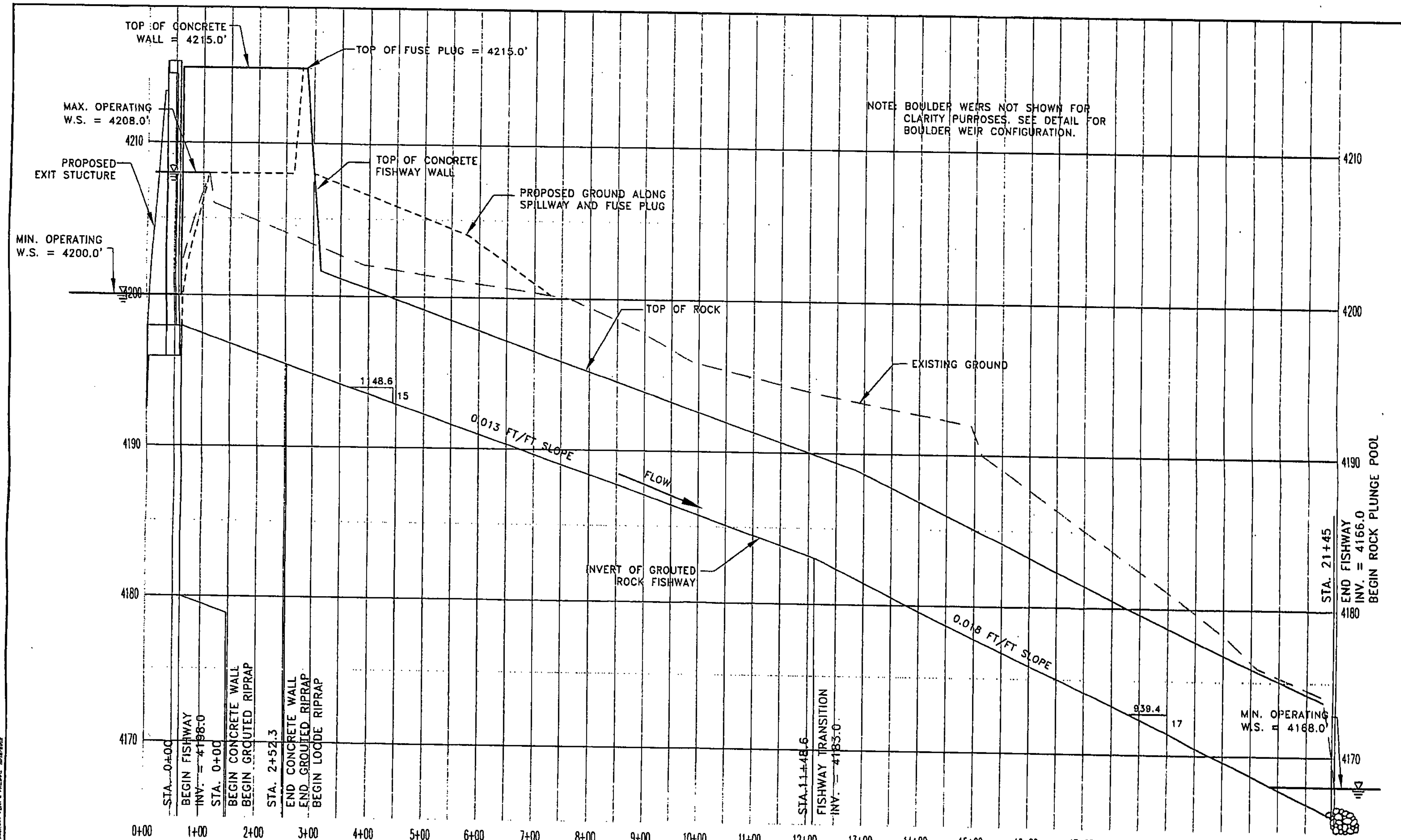
SHEET 4

ATTACHMENT B

DESIGN DETAILS
GROUTED ROCK FISHWAY



REVISIONS:						
REV1	N	PROJECT NUMBER: COMECO3	DRAWN BY: TAW	Anderson Consulting Engineers, Inc Civil · Water Resources · Environmental	WEBER DAM MODIFICATION	ROCK FISHWAY PLAN VIEW
REV2	11X17 SHEET SCALE 1"=100'	ACAD FILE: ROCKFISHWAYLAYO	DESIGNED BY: MKK			SHEET 1
REV3		DATE: 10/22/2002	CHECKED BY: BAA			
REV4						
REV5						
REV6						



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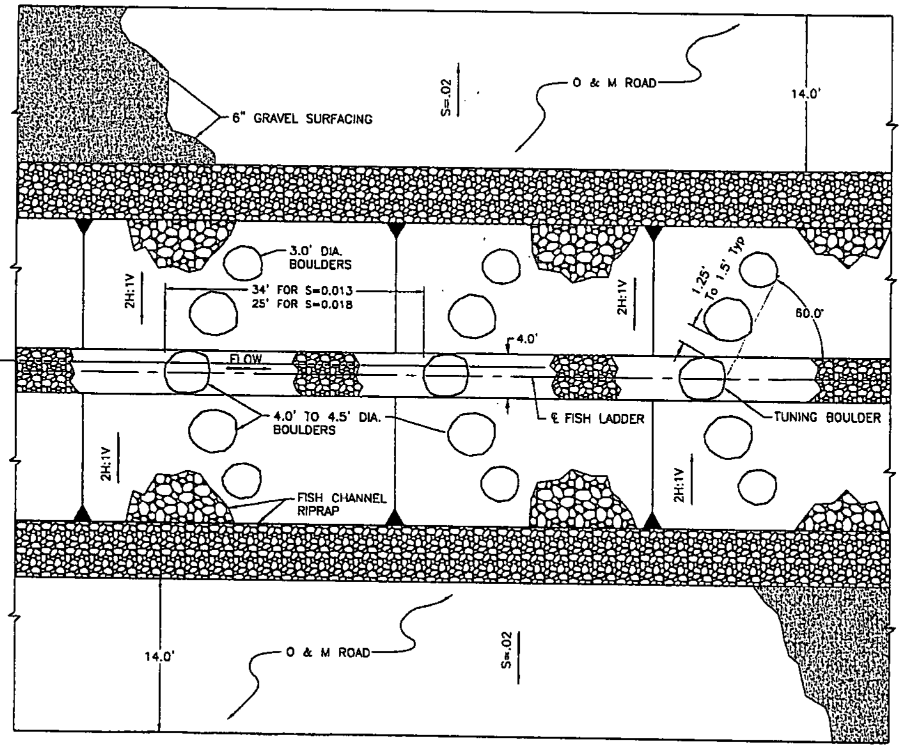
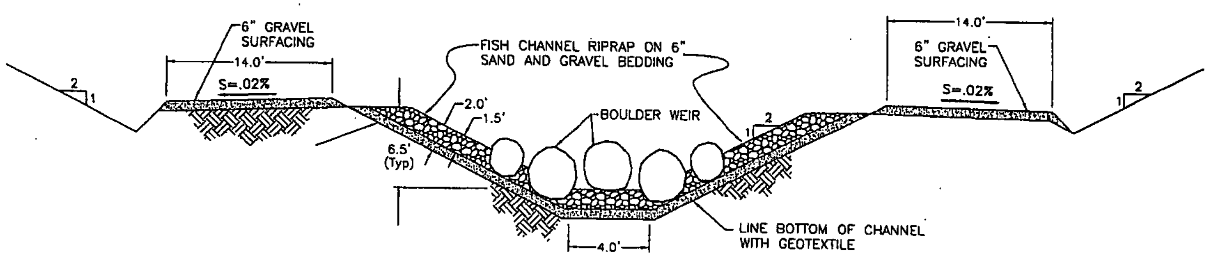
REV2	VERTICAL SCALE 1"= 6'	DATE: 10/17/2002	CHECKED BY: BAA		BUREAU OF INDIAN AFFAIRS		
REV3					WALKER RIVER INDIAN RESERVATION		
REV4							
REV5							
REV6							



1/3 PLAN - BOULDER WEIR



2/3 TYPICAL SECTION

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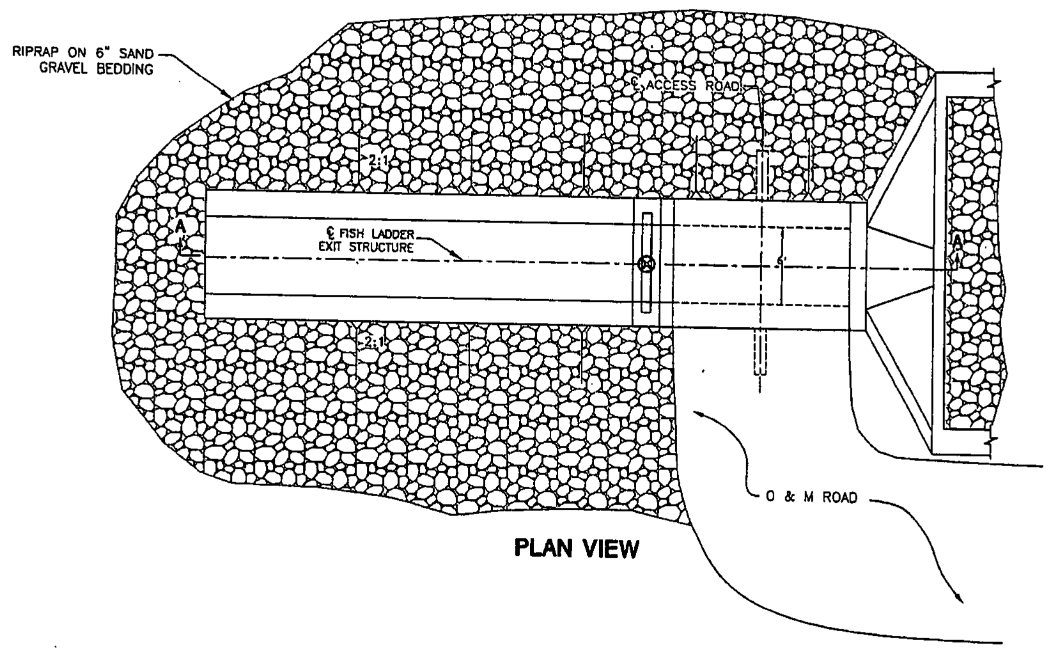
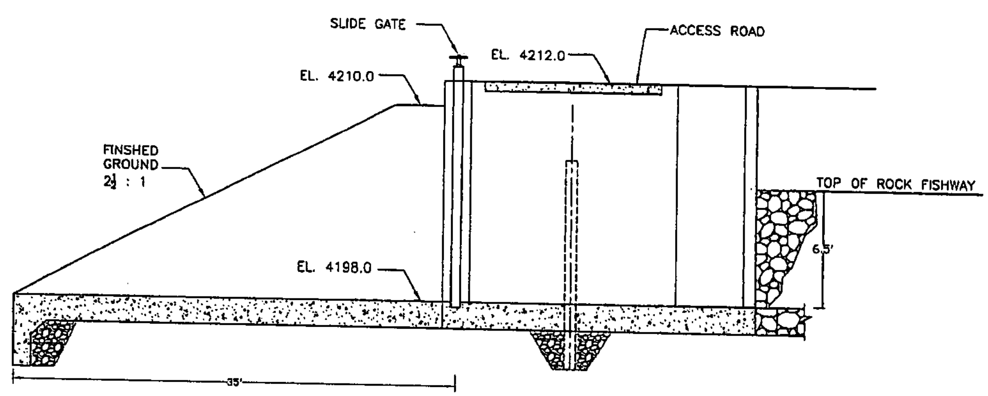
REVISIONS: REV1 REV2 REV3 REV4 REV5 REV6	N.T.S.	PROJECT NUMBER: COMEC03; ACAD FILE: ROCK FISHW DETL.; DATE: 12/04/2002	DRAWN BY: TAW; DESIGNED BY: MKK; CHECKED BY: BAA	Anderson Consulting Engineers, Inc. Civil · Water Resources · Environmental	WEBER DAM
					ROCK FISHWAY PLAN & PROFILE — SHEET 3



PLAN VIEW



SECTION A-A

REVISIONS: REV1 REV2 REV3 REV4 REV5 REV6	SCALE: 1"=10' (0 5 10)	PROJECT NUMBER: COMEC03 ACAD FILE: WEBER ROCK EXIT DATE: 12/18/2002	DRAWN BY: TAW DESIGNED BY: MKK CHECKED BY: BAA	Anderson Consulting Engineers, Inc Civil · Water Resources · Environmental	WEBER DAM MODIFICATION	FISHWAY EXIT STRUCTURE	SHEET 4

Miller Ecological Consultants, Inc.
1113 Stoney Hill Drive, Suite A
Fort Collins, Colorado 80525
970-224-4505

Appendix C – Weber Dam Repair and Modification Project Biological Opinion

April 29, 2005
File No. 1-5-05-F-023
File No. 1-5-99-F-163

Memorandum

To: Superintendent, Western Nevada Agency, Bureau of Indian Affairs, Carson City, Nevada

From: Field Supervisor, Nevada Fish and Wildlife Office, Reno, Nevada

Subject: Biological Opinion for the Proposed Weber Dam Modification Project, Mineral County, Nevada

This document transmits the Fish and Wildlife Service's (Service) biological opinion based on our review of the subject action, which has been proposed by the Bureau of Indian Affairs (BIA) and the Walker River Paiute Tribe (Tribe), and its effects on the threatened Lahontan cutthroat trout (LCT) (*Oncorhynchus clarki henshawi*) in accordance with section 7 of the Endangered Species Act of 1973, as amended (Act) (16 U.S.C. 1531 et seq.). Your October 28, 2004, request for formal consultation was received on November 5, 2004.

This biological opinion was prepared using information contained in the final environmental assessment for the Weber Dam Modification project [Bureau of Reclamation (Reclamation) 1994]; the supplemental environmental assessment for the Weber Dam Modification project (Bureau of Reclamation 1998); the biological assessment (BA) dated October 25, 2004 (Miller Ecological Consultants, Inc. 2004a); the Draft Environmental Impact Statement (EIS) Weber Dam Repair and Modification Project (Miller Ecological Consultants, Inc. 2004b) meetings held on February 17, March 5, March 16, April 27, June 25, September 22, October 4, and October 8, 1999, January 7, 2000, and July 1, 2004; information received from BIA on February 22, 1999; comments received on September 16, 1999, from BIA (BIA 1999a) and from the Tribe on September 14, 1999 (Miller et al. 1999), regarding the draft jeopardy biological opinion; the Tribe's U.S. Army Corps of Engineers (COE) permit application for this project (January 8, 1999); additional comments provided on February 7, 2000, from the Tribe; numerous telephone conversations between the Service and Tribal and BIA personnel; telephone conversations between the Service and Nevada Division of Wildlife (NDOW) personnel on February 24, April 15, and April 22, 1999; the recovery plan for the LCT (Service 1995); and other documents. A complete administrative record of this consultation is on file at the Service's Nevada Fish and Wildlife Office.

Consultation History

The Service received a threatened and endangered species list request from the Reclamation for the proposed project on May 6, 1993. The Service responded on May 26, 1993 (File No. 1-5-93-SP-242). Reclamation subsequently requested additional species lists in 1994 and 1996. The Service responded with updated species lists on August 24, 1994 (File No. 1-5-94-SP-247), and September 4, 1996 (File No. 1-5-96-SP-300).

BIA requested an updated species list on December 14, 1998, and the Service responded on December 16, 1998 (File No. 1-5-99-SP-048). BIA requested additional informal consultation in a memorandum received by the Service on January 25, 1999. The Service informed BIA of several concerns and requested additional information in a letter dated February 5, 1999 (File No. 1-5-99-I-079). BIA provided additional information and requested formal consultation in a letter dated February 19, 1999. Information was also exchanged at meetings among the Service, BIA, and the Tribe held on February 17, March 5, March 16, and April 27, 1999.

A draft biological opinion (File No. 1-5-99-F-163) containing a determination that the proposed action was likely to jeopardize the continued existence of the LCT was provided to BIA on June 24, 1999. Additional meetings among the Service, BIA, and the Tribe where information was exchanged were held on June 25, September 22, October 4, and October 8, 1999.

Subsequent to these meetings, the BIA determined that preparation of an EIS was appropriate due to project changes. The Service provided an initial species list (File No. 1-5-01-SP-201) on June 18, 2001, in response to BIA's Notice of Intent to prepare an EIS for this project. On November 12, 2002, the Service responded with an updated species list (File No. 1-5-03-SP-019) in response to BIA's October 25, 2002, request. An additional species list (File No. 1-5-04-SP-084) was provided by the Service to BIA on March 15, 2004. A draft EIS on the proposed project was prepared and made available to the public for comment in May 2004 (Miller Ecological Consultants, Inc. 2004b). The Service met with representatives from BIA, the Tribe, and the Department of the Interior Solicitor's office on July 1, 2004, to discuss the draft biological assessment, dated April 21, 2004, for the current proposed project.

We concur with BIA's may affect, not likely to adversely affect determination for the threatened bald eagle (*Haliaeetus leucocephalus*) for the following reasons: the species does not nest in the area; utilization of roost and perch trees primarily occurs several miles upstream of the dam; large cottonwoods downstream of the dam that could provide roost and perch sites will not be impacted; foraging does not appear to occur at the reservoir; and if bald eagles choose to forage at the reservoir, the proposed drawdown will likely benefit the species by concentrating fish prey (Herron et al. 1985; Herron, NDOW, pers. comm., 1999; Lockwood, Tribe, pers. comm., 1999; Neel, NDOW, pers. comm., 1999). However, to ensure that potential project impacts are not likely to adversely affect the bald eagle, several additional protective measures and monitoring have been discussed and agreed to by BIA and the Tribe to provide for the conservation of the species, if present, during the construction period. These measures include the following:

1. Document the date of arrival and numbers of bald eagles in the project area from Weber Dam upstream for 6 miles along Weber Reservoir and the Walker River. The Service will be immediately notified of their arrival and locations(s). A meeting among BIA, the Tribe, and the Service will be held promptly to discuss current construction activities and determine additional measures to avoid/minimize impacts to the species, if necessary.

2. Document whether and where bald eagles are foraging at Weber Reservoir or in adjacent upland areas.

3. Monitor bald eagle use of communal night roosts and diurnal perch trees in the vicinity of the dam and reservoir. Monitoring shall occur from no less than one quarter of a mile away.

4. Perch and roost sites will be protected through implementation of restrictions on equipment use and camping in riparian areas. No camping in these areas would occur between October and March.

5. Documentation/reports of bald eagle activity will be provided to the Service every 2 weeks during project construction.

The Service has also consulted previously on several unrelated actions in the project area. The Service completed an informal consultation (File No. 1-5-00-I-011) with the Nevada Department of Transportation (NDOT) on December 17, 1999, for maintenance repair of the Schurz Bridge due to scour damage. We concurred with the not likely to adversely affect determination for LCT due to project timing and duration, Best Management Practices employed, and that the repair would not increase stream velocities under the bridge such that LCT spawners would not have access upstream.

On December 27, 1999, we completed an informal consultation (File No. 1-5-00-I-035) with the Tribe for the construction of tribal housing on the Walker River Paiute Indian Reservation (Reservation). We concurred with the not likely to adversely affect determination for bald eagle and LCT due to project duration, protection of cottonwoods and other riparian vegetation, siting of homes, and the distance of these proposed homes from the Walker River.

The Service completed an informal consultation (File No. 1-5-00-I-198) with BIA for the Lateral 2-A Irrigation Flume project on August 14, 2000. We concurred with the not likely to adversely affect determination for LCT and bald eagle due to project timing, Best Management Practices employed, construction would not constrict the river channel nor increase flow velocities, cottonwoods would not be impacted, disturbed areas would be revegetated with native plant species, and the downstream headcut would be monitored annually.

On September 25, 2002, the Service completed an informal consultation (File No. 1-5-02-I-298) for the Environmental Protection Agency's (EPA) approval of Walker River water quality standards revisions and new Walker Lake water quality standards under § 303 (c) (3) of the Clean Water Act. We concurred with the not likely to adversely affect determination for bald eagle and LCT. The proposed Walker River water quality standards revisions involved: modifying the extent of the reaches of the East Walker River to which certain standards apply; identifying the species of major concern and requirements for the species; revising standards for pH and nitrate in the lower reaches; revising the time period for the dissolved oxygen beneficial use; implementing a dissolved oxygen standard for Topaz Lake; replacing the narrative color standard with a numeric standard; establishing sulfate requirements to maintain existing higher quality conditions; replacing the existing fecal coliform standard with an *Escherichia coli* standard; and establishing a total suspended solid requirement to maintain existing higher quality conditions for Sweetwater Creek.

The proposed new Walker Lake water quality standards included establishing beneficial use standards for recreation, propagation of wildlife, and propagation of aquatic life such as tui chub (*Gila bicolor obesus*), Tahoe sucker (*Catostomus tahoensis*), and adult and juvenile LCT; and adopting water quality standards for pH, dissolved oxygen, total suspended solids, temperature, nitrite, nitrate, total inorganic nitrogen, total phosphorus, and *E. coli* to protect these uses.

Additional measures to avoid adverse impacts to bald eagle and LCT included scheduling a meeting among EPA, Nevada Division of Environmental Protection (NDEP), and Service representatives to discuss establishment of standards not currently being addressed under this consultation and modification of standards in the future if research indicates existing standards are not appropriate for the beneficial uses designated.

NDOT bridge

We completed an informal consultation (File No. 1-5-03-I-296) with the NDOT for the replacement of the Schurz Bridge on November 5, 2003. We concurred with the not likely to adversely affect determination for LCT based on timing and duration of construction activities, maintenance of fish passage during construction, Best Management Practices, riprap would be obtained from an off-site source, riprap placed in the river would provide a roughened surface improving future fish passage, willows removed would be mitigated, and the construction of a low flow channel would improve future fish passage during low river flow periods.

On March 5, 2004, the Service completed an informal consultation (File No. 1-5-04-I-077) with Reclamation for the Walker River Paiute Tribe Fallowing Proposal. This program offers tribal irrigators the opportunity to voluntarily fallow their land in exchange for monetary compensation. The water not used for irrigation would be collected in Weber Reservoir and released to increase flows to Walker Lake. A proportionate amount of storage water in Weber Reservoir above the minimum pool would also be released to Walker Lake. If all irrigators agree to fallow land within any of the seven irrigated areas on the reservation, they would receive a bonus. This is intended to encourage blocks of irrigators to participate, reducing conveyance losses for the remaining irrigators and to allow more water to flow to Walker Lake. The program would not be implemented unless at least 50 percent of the 2,100 acres of irrigated reservation land is enrolled. This program has the potential to increase flows to Walker Lake by 12,653 acre-feet (af). We concurred with the determination that all effects of this action would be beneficial to LCT.

DESCRIPTION OF THE PROPOSED ACTION

Weber Dam is an earth-filled dam on the Reservation in western Nevada that impounds waters of the Walker River which begins in the Sierra Nevada Mountains in California. The dam is located about 16 miles northwest of the present boundary of Walker Lake and approximately 4 miles upstream of Schurz, Nevada (pop. 850). The primary purpose of Weber Dam and Reservoir is to store water for irrigation of agricultural lands on the Reservation through the summer growing period. Currently, approximately 2,100 acres are irrigated. After the modifications to Weber Dam are completed, operation of Weber Dam and Reservoir will return to that in the 1990's. Operation will involve storage of early runoff from the Walker River to assist the Tribe in meeting its annual irrigation requirements. As much water as possible will be stored to a reservoir elevation of 4,208 feet. If the elevation exceeds 4,208 feet, releases will begin by matching outflow to inflow. On April 15, the Tribe receives delivery of Walker River water at a rate of 26.25 cfs for 180 consecutive days. The water stored in Weber Reservoir will be used to supplement this flow to meet the Tribe's irrigation requirements. Normal irrigation releases are approximately 80 cfs for about 2 to 3 weeks. Releases are then halted for 1 to 2 weeks, after which time the process begins again. In wetter years, water may be released from Weber Dam for irrigation, to benefit the lake, and to support LCT spawning migrations, to the extent that water is available and circumstances warrant. Other benefits provided by the presence of Weber Dam and Reservoir to the Tribe and others include a non-native, warm water fishery, boating, camping, and other outdoor recreation. Lack of storage area minimizes the effectiveness of the reservoir in providing downstream flood protection.

The action area for this consultation is defined as the reach of the Walker River from Yerington Diversion Dam downstream to and including Walker Lake and adjacent uplands. Adjacent uplands include those lands upon which activities may occur as a result of the proposed action and may affect listed species.

The major portion of Weber Dam was built by BIA's Indian Irrigation Service between 1933 and 1935, but it was not completed until June 1937 when the spillway gates were installed. Weber Dam is owned by the Federal Government and is operated by BIA for the benefit of the Tribe and individual Indians. The crest of the dam is 16 feet wide, 1,950 feet long, and is at an elevation of 4,217 feet above mean sea level (msl). The structural height of the dam, from the base of the foundation to the crest, is 50 feet. The hydraulic height of the dam, from the lowest point of the original streambed to the top of the spillway gates at 4,208 feet msl, is 36 feet

(Carter and Heyder 1993, cited in Miller Ecological Consultants, Inc. 2004b). The water impounded by Weber Dam creates Weber Reservoir. Normal full reservoir capacity is at elevation 4,208 feet msl. At this capacity the depth of the reservoir is 29 feet. The dam originally could store about 13,000 af with a maximum reservoir surface area of about 960 acres (Kronquist 1939, cited in Miller Ecological Consultants, Inc. 2004b). Sedimentation over the years has reduced storage capacity to approximately 10,700 af (Katzer and Harmsen 1973, cited in Miller Ecological Consultants, Inc. 2004b).

Dam safety investigations in 1989 concluded that Weber Dam had a high hazard rating and poor overall safety rating. On that basis, the BIA and the Tribe have proposed to repair and modify the dam so that it meets appropriate safety standards. The high hazard rating means more than six lives could be lost should the dam fail. The safety rating means the overall risk of overtopping by floods or of structural failure during an earthquake is relatively high. Weber Dam is ranked as the most hazardous of the 116 high and significant hazard dams within BIA's Dam Safety Program; the total population at risk is estimated to be between 300 to 500 people depending on the time of day and the type of dam failure (BIA 1999a).

During the fall of 1999, BIA determined that continuing normal operation of the dam presented unacceptable risks and requested Reclamation's Dam Safety Office located in Denver, Colorado, to develop Interim Operating Criteria for Weber Dam. The study was completed in November 1999 (Bureau of Reclamation 1999). Reclamation recommended in the study that the reservoir level not be held above the spillway crest at elevation 4,195.5 feet msl. Reservoir storage would be reduced from 10,700 af to 2,350 af. Reclamation also recommended that the river outlet works be used to draw down the reservoir to its historical operational low level (about 4,184 feet msl) prior to spring runoff to minimize the duration of the reservoir spilling or exceeding the elevation 4,195.5 feet msl due to flooding. Once the reservoir has been released to the recommended level, the river outlet works should be operated to equal upstream inflows or irrigation demands, whichever is greater. During early 2000, BIA released water from Weber Reservoir to meet Reclamation's recommendation to reduce the hazard to downstream inhabitants in case of an earthquake. At the request of the Tribe, BIA asked Reclamation to reevaluate the restricted reservoir elevation of 4195.5 feet. The original study and recommendation was based on "preventing or eliminating any significant chance of an uncontrolled release of water from the reservoir." The revised recommendation was based on the "not likely" release from Weber Reservoir should the Maximum Credible Earthquake (MCE) occur. As a result of the new criteria, Reclamation changed their recommendation to allow a "maximum interim operating reservoir elevation of 4,200.0 feet" (Reclamation 2002). This results in a reservoir storage capacity of 4,766 af. Annually, the Tribe can request BIA to modify the Interim Operating Criteria to allow water to be stored in Weber Reservoir up to elevation 4,202 feet msl, or 6,083 af storage, for a period not to exceed 30 days. After 30 days, releases must occur to return the water elevation to 4,200 feet msl (Miller Ecological Consultants, Inc. 2004b). These Interim Operating Criteria are expected to be in effect until the proposed Weber Dam modifications begin. Once the modifications begin, the Interim Operating Criteria may be influenced by construction activities. Storage and releases will depend on the amount of runoff discharged to the lower basin. BIA's objective is to achieve a reservoir elevation of 4,202 feet msl at the beginning of the irrigation season sometime between April 15 and May 15. Releases will be managed to achieve this objective.

The proposed repair and modification would prevent earthquake-induced dam failure and increase flood protection from about 7 percent of the Probable Maximum Flood (PMF) to 14 percent of the PMF. If Weber Reservoir were at full capacity in its current condition, movement along the existing fault could cause the outlet works to rupture. This would allow seepage to remove foundation and embankment materials. The material could pass through the ruptured conduit, which could cause a breach of the embankment with a possible uncontrolled release of water. This could result in flooding of downstream areas. The purpose of the proposed modifications and repairs is to modify major features of the dam including: removal of a portion of the existing dam and construction of a new dam portion downstream; widening the existing dam at the outlet works and extending the outlet works tunnel; repair of the outlet works and service spillway; improvement of seepage control; enlargement of the emergency spillway; and roadway reconstruction. In addition, a fish passage structure will be incorporated into the dam. The repair and modifications to Weber Dam have a life expectancy of over 50 years (Miller Ecological Consultants, Inc. 2004b). The construction period is scheduled to occur over a 12-month period beginning in spring 2005.

The following discussion addresses the construction activities to be performed to modify the major features of Weber Dam.

<u>Remove a Portion of Existing Dam and Relocate New Dam Portion Downstream</u>

Movement along the existing fault under the dam could cause the foundation and dam to crack near the fault. The crack would provide an uncontrolled seepage path from the reservoir. Excessive seepage could result in the movement of foundation and embankment materials and the subsequent breach of the dam.

To eliminate threats to structural integrity, it is proposed to relocate a portion of the dam approximately 300 feet downstream of the existing dam crest and slightly rotate its orientation. This requires the complete removal of a portion (400 feet) of the existing dam. The portion to be removed and relocated is the portion which crosses the Walker River. The new dam portion site would be stripped and cleared of vegetation. The seepage pond area, located just downstream of the dam, would be unwatered (removal of surface water). Deep wells and pumps would be installed and the site dewatered (maintaining water levels a minimum of 5 feet below excavated surface during excavation activities). The existing dam would serve as a coffer dam while the new dam portion is being built. The foundation for the new dam portion would be excavated and the new dam portion constructed to elevation 4,185 feet msl. A portion of the old dam would be removed and suitable material from it would be used in building up the new dam portion to 4,201 feet msl. The old dam would then be excavated to below 4,201 feet msl (4,184 to 4,201 feet msl) and the new dam portion built to 4,217 feet msl. In addition to material from the old dam, material from the excavation of the emergency spillway would be used in the new dam portion's construction. The reservoir would be drawn down to 4,179 feet msl to construct the upstream blanket for the new dam portion and remove the remaining material and sediment from the old dam site. Riprap would be placed on the dam for slope protection. Relocating a portion of the dam downstream would increase the reservoir's surface area by about 3 acres and its storage capacity by about 50 af (BIA 1999a).

Widen the Existing Dam at the Outlet Works and Extend the Outlet Works Tunnel

Movement along the existing fault could cause the outlet works to rupture. This would provide shortened, uncontrolled seepage paths which would allow seepage to remove foundation and embankment materials. This could lead to a breach of the dam with a possible sudden release of water from the reservoir. To prevent this, the downstream portion of the dam at the outlet works conduit would be widened. To provide room for the widened dam, the outlet works conduit would be extended 105 feet. A filter/drain envelope would be installed around the outlet works conduit, as well as an internal filter/drain in the dam and fill area in the vicinity of the outlet works conduit. These internal filters would be capable of accommodating embankment cracking that may occur during the MCE.

This portion of the project includes removing and rebuilding the gate house, replacing gates and hoists, and constructing a temporary outlet works diversion pipe to pass flows. A downstream outlet works coffer dam would be constructed. The area would be unwatered and dewatered. The area would be excavated and filled for the downstream channel and conduit extension. In late summer early fall, the reservoir will be drawn down to elevation 4,179 feet msl, with releases made to minimize sediment flows to the extent possible. Releases of about 80 cfs will be made to allow the flow to be used for irrigation purposes. About mid-September, a small coffer dam would be constructed upstream of the irrigation intake tunnel. The coffer dam would have a gated, 5 foot diameter pipe through it to provide emergency flows, if necessary. Construction of the coffer dam will impound water behind it and allow the work on the irrigation outlet works and tunnel to be completed. Once the upstream cofferdam and diversion pipe are in place, the reservoir will be operated to ensure reservoir storage does not exceed elevation 4,200 feet msl. Releases will be made to allow irrigation to take place and/or to avoid adverse impacts to the construction. Depending on the reservoir elevation, either the spillway or diversion structure will be used to make the releases for irrigation, achieve reservoir elevation objective, or meet construction needs. The upstream cofferdam is tentatively scheduled for removal during winter 2005; however, the exact timeframe will be based on a schedule prepared by the construction contractor. The downstream outlet works coffer dam would be removed. The area would be backfilled and riprap placed downstream.

Barrier

A small coffer dam would be placed downstream from the outlet works, but upstream of the service spillway pool, to assist in dewatering of the excavation area for the relocation of the new dam portion. This will prevent LCT from accessing the excavation area during construction.

Rehabilitation of the Service Spillway

This portion of the project would involve constructing the generator house, installing a generator, and rehabilitation or replacement of the spillway gates and float well. Deteriorated concrete in the spillway would be repaired. Much of the service spillway work would be within the confines of the spillway walls. The reservoir would need to be drawn down to less than elevation 4,196 feet msl to accomplish this work. This elevation is scheduled to occur in late summer 2005.

Improvement of Seepage Control

A toe-drain seepage collection system consisting primarily of a bed of permeable material would be installed under the new embankment on the downstream side of the dam. A 12-inch diameter, perforated high density polyethylene corrugated pipe would be embedded and day lighted in the outlet works channel.

Gravel for the drain, like the rock for new riprap, would be obtained from local sources. Approximately 12,000 cubic yards (480 truckloads) of new gravel would be needed.

Seepage would be collected and redirected to the outlet works channel. This redirection will impact the jurisdictional wetland (seepage pond area) known as the "frog pond," but this would be mitigated through the COE's section 404 permitting process.

Enlargement of the Emergency Spillway

The present emergency spillway, which is a naturally-formed channel, would remain. However, the crest of the emergency spillway would be enlarged. The emergency spillway would have a 420-foot-long sill. Construction would require removal of a portion (approximately 200 feet) of the low ridge which separates the emergency spillway from the service spillway. The 420-foot-wide spillway channel would be excavated in a southeast direction from the reservoir rim and downward from elevation 4,208 feet msl at a slope of 1.5 percent for a distance of about 300 feet. An additional 100 feet would be excavated at a slope of 4 percent. This sloped excavation would terminate at elevation 4,200 feet msl, and the remainder of the channel would consist of the channel being excavated eastward to daylight at this elevation. The side slopes of the channel would be cut at a 2(H):1(V) slope. A 4-foot-deep, 14-foot-wide trench would be excavated across the channel, near the reservoir rim, for placement of the spillway erosion sill.

This sill would be constructed by backfilling the trench with riprap and then grouting the riprap in place. The fuse plug embankment would be constructed over the erosion sill.

The new fuse plug would have a sill elevation of 4,208 feet msl. It would have a crest elevation of 4,215 feet msl, and a crest length of more than 420 feet. The pilot channels to initiate breaching of the fuse plug would be at elevation 4,214 feet msl. The existing natural channel below the fuse plug would be slightly reshaped to increase the discharge efficiency, but most of it would be undisturbed. Little work would be required outside the area of the fuse plug itself. Use of heavy equipment would be confined largely to the area immediately surrounding the emergency spillway crest.

The excavation for the enlargement of the emergency spillway would result in approximately 109,000 cubic yards of excavated material. This material would be used as borrow material for construction of the new portion of the dam and coffer dams. It is possible that some portion of the excavated material would be in excess of the quantity needed for construction activities and would need to be disposed of in a borrow area.

Fish Passage Structure

A preliminary fish passage structure design has been developed to be constructed along the emergency spillway of Weber Dam. The design includes a boulder weir-rock lined fish passage. The structure is designed to provide a velocity of about 4 feet per second during an operational flow range of 25 cfs to 200 cfs. The structure will operate between reservoir elevations of 4,200 and 4,208 feet msl. A manually-operated control gate will be included at the upstream end to regulate streamflow. The length of the channel is 2,100 feet with a bottom width of 4 feet. Water depth will be from 3 to 6.5 feet. The vertical drop of the fish passage structure is 32 feet from elevation 4,198 to 4,166 feet msl. The slope varies from 0.013 to 0.018 feet per foot. The distance between boulder weirs will be 25 to 34 feet, maximum height of the boulders above the channel bed will be 3 feet, and the width between boulders is 1.25 to 1.5 feet.

The entrance to the fish passage structure from the Walker River includes a small area of cobble and large gravel to protect the river bottom and bank. Upstream of the river entrance to the fish passage structure, a large cobble and small boulder structure will be placed across the river to direct fish into the fish passage structure and away from the spillway pool. As final design plans become available, the Service will have an opportunity to provide BIA with specific comments to ensure LCT passage needs are being met.

The operation of the fish passage structure (timing, usage, etc.) will be determined in coordination with the Service to best address the survival and recovery needs of LCT. A coordination meeting(s) among BIA, the Tribe, and the Service will be held in January of each year. Other participants could include the Walker River Basin Recovery Implementation Team (WRIT) representatives, NDOW biologists, and other fishery biologists involved in LCT recovery in the Walker River Basin. Topics for discussion may include LCT status in the basin, hydrologic conditions, availability of water to be passed through the fish passage structure, irrigation season coordination, and upstream conditions. These meetings would allow development of a plan for fish passage incorporating the unique conditions each year. Development of a coordinated annual operation plan for Weber Reservoir and the fish passage structure would recognize the Tribe and BIA's authority and responsibility to satisfy the Tribe's needs for irrigation water as well as support for LCT recovery.

The fish passage structure is not anticipated to be operational during the first few years after construction due to the lack of water availability prior to the irrigation season. In the future, Reclamation's Desert Terminal Lakes program and/or other activities may provide water transfers that could be passed down the fish passage structure. Once construction has been completed, BIA and the Tribe would continue to facilitate short-term or long-term water transfers such as the 2004 transfer of water from NDOW's Mason Valley Wildlife Area to Walker Lake.

In addition, BIA will be responsible for inspection, maintenance, and repair of the fish passage structure. All maintenance will be completed by February of each year. Should the structure not operate as designed, BIA will initiate corrective actions immediately until the structure functions as intended.

At the close of any period of fish passage structure operation, the following measures would be implemented to minimize stranding of LCT in the structure: control gate set at minimum operating discharge, a block net placed across the downstream entrance to the fish passage structure, the structure would be inspected and any LCT remaining would be captured and released in Walker River or Walker Lake depending on hydrologic conditions, the control gate would be closed, the structure dewatered, the block net removed, and BIA would report to the Service information related to captured and released LCT and dead, injured, or sick LCT.

<u>Water Quality Controls</u>

Pollutants would be controlled with sediment and erosion controls, wastewater and storm water management controls, construction site management practices, and other controls including Federal and Tribal control requirements as described below.

Wastewater and Storm Water Management Controls

The contractor shall establish methods of dewatering, unwatering, excavation, or stockpiling earth and rock materials which include prevention measures to control silting and erosion, and which will intercept and settle runoff of sediment-ladened waters. Wastewater shall not enter flowing or dry watercourses without the use of EPA-approved turbidity control methods. Storm water runoff from upslope areas shall be diverted away from disturbed areas. Methods of prevention of excess turbidity shall be employed. All such wastewaters discharged into surface waters shall meet all conditions of section 402 of the National Pollutant Discharge Elimination

System permit. Operation of equipment in water bodies will not occur without the appropriate permit.

Construction Site Management

Construction activities will be performed using methods that prevent entrance or accidental spillage of solid matter, contaminants, debris, or other pollutants or wastes, into streams, flowing or dry watercourses, lakes, wetlands, reservoirs or underground water sources. Stockpiles or deposits of excavated materials or other construction materials shall not be located near or on streambanks, lakeshores, or other water courses perimeters where they can be washed away by high water or storm runoff. Storage tanks for oil or other petroleum products shall be placed at least 20 feet from streams, flowing or dry watercourses, lakes, wetlands, reservoirs, or other water sources. Storage areas shall be diked at least 12 inches high or graded and sloped to contain leaks and spills equal to the capacity of all tanks and containers located within the area. An additional amount of free board will be available to contain the 25-year rainstorm. Diked areas shall have an impermeable barrier at least 10 mils thick. Refueling areas shall have an impermeable liner 10 mils thick buried under 2 to 4 inches of soil.

Laws, Regulations, and Permits

Construction operations shall comply with a) all applicable Federal and Tribal laws, orders, regulations, and Water Quality Standards concerning the control and abatement of water pollution and b) all terms and conditions of the applicable permits issued by the permit issuing authority. A Pollution Prevention Plan and a Spill Prevention Control and Countermeasure Plan will be provided to the Contracting Officer 30 days prior to onsite construction and delivery or storage of oil at the site. A water removal and control plan will be submitted to the Contracting Officer prior to beginning work on the unwatering and dewatering systems.

The contractor shall provide all water treatment activities and monitoring as necessary to comply with permit conditions. Sedimentation in the river during drawdown and construction activities will be monitored in accordance with EPA's 402 water quality permit conditions. If sedimentation exceeds the maximum threshold permitted, flows will be discharged into a settling pond located at the wetland mitigation site between the river channel and the outlet works channel. Monitoring reports will be submitted to the Contracting Officer and appropriate agencies.

<u>Contractor's Staging Area</u>

The contractor's staging area will be located in uplands west of the emergency spillway.

Borrow Pits and Stockpiling Areas

An area located approximately 4 miles southwest of the dam, on Bureau of Land Management (BLM) property at the base of White Mountain, would be used as a source of rock for riprap and downstream slope protection. The area has been previously disturbed. Development of the source and production of the riprap and downstream slope protection would require clearing, blasting, and sorting operations. Approximately 6,000 cubic yards of rock for riprap and approximately 5,000 cubic yards of downstream slope protection would be needed to complete the dam modifications.

Excavated materials would not be stockpiled or deposited near or on streambanks, or in other locations where the material could be washed away by high water or storm runoff. Material removed from the dam, but intended for reuse, would be stockpiled in three areas within the project area. These areas include north of the proposed area for the constructed wetland, between the spillway and outlet works, and near the left abutment of the existing embankment.

Upland and Riparian Vegetation

Where possible, construction activities including staging, storage, excavation, and movement of borrow material would be in areas of previous disturbance. Existing vegetation would be protected (marked, fenced) from damage or injury during construction activities. No large cottonwoods are to be removed.

Willows and other riparian vegetation would be replanted to replace vegetation lost due to project activities. Any tree or shrub not required to be removed but damaged beyond recovery would be replaced with the same or approved native species of the same size. Replacements would be maintained for 1 year. Approximately 23.6 acres of upland habitat would be eliminated due to construction of the project. Areas disturbed during any phase of construction activities, with the exception of active borrow sites, roads and parking lots, would be restored according to a detailed restoration plan. The plan would include the restoration of grades and the reestablishment of native vegetation consistent with the specific community type.

Construction would avoid destroying active nests of birds breeding in the area. A biologist will survey for active bird nests in the area to be disturbed. If nesting birds are present in these areas, the work would not begin until 2 weeks after young birds have fledged.

Wetlands

Wetland habitat occurs directly downstream from the dam. This includes: the Walker River, the "frog pond," the Weber Dam outlet channel, and the "seep area" at the emergency spillway area. Construction of the project would impact about 1.6 acres of wetlands. These losses would be mitigated by creating a new wetland site. Wetland mitigation (2 acres) will be based on the requirements specified in the COE's permit under section 404 of the Clean Water Act. Prior to construction of the new wetland, this site would be made available for use as a water quality settling basin, if necessary.

Roadway Reconstruction

The gravel-surfaced roadway crossing the existing dam crest would be reconstructed to cross on the new embankment crest. Realignment of the road approach on the left abutment would begin approximately 700 feet north of the left end of the new dam embankment. To accommodate an improved road alignment and a wider roadway, the existing dam crest to the south of the outlet works would be widened along the downstream side by approximately 8 to 15 feet. The right abutment road approach realignment would end approximately 550 feet south of the service spillway. The total length of reconstructed road would be approximately 2,800 feet. Gravel surfacing would be placed on the entire length to a 6-inch thickness. All existing cable barrier rails would be removed and a W-beam guardrail would be erected where required.

Safety, Traffic, and Noise

The dam is located approximately 2.5 road miles from Alternate U.S. Highway 95. The nearest residences are 4 to 5 miles downstream of the dam. The increased construction traffic would consist of the relatively small number of workers commuting to the site, and the trucks carrying cement and new riprap and gravel. The much heavier truck traffic transporting borrow material would be restricted to the immediate vicinity of the dam. Traffic could be controlled with flagmen or warning signs. If necessary, the road could be temporarily closed.

STATUS OF THE SPECIES/ENVIRONMENTAL BASELINE

LCT is an inland subspecies (one of 14 recognized subspecies of cutthroat trout in the western United States) of cutthroat trout endemic to the Lahontan Basin of northern Nevada, eastern California, and southern Oregon. The species was listed by the Service in 1970 (35 FR 13520) as endangered. Subsequently, LCT were reclassified as threatened in 1975 to permit a State-regulated sport harvest of these fish (40 FR 29864). State regulations currently do not distinguish LCT from other salmonid species and allow take of five fish per day with no size limit. Some bodies of water with LCT are closed to fishing (Nevada Department of Wildlife 2004a). There is no designated critical habitat for LCT (U.S. Fish and Wildlife Service 1995).

The Service has described in the final recovery plan for this species that three distinct populations of LCT exist based on geographical, ecological, behavioral, and genetic factors. These include: (1) the Western Lahontan Basin population comprised of the Truckee, Carson, and Walker River Basins; (2) the Northwestern Lahontan Basin population comprised of the Quinn River, Black Rock Desert, and Coyote Lake Basins; and (3) the Humboldt River Basin population.

A healthy, viable population of LCT in the Walker River Basin is necessary for recovery of this species within the Western Lahontan Basin population. Currently, no lacustrine LCT population exists as self-sustaining in a terminal lake. Reestablishing the Walker Lake population as self-sustaining would provide the first LCT lacustrine population in a true terminal lake within the Western Lahontan Basin population and a second true terminal lake population within its range.

LCT historically occurred in most cold waters of the Lake Lahontan Basin, including: (1) large alkaline terminal lakes (e.g., Walker Lake, Pyramid Lake); (2) major river systems, mountain streams, and lakes; and (3) small tributary streams. Prior to the turn of the century, there were 400 to 600 fluvial LCT populations in about 3,700 miles of streams and 11 lacustrine populations occupying approximately 334,000 acres of lakes within the basins of Pleistocene Lake Lahontan (Gerstung 1986).

LCT currently occupy between 155 and 160 streams in Nevada, Oregon, and California; 123 to 129 streams are located within the Lahontan basin and 32 to 34 streams are located outside of the Lahontan Basin. LCT are also found in six lakes and reservoirs (U.S. Fish and Wildlife Service 1995). The number of LCT within its range is unknown. Currently, range wide, self-sustaining LCT remain in only 10.7 percent (404 miles) of their probable historic stream habitat and 0.4 percent (1,290 acres) of their probable historic lake habitat (U.S. Fish and Wildlife Service 1995). Self-sustaining LCT lacustrine populations currently exist only in Independence Lake, California (not a terminal lake) in the Western Lahontan Basin and in Summit Lake, Nevada in the Northwestern Lahontan Basin, both high elevation lakes.

LCT are obligatory stream spawners. Spawning generally occurs in riffle areas over gravel substrate from April through July, depending on stream flow, elevation, and water temperature (La Rivers 1962; McAfee 1966; Lea 1968; Moyle 1976). LCT spawning migrations have been observed in water temperatures from 5 to 16° C (41 to 61 ° F) (Lea 1968; U.S. Fish and Wildlife Service 1977; Cowan 1983; Sigler et al. 1983). Observations of historic Pyramid Lake LCT spawning runs indicate adult began entering the Truckee River as early as March and may remain in the river as late as July (Snyder 1917). This extended spawning period could occur in the Walker River as well. To minimize the risk of exposure to excessive daily maximum temperatures and cumulative weekly exposure to high and fluctuating stream temperatures, Dunham (1999) recommended a maximum weekly maximum temperature of 20° C. Dunham (1999) also identified a maximum weekly maximum temperature of 12.8° C for the protection of LCT spawning, egg incubation, and fry emergence. Lacustine LCT probably reached ages of 10 to 15 years (Behnke 1992). Stream-dwelling LCT mature at 2 to 4 years of age and presumably lacustrine LCT would mature at an older age due to their longevity. Post-spawning mortality rates as high as 90 percent have been reported for LCT (Cowan 1982). Consecutive year spawning is uncommon. A description of LCT life history is provided in the final LCT recovery plan (U.S. Fish and Wildlife Service 1995). Life history information for lacustrine LCT is based mostly on stream dwelling LCT or hatchery derived LCT strains stocked into the terminal lakes.

Major reasons for the decline of LCT abundance and impacts to habitat throughout its range include: (1) reduction in and alteration of stream discharge; (2) alteration of stream channels and morphology; (3) water quality degradation; (4) lake level reduction and concentration of chemical components in lakes; and (5) non-native fish introductions (U.S. Fish and Wildlife Service 1995).

In the Walker River basin, LCT historically occurred in Walker Lake and its tributaries upstream to Pickle Meadows, California, in the West Fork of the Walker River, and upstream to Bridgeport Valley, California in the East Fork of the Walker River. Approximately 360 miles of stream habitat and 49,400 acres of lake habitat were occupied. Walker Lake and Upper and Lower Twin Lakes supported the only lacustrine populations (Gerstung 1986).
Currently, the Walker River Basin supports few self-sustaining areas of LCT. Original Walker River LCT are believed to occupy ByDay Creek, a tributary which enters Bridgeport Reservoir on the East Fork of the Walker River in California. The other occupied areas result from introductions into Bodie, Mill, Murphy, Silver, Slinkard, and Wolf Creeks from ByDay or Slinkard Creeks; these creeks are upstream of historic habitat. All of these populations are found above large natural barriers that prevent upstream migration of nonnative salmonids. Mill, Silver, Slinkard, and Wolf Creeks are tributaries to the West Fork of the Walker River. Bodie and Murphy Creeks are tributaries to the East Fork of the Walker River and enter the river below Bridgeport Reservoir. Data extrapolated from Gerstung (1986) indicate 11 miles of suitable habitat in these streams are occupied by LCT; this represents 3.1 percent of the historic habitat within the basin (U.S. Fish and Wildlife Service 1995). In the fall of 2004, LCT population surveys were conducted in ByDay, Silver, Wolf, and Mill Creeks. In addition to estimated population numbers, distribution was also determined. ByDay Creek had a mean number of 186 fish within 1.1 miles of occupied habitat; the average length of LCT in ByDay Creek was 133 millimeters (mm) (5 inches (in)) (U.S. Forest Service 2004a). The mean number of fish caught in Silver Creek was 1,186 within 3.3 miles of occupied habitat. The average length of the fish in Silver Creek was 182 mm (7 in) (U.S. Forest Service 2004b). The mean number of fish found in Wolf Creek was 757, they were distributed within 3.2 miles of stream, and the average length of these fish was 136 mm (5.4 in) (U.S. Forest Service 2004c). In Mill Creek, the mean number of fish was 1,496 with an average length of 102 mm (4 in). They occupied 5.4 miles of stream (U.S. Forest Service 2004d).

As early as 1860, LCT spawning runs began to diminish due to agricultural development in Smith and Mason Valleys, Nevada (U.S. Fish and Wildlife Service 1995). Upstream agricultural development resulted in: (1) construction of reservoirs which reduced the amount of habitat available and created barriers to migration of LCT; (2) installation of numerous unscreened diversion structures which diverted river flows as well as LCT, especially downstream migrating fry, and created barriers; and (3) reduction of Walker Lake water elevations due to water diversions. Bridgeport Reservoir is located on the East Fork of the Walker River in California, and Topaz Reservoir is located off-river along the West Fork of the Walker River in Nevada and California. Bridgeport Dam and Reservoir, completed in 1924, has a storage capacity of about 44,000 af, while Topaz Reservoir, which increased its capacity in 1937, can store about 59,000 af

(California Department of Water Resources 1992). These two reservoirs comprise the Walker River Irrigation District's major facilities and are located approximately 110 and 75 miles, respectively, upstream of Weber Dam and Reservoir.

Construction of Weber Dam and Reservoir, the only reservoir located on the mainstem, was begun in 1933 and completed in 1937 to store Tribal water. Its location, only a few miles upstream of the lake (1933 lake elevation was approximately 4,035 feet), prevented upstream migration of LCT from this point to any potential remaining spawning habitat in Walker River (California Department of Water Resources 1992). Yerington Dam and Bridgeport Dam, both completed prior to Weber Dam, also prevented LCT migration further upstream. Walker Lake was fished commercially and provided subsistence fishing during spawning runs for the Paiute Indians (Sevon 1988). After Weber Dam was built, Tribal members were forced to capture LCT by seining in Walker Lake (Sevon 1988). Some limited reproduction may have occurred downstream of Weber Dam during subsequent years. LCT spawning runs were documented in the reach below Weber Dam in 1952, 1956, 1958, and 1966 (Sevon 1988). In April of 1983 ripe LCT were netted at the mouth of the river in an attempt to artificially spawn them by NDOW (Sevon 1988). No spawning runs occurred during the drought years of the late 1980's and the early 1990's. During recent wet years (1996-98), LCT have been observed migrating up Walker River during high spring flows and have been blocked by Weber Dam (Myers 1997; Drake, NDOW, pers. comm., 1998). It is expected that LCT again migrated upstream in 1999 as spring flows were adequate. It is not known whether LCT made spawning migration attempts after 1999, but it is unlikely due to drought conditions within the watershed. Evidence of recruitment in the lower Walker River has not been seen since the 1950's (Sevon 1988).

Due to the loss of successful spawning runs, large LCT were taken from the river or lake by the Nevada Fish and Game Commission (the predecessor to NDOW) in 1948 to be used as broodstock. NDOW began a hatchery program to stock LCT into Walker Lake in 1949 which continues today (Sevon 1988). LCT strains primarily stocked by NDOW currently include Independence, Heenan, Catnip, and Pyramid Lakes. Prior to construction of the Mason Valley Hatchery in 1991, LCT to be stocked in Walker Lake by NDOW were raised primarily at the Verdi Hatchery (Drake, NDOW, pers. comm., 1999). Between 1986 and 1999, roughly 65,000 to 224,000 LCT were stocked each year (Nevada Division of Wildlife 1998a; Nevada Division of Wildlife 1999). In 2000 and 2001, approximately 262,000 and 193,000 LCT were stocked into Walker Lake, respectively (Nevada Division of Wildlife 2000, 2001). In 2002, NDOW stocked approximately 94,000 LCT (8,200 Independence and 86,000 Pyramid Lake strains) into Walker Lake (Sollberger 2002). In 2003, NDOW stocked approximately 110,000 Pyramid Lake strain LCT into Walker Lake (Nevada Division of Wildlife 2003). In earlier years, the following approximate numbers of cutthroat trout were stocked annually in Walker Lake: 1951-1958 (2,100-18,600 Walker strain); 1960-1969 (11,000-116,000 various strains); 1970-1979 (17,000-379,000 unknown strains); 1980-1983 (84,000-302,000 various strains) (Sevon 1988).

Angler surveys indicate that between 1990 and 1992 approximately 29,000 to 40,000 LCT were caught at Walker Lake; between 1993 and 1997 approximately 69,000 to 99,000 LCT were caught (Drake, NDOW, pers. comm., 1999). The increase in numbers of LCT caught between 1993 and 1997 could reflect a positive response to the increased lake levels resulting in increased survivability as well as improved fish acclimation procedures and stocking. Fishing derbies have been conducted at Walker Lake since the early 1970's. Data from recent spring fishing derbies indicate that more fish were caught per hour in 2004 and their body condition was better than in the past 2 years (Nevada Department of Wildlife 2004b).

NDOW has also stocked the West Fork of Walker River with extra LCT from Mason Valley Hatchery in 1997 and 1998. Approximately 28,000, 2- to 6-inch LCT (Independence Lake strain) were stocked in Hoye and Wilson Canyons and Topaz Canal in 1997. In 1998, approximately 10,500, 2 to 6-inch LCT (Pyramid and Independence Lake strains) were stocked in Hoye and Wilson Canyons and in the Smith and Wellington areas (Sollberger, NDOW, pers. comm., 1999). These stockings have been incidental to the LCT stocking efforts at Walker Lake, and the survival of these individuals is unknown.

In 1965, construction of the Lahontan National Fish Hatchery (LNFH) began in Gardnerville, Nevada. Congress authorized the hatchery, operated by the Service, to reestablish fisheries in the western United States. Operations for fish production began in 1967, and stocking of LCT in Walker Lake began that year. Between 1967 and 1985, the Service stocked various numbers of LCT; Service records indicate between 1,100 and 250,400 LCT of several strains (Heenan, Summit, Ennis, and Catnip) were stocked each year. Between 1986-1998, stocked numbers (primarily Pyramid Lake strain) ranged from about 90,000 to 150,000 per year. The size of LCT stocked was approximately 6 inches. Beginning in 1998, the Service added approximately 7,000 Pilot Peak strain LCT (ongoing genetic investigations may determine if this strain is derived from the original Pyramid Lake strain) to the Walker Lake stocking program (100,395 Pyramid Lake strain were also stocked). In 1999, approximately 18,000 Pilot Peak strain LCT were stocked with about 82,000 Pyramid Lake strain LCT (Marchant, Service, pers. comm., 1999). In 2000, LNFH stocked about 134,000 Pyramid Lake strain LCT and about 750 Pilot Peak strain LCT into Walker Lake. Approximately 78,000 Pyramid Lake strain LCT and 15,000 Pilot Peak LCT were stocked in 2001. During 2002 to 2004, only Pyramid Lake strain LCT were stocked into Walker Lake; numbers ranged from 92,000 to 106,000 individuals (Duncan, Service, pers. comm., 2005).

In cooperation with NDOW and the Pyramid Lake Fisheries Program, the LNFH began an acclimation program for LCT stocked in Walker Lake in 1995. Prior to the acclimation program, initial survival of LCT in Walker Lake was below 60 percent. The acute shock of moving from rearing levels of 134 milligrams per liter (mg/l) of Total Dissolved Solids (TDS) at the hatchery to more than 13,000 mg/l at Walker Lake was believed to account for the high mortality rates. Pyramid Lake's TDS levels are 5,200 mg/l, less than half of what is found at Walker Lake. The acclimation program involves transporting fish reared at LNFH to raceways at Sutcliffe Fish Hatchery, Pyramid Lake. Fish are kept in these raceways, which utilize Pyramid Lake water, for 1 week. After the 7-day acclimation period, the fish are transported to Walker Lake for release. Initial survival rates have been consistently above 90 percent for all acclimated fish (Marchant, Service, pers. comm., 1999). Beginning in 2000, fish continued to be acclimated at Sutcliffe Fish Hatchery, but the acclimation time varied between 1 to 7 days. Survival of acclimated fish is dependent upon acclimation time and TDS at the time of stocking. Although the optimum number of days for acclimation is still being tested, it appears that mortality of acclimated fish increases at higher TDS levels in the lake (Byers, Service, pers. comm., 2005).

NDOW has acclimated LCT by pumping water into their fish distribution truck and acclimating them in the truck. Fish bioassays at Walker Lake are performed by NDOW. A 100 fish sample from each stocked strain and from each acclimation procedure were marked and placed into live cages. LCT survival and average lake temperature were monitored and recorded for about a week. A control group of non-acclimated LCT of each strain is also bioassayed and monitored for about a week to record their survival (Branstetter, Service, pers. comm. 1999). In 2003, NDOW began acclimating their fish at the Sutcliffe Fish Hatchery in a similar manner to LNFH's practices. Varying numbers of days (0, 2, and 7 days) were used in acclimating LCT both in 2002 and 2003. Results of these acclimation tests also indicated that fish mortality increases with higher TDS levels (Byers, pers. comm. 2005).

The creation of Weber Reservoir resulted in the degradation and loss of an unknown quantity of historic LCT habitat by converting riverine habitat to lacustrine habitat. Weber Reservoir is approximately 3.5 miles long at full capacity. Inundation of this length of the Walker River may have eliminated an unknown amount of spawning and other habitats for LCT; prior modifications made to the channel before construction of Weber Dam may have resulted in loss of habitats except for migration habitat. Today suitable spawning habitat downstream of the dam does not appear to exist; much of this portion of the river would have originally been inundated by the higher levels of Walker Lake. As the lake elevation declines, an increasing portion of the reach downstream from the dam is transitioning from lacustrine to riverine habitat.

Weber Reservoir creates habitat suitable for several non-native fish species that have been introduced into the Walker River Basin. Non-native fish species often out compete native fish species for space and resources and impact their distribution and abundance in altered habitats. Weber Reservoir supports a Tribal warm water fishery comprised of the following species: carp (*Cyprinus carpio*), brown bullhead (*Ameiurus nebulosus*), channel catfish (*Ictalurus punctatus*), white crappie (*Pomoxis annularis*), and largemouth bass (*Microterus salmoides*) (Miller et al. 2001, cited in Miller Ecological Consultants, Inc. 2004b). Additional fish species that are found in the river, and thus also could occur in the reservoir, include: native species such as tui chub, Tahoe and Lahontan suckers (*C. platyhynchus*), redside shiners (*Richardsonius egregius*), and speckled dace (*Rhinichthys osculus robustus*), and non-native species such as bluegill (*Lepomis macrochirus*) (Miller et al. 1999; Miller Ecological Consultants, Inc. 2004b). No stocking of the warm water fishery in the reservoir occurs; reproduction occurs naturally. The Tribe generates revenue from this fishery by selling permits. There are no population estimates for these species. However, in August 2000, a large fish kill occurred in Weber Reservoir due to drought and flows released to meet the Interim Operating Criteria developed for dam safety concerns. Thousands of fish, primarily carp, were killed, but catfish, bass, and crappie were also involved (DeLong 2000).

Weber Dam and Reservoir provide water storage for agricultural activities on Reservation lands. Approximately 2 miles downstream of the dam, a diversion structure diverts water to Tribal lands. This structure diverts a small percentage of the total amount of water diverted from the river compared with the numerous upstream diversions made by other basin water users which have resulted in over appropriation of the system. Combined diversion of river flows has contributed to the degradation of downstream riverine habitat. Myers (1997) reported that 4,000 af evaporates from Weber Reservoir each year, while BIA files (BIA 1999b) indicate during the 1989 to 1998 period, approximately 2,255 af evaporated each year from the reservoir. This evaporation contributes to less stream flow reaching Walker Lake. Approximately 16 miles of river now exist between the dam and the lake. This reach of the Walker River has lengthened over the decades as Walker Lake's shoreline has receded. Tribal diversions, along with others, have contributed to the decline in Walker Lake levels and the resulting increase in TDS concentrations which affects the health of LCT as well as the system as a whole. Numerous small dams have been constructed along the Walker River to divert flows through canals and ditches to reach agricultural lands. About 29 diversions are found upstream of Weber Reservoir based on topographic maps (Miller et al. 1999); based on 1997 aerial photography about 45 diversion points, some with fish barriers, occur along the mainstem and forks of the Walker River. The largest diversion structure is the Yerington Diversion Dam which is located several miles downstream of the town of Yerington, Nevada. This structure diverts water to agricultural areas in Mason Valley. This is the first major diversion structure upstream of Weber Dam, and it may create a barrier to upstream fish migration. An unknown number of stocked LCT are lost annually due to diversion into irrigation canals and onto irrigated lands in the basin.

The Walker River is a low gradient stream with a poor pool to riffle ratio and a substrate of fines and sand. Portions of the channel have been modified over the years. Stream flow varies depending on the time of year and location (Miller et al.1999). From Walker Lake, the mainstem Walker River extends approximately 60 miles upstream to the confluence with the East and West Forks. The West Fork of the Walker River originates in the Sierra Nevada in California and flows northeast towards Nevada. The main channel of the West Fork flows for a distance of about 5 miles between the inlet and outlet of Topaz Reservoir. From the outlet of Topaz Reservoir, the West Fork flows approximately 35 miles to where it meets the East Fork and the mainstem of the Walker River. The West Fork varies from a low gradient stream in the valleys to a steeper gradient, higher velocity stream through Wilson and Hoye Canyons (Miller et al. 1999). Based on recent NDOW data (Nevada Division of Wildlife 1998b), there is no trout spawning in the Hoye and Wilson Canyons where most of the stocking has occurred. Limited brown trout (*Salmo trutta*) spawning has occurred in the upper California reaches (Miller et al. 1999). The East Fork of the Walker River begins in the Sierra Nevada in California. From Bridgeport Reservoir, the river flows about 60 miles to meet with the West Fork and the mainstem Walker River. Stream characteristics vary considerably below Bridgeport Reservoir, with some reaches providing suitable trout habitat (Miller et al. 1999). Recent NDOW information (Nevada Division of Wildlife 1997, 1998c) indicates that in the areas of the Sceirine and Rosachi Ranches and the Elbow adequate spawning habitat exists. Natural reproduction has been documented as evidenced by rainbow and brown trout young-of-the-year.

Nevada water law is based on the principle of prior appropriation. Nevada does not currently have any instream flow requirements. The Walker River basin is federally adjudicated and is over appropriated; water rights exist for about 130 percent of the river's normal flow (Myers 1997). Based on gage information for the Walker River near the Wabuska, Nevada station (10301500) from 1902 to 1998, average water years have a mean flow rate of 167 cfs, low water years have a mean flow rate of 12.9 cfs, and high water years have a mean flow rate of 832 cfs (U.S. Geological Survey 2003). Most of Walker River water right owners belong to the Walker River Irrigation District. Bridgeport Reservoir and Topaz Reservoir, as discussed earlier, comprise the Walker River Irrigation District's major facilities. Currently, water diversions for 120,000 acres of non-Tribal agricultural production occur (40,000 acres in California; 80,000 acres in Nevada) (California Department of Water Resources 1992).

In the late 1950's supplemental groundwater wells began production when surface flows were insufficient to meet water rights. Pumping results in lowering of the groundwater table which decreases groundwater flow to the river. During high flow years, less water reaches the river because of aquifer recharge (Myers 1997).

In 1970, NDOW filed for water rights for Walker Lake to maintain water levels to support fish, game, and recreation. In 1983, the application was approved by the Nevada State Water Engineer and allows a water right appropriation of 795.2 cfs limited to a volume of 575,870 af per year. This water right has a priority date of September 17, 1970, and is subject to future appropriations for municipal and industrial purposes in the Walker River or on Walker Lake. Water rights filed prior to this Walker Lake right have priority. As a result, only during years with above average precipitation can this water right possibly be met.

Over appropriation of water, reservoir storage and evaporation, and groundwater pumping have all contributed to decreased flows reaching Walker Lake as well as reduced flows in the river. This has resulted in a decline in lake elevation and an increase in alkalinity and TDS concentrations. Walker Lake dropped about 140 feet between 1882 and 2003. In 1882 lake elevation was recorded at 4,080 feet msl and TDS was measured at about 2,560 mg/l (Horton 1996). By 1994 the lake elevation was at 3,942 feet msl after 8 years of drought (Myers 1999); TDS concentrations were about 14,000 mg/l (Myers 1997). During the drought period little or no water reached the lake. The Walker Lake ecosystem was on the verge of collapse. Wetter years in the mid 1990's raised the lake's level and resulted in improved conditions for LCT as well as tui chub and Tahoe sucker as TDS concentrations were reduced to 12,400 mg/l as of September 1998 (Thomas, U.S. Geological Survey, pers. comm., 1999). In April 1999, the lake had an elevation of 3,954.4 feet msl, a volume of 2,420,000 af, and a surface area of 35,100 acres (Thomas, U.S. Geological Survey, pers. comm., 1999). Subsequent drier conditions returned and by September 2003 the lake had declined to 3,939.2 feet msl with a volume of 1,911,000 af (U.S

Geological Survey 2003). In 2004, the TDS concentration increased to about 15,000 mg/l (U.S Geological Survey 2004). Dickerson and Vinyard (1999) determined that TDS concentrations of 10,300 mg/l significantly impaired the survival of small (2 to 3 in) LCT. Horne et al. (1994) determined that to allow maintenance of a healthy LCT resource, lake levels and TDS concentration would need to be at 3,974 feet msl (volume 3,150,000 af) and 10,000 mg/l, respectively. Sevon (1988) stated that at a TDS concentration between 16,000 and 19,000 mg/l, Walker Lake would no longer be able to support a trout fishery or a tui chub population.

Fish species, such as Sacramento perch and carp, which were introduced into Walker Lake over the years for recreational purposes, no longer exist due to decreased water levels and increased TDS concentrations (California Department of Water Resources 1992). Tui chub, native to Walker Lake and an abundant forage species for LCT, continue to exist in the lake while Tahoe suckers are relatively rare (Koch et al. 1979). Tui chub eggs are adversely affected at TDS levels above 10,000 mg/l, and adults perish at TDS levels near 20,000 mg/l (Lockheed Ocean Science Laboratories 1982; Rowe and Hoffman 1987). LCT is the only salmonid currently capable of surviving in the lake (Sevon 1988).

In addition to high salinity levels in Walker Lake, during summer and fall LCT may need to contend with a bottom layer of water with low oxygen levels containing toxic sulfides and ammonia and an upper layer of water with temperatures too warm for survival (Beutel and Horne 1997). This "oxygen-temperature squeeze" was observed in 1995 and 1996. Beginning in late summer, optimal habitat for LCT begins to shrink as the surface layer of warm water reaches the low oxygen bottom layer. As observed by Beutel and Horne (1997), most LCT were observed between 12 and 13.7 meters (39.4 to 44.9 feet) by September; this is a layer of water less than 2 meters (6.6 feet) thick.

The concern for the long-term health of the system remains due to the decline in lake level and associated water quality concerns (Koch et al. 1979; Sevon 1988). Species diversity in Walker Lake has declined due to the degradation of water quality. Increased salinity has adversely impacted some zooplankton species. To maintain the limnological structure and balance evaporative losses, Walker Lake needs a long-term average annual inflow of about 160,000 af. Based on the record from 1939 to 1993, total average annual water inputs to Walker Lake are estimated at 104,000 af. Walker River flows contribute an estimated 76,000 af of the total (Thomas 1995). Absent increase in annual inflow to Walker Lake, increasing TDS will continue to pose a threat to the persistence of fish and invertebrate species.

Concern about contaminants in the Walker River basin and possible impacts to humans and fish and wildlife have been raised recently (Thodal and Tuttle 1996; Seiler et al. 2004). Mercury is a serious contaminant of water, sediment, and biota, especially in Nevada due to its use during 19th century gold and silver mining activities. In 1998, mercury problems were reported in the Walker River Basin when blood samples from common loons (*Gavia immer*) using Walker Lake during their migration indicated elevated levels of mercury. During 1999 to 2001, the U.S. Geological Survey and the Service collected water, sediment, and biological samples to determine sources of mercury, its distribution, and potential effects on the Walker River Basin (Seiler et al. 2004). Elevated mercury levels were found in tui chub and common loons. This indicates there is a potential threat to fish and wildlife that use Walker Lake. There is also a concern for wildlife that use Weber Reservoir because it is the first reservoir downstream from mining areas in the Bodie and Aurora areas and mercury concentrations were elevated in sediments. Additional research of mercury concentrations in higher predators, such as fish-eating fish and birds, is needed to assess public health and other environmental concerns (Seiler et al. 2004).

A recovery program for LCT has been established. The final LCT recovery plan (U.S. Fish and Wildlife Service 1995) states that existing LCT populations and their habitats should be maintained and enhanced. An ecosystem approach to manage the major watersheds was recommended. Appendix E of the LCT recovery plan (U.S. Fish and Wildlife Service 1995) lists the areas of occupied habitat (natural, introduced, or reintroduced populations) and potential reintroduction sites for recovery as of its 1995 printing. Three major management units were listed. These units are the Western Lahontan Basin, the Northwestern Lahontan Basin, and the Humboldt River Basin. The Service's position is that populations in both the Walker and Truckee River Basins are needed to recover the species in the Western Lahontan Basin population. Recovery of LCT within these basins would provide two terminal, lacustrine populations. The Northwestern Lahontan Basin population and the Humboldt River Basin population are comprised primarily of fluvial LCT populations. Reestablishing the Walker Lake population as self-sustaining would provide the first LCT lacustrine population in a true terminal lake within the Western Lahontan Basin population and a second true terminal lake population within its range.

Since publication of the recovery plan in 1995, additional efforts have been undertaken to promote LCT recovery in the basin. In 1999, the WRIT was established to develop a strategy for restoring and recovering LCT in the Walker River Basin. The WRIT consists of representatives from California Department of Fish and Game, U.S. Forest Service, U.S. Geological Survey, University of Nevada, Reno, the Tribe, BIA, U.S. Reclamation, BLM, and the Service. A plan of short-term actions proposed for the Walker River Basin was finalized in 2003 (Walker River Basin Recovery Implementation Team 2003). The short-term actions were placed in five groups. These groups were entitled: 1) general integrating issues, 2) genetics and population dynamics, 3) physical habitat and environment, 4) biological and limnological (chemical), and 5) recreational fisheries. In group 3, the identifying and assessing of barriers to LCT migration within the Walker River Basin is discussed with recommendations for passage and barrier activities.

Efforts in the basin to understand and improve water quality and water quantity concerns, and habitat conditions include:

1. A Walker River Basin water settlement mediation process has been occurring for the past 2 years to, in part, address water quality conditions in Walker Lake. The process is ongoing under

a confidential agreement amongst the parties. As a result, specific details are not available at this time.

2. The EPA in 2002 approved Walker River water quality standard revisions as well as new Walker Lake water quality standards involving several constituents which have the objective to improve conditions for LCT as well as the system as a whole. The EPA recognized that the health of LCT was also affected by TDS, ammonia, arsenic, chloride, mercury, and other constituents which were not part of the standards submitted by the State of Nevada to EPA for approval. The EPA and the Service agreed to establish a process for working with the State of Nevada towards the establishment of site-specific standards for the constituents not addressed in the proposed revisions and new standards for Walker River and Walker Lake, respectively.

3. The Service, in cooperation with NDOW and the NDEP, completed a Mason Valley Environmental Monitoring Investigation in 2003 (Wiemeyer et al. 2003). This study assessed the capacity of the Mason Valley Wildlife Management Area (WMA) wetlands to improve the quality of alternative water sources to meet applicable water quality standards for discharge into the Walker River. The study also assessed the effects of alternative water sources on fish, wildlife, and their habitats at Mason Valley WMA. Conclusions reached were that water quality of the wetlands were related to their water sources and their position in the system. The terminal wetlands had the poorest quality of water, and some wetlands did not meet the water quality standards in the Walker River for several constituents. Without discharges or flushing with good quality waters these conditions will gradually worsen. Due to the existence of poor quality water in these terminal wetlands, discharge to the Walker River may not be possible. Additional monitoring is recommended.

As has been discussed throughout this section, there are numerous factors, in the action area as well as throughout the basin, which can influence LCT survival and recovery in the Walker River Basin. These concerns include the need to increase stream flows to Walker Lake to enhance water quality and quantity, improve water quality parameters such as stream temperatures, provide fish passage at dams and diversion structures, and reduce the likelihood of losing LCT adults and young into ditches and canals. Stream habitat conditions need to be enhanced or restored to provide adequate spawning and rearing habitat, and the competition between LCT and non-native and exotic fish species will need to be controlled. The Service recognizes these additional basin-wide issues and challenges to be resolved to fully reestablish LCT in the Walker River Basin and is committed to helping resolve them.

EFFECTS OF THE PROPOSED ACTION

The proposed modifications to Weber Dam and construction of a fish passage structure would have both positive and negative direct and indirect effects on LCT over the long- and short-term.

Weber Dam Modification

1. During current dry and normal hydrologic years, stream flows are unlikely to provide sufficient flows to allow LCT access from Walker Lake upstream to Weber Dam. During spring runoff of high water years, LCT have been able to reach Weber Dam and could be found in the project area. Construction activities will occur during a 12-month period which would include the migration/spawning period (April-July) for LCT. Flows related to unwatering and dewatering activities, which would be in addition to any stream flows being passed through the system for irrigation, could contribute to adequate flows for upstream migration to Weber Dam by LCT during the spring/summer construction period. These flows would be passed through the outlet works channel and service spillway. In an attempt to protect any construction during high flow periods and to reduce the possibility of creating attraction flows for LCT during their spawning season, flows would be released early in January. To prevent LCT from accessing the work areas located upstream of the service spillway pool, a coffer dam would be constructed. LCT would have access to the service spillway pool which provides some deep water habitat. LCT that enter the river could become stranded as river flows decrease later in the construction period if they have not already returned to Walker Lake. LCT found in the project area may need to be captured and moved back to the river downstream of construction activities or to Walker Lake. To return LCT to the river or lake will require handling by netting, electroshocking, or seining. LCT will also need to be held in buckets or net pens until they can be returned to the river or lake. LCT may be stressed and/or die from handling if the ambient air temperatures and water conditions are warm.

2. A reservoir drawdown is necessary for repair of the service spillway and irrigation intake and outlet works. The reservoir would be drawn down to elevation 4,179 feet msl for the outlet works repair beginning August 1 and continuing until September 15. A coffer dam would be constructed upstream of the irrigation intake tunnel; the coffer dam would impound water behind it and allow the work on the irrigation outlet works and tunnel to be completed while the area is dewatered. During this period, reduced river flows could occur downstream. Inflows to the reservoir are expected to continue following completion of the upstream coffer dam. This will result in a gradual increase in the reservoir elevation until elevation 4,196 feet msl is reached and water can again flow through the service spillway. LCT, by this time of the year, would have likely returned to Walker Lake, however, possible decreases in river flow downstream of the dam could impact LCT by stranding any individuals still occupying the river. In addition, it could temporarily reduce stream flows reaching Walker Lake during the warm fall months adversely impacting LCT in the lake. As discussed earlier, this would occur when LCT in the lake may be experiencing an "oxygen-temperature squeeze". Reduced flows to the lake due to the proposed action could exacerbate a stressful situation resulting in harm or harassment.

3. While sediment may cause harm or harassment to any LCT which are in the river in the vicinity of construction activities, Best Management Practices, as discussed in the proposed action description, will be employed to limit sediment impacts from construction activities on water turbidity and downstream habitats.

4. LCT could be harmed or harassed if a spill (e.g., gasoline, oil, diesel fuel) were to occur in or near the river or reservoir during construction. Based on the proposed action description, Best Management Practices will be employed including all equipment refueling would occur away from the river in designated protected (barrier) areas. Storage areas will be diked to contain any leaks or spills.

5. Fish species that must migrate through reservoirs to reach upstream or downstream habitats may experience increased travel time (Raymond 1968; 1969, Bentley and Raymond 1976, cited in Miller Ecological Consultants, Inc. 2004a; Keefer et al. 2002). Due to Weber Reservoir, any LCT which are able to get upstream of Weber Dam as a result of the construction of the fish passage structure, as discussed below, could be harmed due to being delayed during migration upstream to appropriate spawning habitat in the future. If spawning habitat was reached and spawning occurred, the adults, as well as larvae and fry, may be delayed during their downstream migration through Weber Reservoir to Walker Lake. At this time, we do not have an estimate on the length of any possible migration delay through Weber Reservoir, which at full capacity is approximately 3.5 miles long and 0.5 miles wide. Any delays could expose LCT to increased predation or less than ideal water quality conditions for a longer period of time as discussed further below. This could result in harm or harassment to LCT.

6. Loss of juvenile salmonids due to predation during migration through reservoirs has been reported (Rieman et al. 1988). If successful upstream spawning and recruitment occurs in the future, larvae and fry attempting to reach Walker Lake would likely become harmed by becoming prey for the non-native fish species inhabiting Weber Reservoir. The existence of non-native fish species in Weber Reservoir could cause harassment as they compete with LCT for food and space. As indicated earlier, numerous non-native fish species inhabit Weber Reservoir as well as the river upstream of the reservoir. The following species, which may be found in Weber Reservoir, could prey upon LCT larvae and/or fry: largemouth bass, white crappie, bluegill, and mosquitofish (*Gambusia affinis*).

After project completion, the Tribe has indicated that they would no longer actively manage Weber Reservoir for a non-native, warm water fishery; no warm water species stocking occurs now nor will it in the future. Weber Reservoir will be managed by the Tribe to promote LCT passage and minimize predation to the extent possible.

Future recovery efforts may reduce the concern regarding predation of LCT larvae and fry by non-native fish species as management efforts decrease the numbers of non-native salmonids and other non-native fish species released into the Walker River system upstream of Weber Dam and Reservoir. This concern as well as concerns related to competition should decrease as well as habitat improvements increase the quality and quantity of spawning and rearing sites, etc. for LCT in the Walker River Basin.

7. Currently, there is little data regarding the water quality of Weber Reservoir. There are concerns related to increased water temperatures in the reservoir as well as the Walker River and its effect on LCT. Due to the reservoir's shallow depth at capacity (29 feet), warm water temperatures, and potentially low dissolved oxygen, depending on reservoir levels and flow into the reservoir, conditions could harm or harass to some unknown degree LCT adults as they ascend and descend from any successful passage and future spawning effort and LCT larvae and fry as they descend from any successful future spawning.

The Tribe will continue to collect water quality data at Wabuska gage as part of the U.S. Geological Survey National Stream Quality Accounting Network. The Tribe will also continue to collect water quality data on the Reservation for its water quality plan. These efforts, as well as additional efforts discussed under the baseline conditions, will assist in better understanding the overall water quality situation in the Walker River Basin. With better understanding, efforts can be made to improve water quality conditions.

8. The presence of Weber Dam and Reservoir may provide future benefits to LCT by allowing storage of dedicated water from upstream users which could be released to Walker Lake. The water could be released in large amounts that would minimize delivery losses and during a time when the water would be of most benefit to the lake's ecosystem. For example, in 2004, NDOW and Reclamation coordinated with BIA and the Tribe to store NDOW water from Mason Valley WMA for later transfer to Walker Lake. The NDOW water was stored until a sufficient amount was in Weber Reservoir to efficiently transfer the water to Walker Lake. While this transfer occurred during the summer, future transfer releases could be timed to assist LCT migration. It is not known at this time when additional releases of this type may be coordinated and implemented among interested parties in the basin.

Weber Dam Fish Passage Structure

1. Construction of a dam across a river can block or delay upstream migration (among other impacts such as flow alteration, loss of habitat, water quality and temperature changes) contributing to the decline or extinction of a species that depends on movements within a stream during their life cycle (Bergkamp et al. 2000; Bernacsek 2000; Larinier 2000). The construction of Weber Dam has contributed to the decline and loss of the original stock of LCT in the Walker River Basin by preventing migration of LCT to upstream spawning and rearing habitat. The proposed construction of the fish passage structure at Weber Dam will assist in removing the significant adverse effect of Weber Dam on LCT which has existed since 1937.

The effectiveness of a fish passage structure relates to its capability of letting all species targeted through it within a range of conditions during the migration period (Larinier 2000). The efficiency of a fish passage structure relates to the proportion of the species present which enter and successfully go through the structure within a period of time (Larinier 2000). A successfully designed and operated fish passage structure will allow and promote LCT migration upstream of and downstream from Weber Dam. This will begin the process of reconnecting lacustrine LCT with the approximately 360 miles of stream and spawning habitat historically available in the Walker River Basin and to repopulate currently unoccupied upstream habitat over the long-term. In the short-term it will begin the process of improving the opportunity for survival and recovery of LCT in the defined reach of the Walker River.

The Tribe and BIA will coordinate with the Service on the final design criteria/plans for the fish passage structure to ensure they meet LCT passage needs.

2. In rare instances, the fish passage structure may be closed or inoperable in the future due to insufficient water supply or for maintenance or repair. In those instances, LCT would be harmed and harassed due to being prevented from migrating upstream and accessing spawning and rearing habitat. In later years, this may reduce the likelihood of survival for LCT and delay recovery by preventing a partial or entire run and the development of a year class. As LCT recovery progresses, the impact of losing a year class will decrease due to the increased number of LCT in the system as well as their longevity.

3. LCT could be harmed and harassed during operation of the fish passage structure and other facilities at Weber Dam. LCT may be injured or killed if they fall over/go through the outlet works/service spillway or are stranded during ramping operations during spawning migrations or when the facility must shut down.

4. With fish passage, hybridization, competition, and predation may occur between LCT and non-native salmonids (i.e., brown and rainbow trout). Stocked LCT in the Walker River already experience these impacts. These issues should become less of a concern as management efforts decrease the numbers of non-native salmonids released into the Walker River system. This concern should decrease, as well, as habitat improvements increase the quality and quantity of rearing sites, etc. for LCT in the Walker River.

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 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 Act.

Weber Dam is located on the Reservation with BIA responsible for operation and maintenance of the facility. Under the Walker River Decree (C-125), entered April 15, 1936, and amended on April 20, 1940, in *United States v. Walker River Irrigation District*, the United States was awarded, in trust for the Tribe, a flow right of 26.25 cfs. This right came with a priority date of 1859 and was for the irrigation of 2,100 acres of Reservation lands. The Department of Justice, on behalf of the Tribe, has filed suit related to Federal reserve water rights under the C-125 Decree associated with lands restored to the Tribe in 1938 and to recognize water storage rights for Weber Reservoir. In addition, recognition of the Tribe's right to regulate and use ground water under the Reservation is being sought. The outcome of this lawsuit is uncertain at this time. Additional Tribal actions would include continued fishing on the Reservation, continued participation in LCT recovery actions, and a proposed lower river restoration effort that would include channel work and tamarisk (*Tamarix ramosissima*) removal.

The NDEP is proposing TDS Total Maximum Daily Loads (TMDL) for Walker Lake be established by March 15, 2005. The TMDL is proposed as a long-term average annual TDS target of 12,000 mg/l. Load allocations have been assigned to four TDS loading sources which are the Walker River (500 mg/l), groundwater (29,000 tons/year), lake bed sediments (18,000 tons/year), and Walker Lake TDS mass (30.0 million tons) (Nevada Division of Environmental Protection 2004). If each of the four allocations are achieved, the TMDL would be achieved. It is recommended that monitoring continue for the Walker River and Walker Lake TDS levels and streamflows, and review of the TMDL should occur every 5 years or as necessary to account for TDS control changes or changes in streamflows to the lake. The TMDL report is not a regulatory document, and State Environmental Commission approval is not required. The nonpoint source program in Nevada is voluntary.

Interested parties are working to identify possible water management improvements to the basin to provide Walker Lake with higher quality and quantity of stream flows. These efforts are extremely important to the future well-being of the Walker River Basin ecosystem and recovery of the Walker Lake lacustrine LCT population. The proposed modifications to Weber Dam and the inclusion of a fish passage structure will assist tremendously in efforts to begin allowing lacustrine LCT to reconnect with upstream river and spawning habitat in the Walker River Basin.

CONCLUSION

After reviewing the current status of LCT, the environmental baseline, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the modifications to Weber Dam and construction of a fish passage structure at the dam, as proposed, are not likely to jeopardize the continued existence of LCT. No critical habitat has been designated for this species, therefore none will be affected.

The Service reached this conclusion for the following reasons: (1) the adverse effects of Weber Dam on LCT will be removed as part of the proposed action through construction of a fish passage structure with appropriate design and operation, which will improve the survival and recovery of LCT in the reach of the Walker River influenced by Weber Dam and Reservoir by allowing upstream and downstream migration; (2) lacustrine populations of LCT depend on both lacustrine and riverine habitats for various stages of their life history. Removal of significant adverse effects of Weber Dam through number 1 will provide the first step in the process for achieving survival and recovery of LCT in the Walker River Basin by allowing reconnection of LCT with its habitat; (3) while Weber Reservoir will remain, the Tribe has indicated that they would no longer actively manage Weber Reservoir for a non-native, warm water fishery. Weber Reservoir will be managed to promote LCT passage and minimize predation to the extent possible; (4) BIA and the Tribe will work to understand and improve water quality conditions in

Weber Reservoir and the Reservation; and (5) Weber Reservoir may offer benefits to the system by providing a storage facility for large quantities of water which could be released to Walker Lake at an appropriate time.

INCIDENTAL TAKE STATEMENT

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

The measures described below are non-discretionary and must be undertaken by BIA so that they become binding conditions of any grant or permit issued to the Tribe, as appropriate, in order for the exemption in section 7(o)(2) to apply. BIA has a continuing duty to regulate the activity covered by this Incidental Take Statement. If BIA (1) fails to assume and implement the terms and conditions or (2) fails to require the Tribe to adhere to the terms and conditions of the Incidental Take Statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, BIA must report the progress of the action and its impact on the species to the Service as specified in the Incidental Take Statement.

Amount or Extent of Take Anticipated

Incidental take of LCT is expected to be in the form of harm and harass (injury and death). All adult migrating LCT will be harmed by Weber Dam preventing access above the dam and reservoir for two additional spawning migration periods while the project is being completed. Harm and harassment may occur to any LCT that become stranded behind coffer dams during the construction period. Harm or harassment of all LCT present will occur when they are netted, held in buckets or net pens and then moved to the river downstream of construction activities or to Walker Lake. During construction, additional harassment may occur if suspended sediments below the dam increase above normal. LCT could be injured or killed as a result of a contaminant spill. During construction of Weber Dam modifications, river flows could be reduced for a period of time. As a result, LCT still in the river late in the season could be stranded and LCT inhabiting the lake could be harmed or harassed due to reduced inflows to the lake. All spawning adult LCT may be harmed or harassed if the fish passage structure does not function as intended or are prevented from utilizing the fish passage structure in rare later years due to possible closure; an undeterminable number of young may not be produced because of prevention of these spawning migrations. These instances of the fish passage structure not functioning properly or being closed will not occur for more than one spawning/migration period each so long as sufficient water is available. All adult LCT, fry, and larvae may be harassed by being delayed during migration through Weber Reservoir. All LCT could be harmed or harassed during migration through Weber Reservoir due to existing water quality conditions. The percentage of juvenile, fry, and larval LCT that may be harmed or harassed due to predation by non-native piscivorous fish species inhabiting Weber Reservoir will be determined at a later date. Population estimates for these non-native piscivorous fish species will be determined by 2010. The percentage of authorized take of juvenile and larval LCT will be related to these estimates.

Effects 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. This level of anticipated take is not likely to result in destruction or adverse modification of critical habitat since critical habitat has not been designated for this species.

Reasonable and Prudent Measures

The Service believes that the following reasonable and prudent measures are necessary and appropriate to minimize the impact of incidental take of LCT:

1. Measures shall be taken to minimize mortality, injury, harm, and harassment of LCT during the construction of the Weber Dam modification project.

2. Measures shall be taken to minimize mortality, injury, harm, and harassment of LCT upstream, within, and downstream of the fish passage structure at Weber Dam.

3. Measures shall be taken to minimize mortality, injury, harm, and harassment of LCT due to the operation of the fish passage structure at Weber Dam.

4. Measures shall be taken to minimize mortality, injury, harm, and harassment of LCT due to the existence of Weber Reservoir.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, BIA must comply with the following terms and conditions which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

1. To implement Reasonable and Prudent Measure 1, the following terms and conditions shall be implemented:

   (a) The BIA Contracting Officer shall require compliance with all Terms and Conditions of this Biological Opinion.

   (b) The Tribe shall, upon award of the contract, submit a copy of the Environmental Protection Plan (including Pollution Prevention Plan, Spill Prevention Control and Countermeasure Plan, and Water Removal and Control Plan) to the Service for our approval. Additionally, the contractor will adhere to all other requirements as specified by other Federal permits. The provisions for reclamation, revegetation, wetland mitigation, and site cleanup will be implemented as stated in the appropriate permits.

   (c) During construction of the Weber Dam Modification project, BIA shall submit all monthly water quality reports (turbidity) to the Service within 7 days of receipt from the contractor. Corrective measures shall be implemented as necessary.

   (d) Storage tanks for oil or other petroleum products shall be placed at least 100 feet from streams, flowing or dry watercourses, lakes, wetlands, reservoirs, or other water sources.

   (e) As agreed to during the consultation process, the area to be restored as mitigation for wetland losses to the "frog pond" shall be used as a water quality settling basin prior to the construction of the new wetland, if necessary, rather than the river channel in the area of the outlet channel and service spillway.

   (f) As agreed to during the consultation process, 2.5 af of spoil material shall **not** be spread across the reservoir surface. Any extra material shall be disposed of in approved upland locations.

   (g) During the construction of the Weber Dam Modification project, a qualified contracting officer representative shall be present on-site to direct and monitor activities.

   (h) The Walker River will be monitored by BIA and the Tribe to determine if LCT have appeared in the project area. BIA shall work with the Service in evaluating the need to salvage LCT from the project area during the construction period. If salvage is necessary, salvage operations shall occur in accordance with methods established by the Service.

2. To implement Reasonable and Prudent Measure 2, the following terms and conditions shall be implemented:

(a) The operation of the fish passage structure will be determined yearly in coordination with the interagency operations team and LCT recovery efforts as discussed above. See also 3 (a).

(b) The fish passage structure shall operate, when appropriate, at various river flows. It shall remain open as long as possible during operational periods based on flows from dedicated waters or excess streamflow and while adult LCT are migrating and juveniles are descending towards the lake. Should the fish passage need to be closed, BIA or the Tribe will contact the Service and allow the salvage of LCT from the passage structure before flow reduction or closing occurs.

(c) The fish passage structure will operate between reservoir elevations 4,200 and 4,208 feet msl. The fish passage structure design will have flow depths between 3 and 6.5 feet. Average velocities within the fish passage structure will be between 2 and 6 feet per second and not exceed 8 feet per second. The BIA and Tribe will coordinate with the Service on final design criteria/plans to ensure they meet LCT passage needs. The Service anticipates receiving the design criteria/plans for comment by May 2005.

(d) Velocities and flow patterns in the fish passage structure shall be assessed for various river flows to determine the range of operational conditions. This determination shall be done in coordination with the Service.

(e) The following measures would be used to minimize stranding of LCT in the fish passage structure at the end of its operation: control gate set at minimum operating discharge, a block net placed across the downstream entrance to the fish passage structure, the structure would be inspected and any LCT remaining would be captured and released in Walker River or Walker Lake depending on hydrologic conditions, the control gate would be closed, the structure dewatered, the block net removed, and BIA would report to the Service information related to captured and released LCT and dead, injured, or sick LCT.

(f) BIA shall be responsible for the inspection, maintenance, debris clearing, and repair of the fish passage structure. All these activities shall be completed by February of each year the passage structure is to be operated unless catastrophic natural events occur beyond BIA's control that delay this schedule.

(g) Should the fish passage structure not operate as designed, BIA shall initiate the necessary corrective actions immediately for any and all problems until the fish passage structure functions as intended.

(h) The effectiveness and efficiency of the fish passage structure shall be evaluated by the interagency operations team as described in 3 (a). A monitoring plan should be developed to determine these components. Effectiveness can be measured through visual inspection, trapping, or video checks. Efficiency can be measured by marking or telemetry, etc.

(i) A monitoring plan shall be developed and implemented to evaluate predation of LCT by birds at the entrance to the fish passage structure. Methods shall be developed to avoid impacts, as necessary.

3. To implement Reasonable and Prudent Measure 3, the following terms and conditions shall be implemented:

(a) An interagency operations team with BIA/Tribe as lead shall be formed and will include representatives from the Service. Other participants may include WRIT representatives, NDOW fishery biologists, and other biologists involved with LCT recovery in the Walker River Basin. The team shall develop and implement an annual operation plan for the fish passage structure and Weber Reservoir within established water rights and in consideration of the water management plan for dedicated waters or excess streamflows to meet the instream flow criteria for LCT.

(b) Prior to January 1 of each year, an evaluation of the operation of the fish passage structure shall be conducted by the interagency operations team to determine the effectiveness of the fish passage structure in assisting or furthering LCT recovery efforts. If the structure or its operation is deemed deficient in this area, BIA shall reinitiate consultation.

(c) All foreseeable situations which may contribute to the inoperability of the fish passage structure shall be, to the maximum extent practicable, covered under the interagency operations team's annual operation plan.

(d) Water dedicated to Walker Lake that flows to Weber Reservoir will be managed (i.e., passed through or stored in and released from Weber Reservoir) in an efficient manner to provide the maximum benefit to the Walker Lake ecosystem and LCT recovery.

4. To implement Reasonable and Prudent Measure 4, the following terms and conditions shall be implemented:

(a) The interagency operations team shall develop and implement an adaptive management plan which shall include monitoring the effects of Weber Dam and Reservoir operations on LCT (predation, competition, water quality, passage time, etc.), managing the resident fisheries in the reservoir, and coordinating operations to the extent possible to promote LCT recovery.

The Service believes that no more than the take previously stated will occur as a result of the proposed actions. The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measure provided. BIA must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measure.

REPORTING REQUIREMENTS

Upon locating dead, injured, or sick LCT, initial notification must be made to the Service's Division of Law Enforcement in Las Vegas, Nevada, at (702) 388-6380, and the Nevada Fish and Wildlife Office within 3 working days. Instructions for proper handling and disposition of such specimens may be obtained from the Service at (775) 861-6300. Care must be taken in handling sick or injured individuals to ensure effective treatment and best possible state. In conjunction with the care of sick or injured individuals, or the preservation of biological materials from a dead individual, BIA has the responsibility to ensure that information relative to the date, time, and location of the listed species when found, and possible cause of injury or death of each individual, be recorded and provided to the Service.

CONSERVATION RECOMMENDATIONS

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

1. BIA and the Tribe should pursue funding opportunities to install fish screens on irrigation canals to prevent loss of LCT to agricultural fields on the Reservation.

2. BIA and the Tribe should fully participate in any interagency cooperative efforts in the Walker River Basin for the survival and recovery of LCT. This may include attending

meetings, providing technical assistance, preparing or reviewing management plans, participating on the WRIT, participating in research, and other activities.

3. BIA should continue to assist in cooperative efforts to gather information for LCT recovery, particularly on the Reservation, relative to water quality in Weber Reservoir and Walker River, potential LCT spawning sites, obstacles to LCT river passage, and stream flow requirements.

4. BIA and the Tribe should participate in any future efforts to manage Walker River flows in a coordinated manner to mimic the natural hydrograph.

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

REINITIATION NOTICE

This concludes formal consultation on the proposed Weber Dam modification project as outlined in BIA's 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 retained (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 not considered in this opinion; (4) a new species is listed or critical habitat designated that may be affected by the action; or (5) if evaluation of operations and the fish passage structure by BIA and the Tribe reveal that conditions necessary for recovery of the listed species are not being achieved due to these operations. In instances where the amount or extent of incidental take is exceeded, any operation resulting in such take must cease pending reinitiation.

Please reference File No. 1-5-05-F-023 in any future correspondence regarding this project. If you have any questions or comments, please contact me or Marcy Haworth at (775) 861-6300.

Jody E. Brown

for Robert D. Williams

cc:
Chairwoman, Walker River Paiute Tribe, Schurz, Nevada

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Appendix D – Weber Dam Alternatives Screening Memorandum

Draft
Technical Memorandum
Weber Dam Repair and Modification Project
Alternative Screening Analysis

Prepared for:

Bureau of Indian Affairs
Western Regional Office
Phoenix, Arizona

On behalf of
Walker River Paiute Tribe
Schurz, Nevada

Prepared by:

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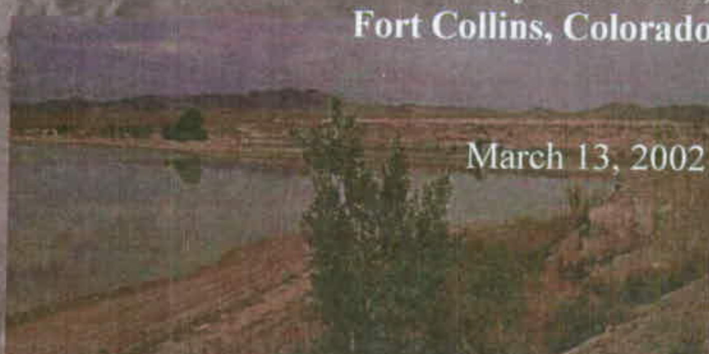

March 13, 2002

MILLER ECOLOGICAL CONSULTANTS INC.

Introduction

Two alternatives were evaluated for the Alternative Screening Analysis. These alternatives were proposed during the scoping process for the Weber Dam Modification EIS. Alternative 1 is construction of an off-channel reservoir. This reservoir would be of sufficient size to provide water in the same quantity and quality as the current Weber Dam at full capacity for the irrigation on the Walker River Paiute Tribe reservation. Alternative 2 is development of ground water wells to supply water in the same quantity and quality as current Weber Reservoir at full capacity. Common to both alternatives is the removal of Weber Dam to remove the impact to passage of Lahontan cutthroat trout (LCT).

The current operation of the irrigation system relies on Weber Dam to provide sufficient water to the diversion dam at canal #1 and canal #2 to provide irrigation for the Walker River Paiute Tribe. The canal typically operates with a two week on and two week off sequence throughout the irrigation season. It takes approximately two weeks to get water to all the irrigators on the reservation. The water volume for each canal is approximately 40 cubic feet per second (cfs) for efficient distribution to the irrigators (Chuck O'Rourke, personal communication).

Alternative 1- Off-channel Reservoir

The off-channel reservoir was evaluated to provide a capacity up to 10,700 acre feet (A-F), which is the current capacity of Weber Reservoir. Alternative reservoir sites off-channel were evaluated. There are no cross drainages or deep ravines of sufficient size close to the river upstream of Little Dam to provide a natural reservoir location on the reservation. There is one potential site approximately seven miles from the river and 450 feet higher than the present Weber Dam elevation. It would be uneconomical to construct a reservoir at this site due to the distance from the river and the pumping lift required to get water into a reservoir constructed at this location.

A constructed reservoir in the Sunshine Flats area was evaluated as an alternative to a natural reservoir site. The reservoir size evaluated was a volume of 5,000 to 6,000 acre feet of storage in a lined reservoir. Assumptions for this alternative include: 1) the quantity of water was the minimum that could be stored in the reservoir that would supply full irrigation during the growing season; and 2) the water diverted into storage would only be diverted during high flows and the spring runoff season.

The reservoir would be constructed by excavating to a depth of 20 feet. Excavated material would be used as fill for the embankment to build up the reservoir size. It is estimated that the actual cost of construction, not including engineering, permitting and contingencies, would exceed $20 million for a reservoir of this size. The addition of engineering, permitting and contingencies would result in a cost of approximately $32 million. These cost estimates used the valuation provided in the Bureau of Reclamation (Reclamation) documentation for reservoir construction and the rehabilitation of Weber

Dam. Engineering, permitting and contingency costs were based on Reclamation values for those tasks.

In addition to the reservoir construction costs, there would be a cost for construction of the diversion in Walker River, which would divert into the off-channel reservoir. This diversion would require electricity for pumping facilities to transport water to the reservoir. It would also need to include fish passage at the diversion dam. The pipeline cost is estimated at approximately $1.6 million per mile using a pipe of 33 to 36" diameter.

Estimated engineering costs for removal of Weber Dam, reconstruction of stream channel and wetlands mitigation is estimated to exceed $15 million. All of these costs would be added to the reservoir construction costs. The total estimated cost for the off-channel reservoir is approximately in the $50-60 million range for total construction.

It appears that, due to high cost, this alternative is not a feasible for replacement of Weber Dam. The cost per acre of irrigated land would be excessive (approximately $24,000.00 per acre) and would require new authorization for construction.

Alternative 2 – Ground water well field

Alternative 2 is the proposed development of ground water wells on the Walker River Paiute Reservation that would supply water in the same quality and quantity as Weber Dam and reservoir. The ground water technical memorandum (Appendix B) shows that sufficient ground water resources exist on the reservation to develop well fields for irrigation of the 2,100 acres. These water supply wells could be used to supplement or possibly replace the water supply for irrigation from Weber Reservoir, however, the long term sustainable yield of the ground water system and potential impacts to flows in the Walker River have not been estimated at this time based on the lack of data.

Assumptions for development of the ground water were that the surface water rate of 26.25 cfs will be delivered to the reservation through the growing season and that an additional 53.75 cfs would be required from the supply wells to meet the current peak demand during the irrigation season. Weber Dam currently releases approximately 80 cfs during irrigation which is divided at approximately 40 cfs per canal to provide enough head to irrigate each of the farmers along the canal in sequence.

Supplying the 53.75 cfs would correspond to a total pumping rate of approximately 24,000 gallons per minute. This demand could be met with ten production wells with an average yield of 2,400 gallons per minute (gpm). Typical costs for each well are approximately $88,000. Total estimated costs just to install the well field to meet irrigation demands are $890,000. This cost estimate does not include operation and maintenance, which is estimated at approximately $240,000 per year for the entire well field. In addition, there would be cost to construct supply lines from the wells up to near the Little Dam area into each canal. Estimated cost to transport the volume of water needed is approximately $1.6 million per mile for pipeline. The pipeline would need to extend at least five miles for about an $8 million cost for construction of the conveyance system.

In addition to water conveyance facilities to get from the ground water wells up to the canal inlets, rights of way would need to be secured for both well construction and also for pipeline rights-of-way. The current well field locations seem to be best located in the upper flood plain area downstream of Little Dam. This area also includes the irrigated acreage and would need multiple rights-of-way from the allottees on these parcels. This institutional constraint has not been evaluated as to the time required to secure rights-of-way from the individual allottees.

In addition to the construction cost of approximately $9 million, the additional cost for wetland mitigation would be needed. Wetland mitigation for both the off-channel reservoir and the ground water facility is estimated at approximately $4.7 million for construction of wetlands that would be lost from the upper end of Weber Reservoir when the dam is removed. This cost does not include the long-term operation, maintenance, and additional water needed for irrigating the wetlands to provide the wetland function. Approximately 450 acres of wetlands would need to be mitigated with the removal of Weber Dam (See Appendix E). Some of these wetlands can be mitigated along the stream channel but the majority of the wetland would need to be located off the stream channel either adjacent in the area that they currently exist and maintain through flood irrigation or a suitable location off-channel would be required and irrigation water supplied to maintain the wetland function. Irrigation surface water would be needed at approximately 10-15 acre feet per acre per year with a total supply of up to 7,000 acre feet needed for wetland irrigation needed to maintain the wetland function for mitigation.

Biological Resources, Other Values

Both alternatives will have impacts on terrestrial and aquatic resources with the removal of Weber Dam. Dam removal will result in the total loss of the reservoir fishery. The current water temperature regime downstream of Weber Dam will be elevated due to lack of cool water release from Weber Dam. This will make the water temperatures in Walker River unsuitable for LCT at an earlier date than currently exists. Elevation of water temperatures may make the river unsuitable for some of the warm water species that currently exist in the reservoir and river.

A fish passage facility would be required with the off channel reservoir. This facility is likely to be nearly as large as a fish passage facility for Weber Dam. No fish passage facility would be required for the ground water well alternative.

The loss of wetlands and conversion of riparian to upland habitat in the upper end of the reservoir would result in loss of terrestrial habitat and species associated with those habitat types. The removal of the reservoir would result in a loss of habitat for waterfowl and shorebirds. It is anticipated that the riparian area upstream of the reservoir would become much smaller in size and be similar to the current narrow riparian corridor downstream of the reservoir.

The removal of the dam and reservoir would result in the loss of fishing and camping opportunities as they currently exist. The flood attenuation that can be achieved with Weber Dam would be lost. The potential for flooding in downstream areas, including Schurz would be increased. Weber Dam was operated during the 1997 winter flood to prevent flooding in Schurz. This capability would be lost with dam removal.

Summary

In summary, the two alternatives evaluated were an off-channel reservoir and a ground water well field. The costs and associated impacts for each alternative are summarized in Table 1. The off-channel reservoir has a cost of approximately $56 million for construction costs and is not a feasible alternative. The cost for development of a ground water field is approximately $9 million in capital costs and $240,000 of continued operation and maintenance per year of operation. In addition, there would be wetland mitigation costs of over $3 million, plus channel reconstruction costs of approximately $7 million. Total costs for the ground water system for initial capital costs are approximately $19 million. The impacts to environmental resources with removal of Weber Dam include the potential loss of 450 acres of mature wetlands and riparian areas that would be converted to a dry desert shrub environment that exists within the basin. The wetlands and riparian areas are currently a function of the backwater effect from Weber Dam that has been there since the 1930s. Mitigation of this area would require construction of up to 450 acres of wetlands and the additional surface water requirement of up to 7,000 acre feet annually to maintain the wetlands function. The cost of obtaining an additional 7,000 acre foot for wetlands mitigation has not been estimated. It appears from the analysis presented that the ground water alternative is feasible from the standpoint of water availability but other issues of construction costs, rights-of-way and wetlands mitigation make that alternative unfeasible for potential replacement of Weber Dam and Reservoir. The most feasible alternative is repair and modification of Weber Dam with the addition of fish passage to mitigate the block to migrating LCT to upstream areas.

Table 1. Summary of costs and impacts by resource category.

Resource area	Proposed Action	Off-Channel Reservoir	Ground Water Wells
Geomorphology	No change from current conditions	Channel change expected from Little Dam to upstream of current Weber Reservoir Channel stabilization required. In-channel structures required to stabilize channel in Weber Reservoir basin. Channel lowering expected of approximately 1 foot.	
Ground water	No change expected	No change expected	Sufficient ground water resource to replace Weber Reservoir Long term impact to ground water yield unknown Ten wells required to replace Weber Reservoir
Wetlands	Loss of small wetland downstream of current dam	Loss of up to 450 acres of wetlands Requires construction of new wetlands Requires additional surface water diversion to irrigate constructed wetland	Loss of up to 450 acres of wetlands Requires construction of new wetlands Requires additional surface water diversion to irrigate constructed wetland
Surface water	No change	Additional water needed for wetland irrigation No flood attenuation	Additional water needed for wetland irrigation No flood attenuation
Costs	Capital Cost: $8,000,000 Operation and Maintenance:	Capital Cost:$50,000,000 + Mitigation costs: -Fish passage	Capital Cost:$9,000,000 Operation and Maintenance

	$65,000 per year Mitigation costs: Fish passage $2,000,000 Wetland mitigation $100,000	facility $2,000,000 -Wetlands- $3,590,000 **Additional costs not quantified:** -Construction of diversion dam and pumping facility -Additional surface water (7,000 AF) for wetland irrigation -Loss of reservoir fishery -Operation and maintenance of pumping facility -Securing rights-of way for reservoir site and pipelines.	$240,000 per year Dam removal: $7,000,000 Mitigation costs: Wetlands- $3,260,000 **Additional costs not quantified:** Additional surface water (7,000 AF) for wetland irrigation Loss of reservoir fishery Loss of terrestrial habitat Securing rights-of way for wells and pipelines.
Total estimated cost	Capital $10,000,000 + O&M $65,000 per year	Capital $56,000,000 + O&M: not quantified	Capital $19,000,000 + O&M $240,000
Other considerations	Repair authorized under Indian Dam Safety Act Annual economic loss to irrigators and Tribe until dam at full capacity	New construction would require new source of funding for construction Annual economic loss to irrigators and Tribe until construction complete	New construction would require new source of funding for construction Annual economic loss to irrigators and Tribe until construction complete Obtaining rights-of ways may be a lengthy process.

Appendix A – Off-Channel Reservoir Alternatives

Draft

ALTERNATE OFF-STREAM STORAGE SITES INVESTIGATIONS AND REMOVAL OF WEBER DAM & RESERVOIR

In view of the fact that Weber Dam and Reservoir is located on the main channel of the Walker River it was decided to investigate the possibility of storing water in an off-stream site. Walker Reservoir presently has a capacity of 10,900 Ac.ft. The initial review of the topography concentrated on trying to find an off-stream storage site of the comparable size. Service to any such site by either a gravity diversion or pumping station would be considered acceptable so the site could be considered for a recon level study.

No such natural site was found to be available.

As the river enters the Reservation near the Wabusha stream gaging site it enters into a shallow valley. There are no cross-drainages or deep ravines close to the river where a dam could be built that could develop a reservoir anywhere close to a capacity of 10,000 Ac.ft. There is one area located on the northeast portion of the Reservation that presents some potential for a storage site, but unfortunately it is located approximately 7+ miles from the River and is approximately 450+ feet higher. This distance and pumping lift would require both high capital costs and operating costs making it uneconomical to develop.

Since there were no natural sites available it was decided to look at the possibility of constructing a lined reservoir that would hold 5,000-6,000 Ac.ft. of storage as a replacement system. Such a reservoir could be constructed somewhere in the Sunshine Flats area. This area is located on the east side of the Walker River and is upstream of the area that is being irrigated. This would allow the present irrigation systems to be utilized with very little modification. The quantity of water to be stored was estimated based on a best guess judgement of the minimum that could be stored so that the farmers could receive a full irrigation supply during the growing season. This minimal storage amount would also require that much of the time the irrigation demand would be furnished out of direct flow.

Some additional assumptions were that water would be diverted into storage only during the spring runoff season or if exceptionally high flows occurred later due to natural precipitation events. This would mean the diversion facilities would have to be sized larger than if diversions could be made constantly throughout the irrigation season.

It was also assumed that to cut down on reservoir size and reduce evaporation loss a minimum depth of 20.0 would be used. This would require a reservoir surface area slightly larger than 250 Acres. Material excavated would be used to build the banks to cut down on the depth of excavation. An actual cost of construction not including engineering, permitting, contingencies, etc. would exceed $20,000,000. When one adds in the costs of engineering, permitting and allows for contingencies the cost would be nearer to $32,000,000.

To this would have to be added the cost for a pumping plant with a fisheries station, a diversion dam, supply and return pipeline to transport water to the reservoir and bring it back to the irrigation system, electrical facilities (transmission line and substation), and a facility to allow fish passage around the diversion dam. Since the pipeline would cost approximately $1,600,000 per mile (used on a pipe diameter of 33" to 36"), the facility should be located as near as possible to the river. Adding on these costs to the $32,000,000 required for just the reservoir makes this project unfeasible for providing irrigation water for 2,100 acres of farm land.

Since the off-stream reservoir is a replacement for the existing structure costs for removal of Weber Dam and the required restoration of the stream channel and reclamation of the dam and reservoir site was estimated.

The costs calculated include excavation and disposal of the earthen embankment, demolition and destruction of the concrete spillway and outlet works, rebuilding the stream channel and reclamation of the dam site, reservoir area, emergency spillway, existing roads and any work areas (approximately 1,000 acres). No consideration was given any potential environmental problems that might be encountered in the sediments that have accumulated in the bottom of the reservoir. Since there has been some mining activity upstream of this area there is a possibility that some toxic materials might have accumulated in these deposits. Based on a reconnaissance level effort the cost to remove and rehabilitate the existing dam and reservoir is approximately $15,000,000.

This cost must be added to the costs of any off-stream storage facility.

An irrigation system that is as small as the system presently serviced by Weber Dam could not in any manner pay back such high construction costs.

Appendix B – Groundwater Alternatives

MEMORANDUM

Date: 2/8/01

To: Bill Miller
Miller Ecological Consultants, Inc.

From: Patrick Plumley

Project: Weber Dam Modification EIS

Subject: Groundwater Alternative
Screening Level Assessment

Cc: Richard Spotts, Water and Earth Technologies, Inc.

Introduction

We understand that two alternatives, both of which would involve the complete removal of the Weber Dam and Reservoir, were suggested during the EIS scoping process. Under these alternatives, irrigation water previously provided by Weber Reservoir would be replaced by either:

- Alternative 1 - Construction of an off-channel reservoir, or
- Alternative 2 - Development of groundwater resources.

The purpose of this memorandum is to provide a screening level assessment of the adequacy of the groundwater aquifers to meet the irrigation demands of the reservation. The information provided in this memorandum is intended for use in determining if Alternative 2 should be carried forward as an alternative to the Proposed Action in the EIS.

Scope-of-Work

Our scope-of-work was outlined in our memorandum dated December 17, 2001. In summary, the scope-of-work included researching, compiling and reviewing available published and unpublished groundwater resource information pertinent to the feasibility evaluation on file with the tribe, BIA, and state and federal agencies. These data were used to provide a preliminary characterization of the existing groundwater resources that could potentially be affected by removal of the dam, or development of a well field. The results of this evaluation are summarized in this memorandum.

Initially, we proposed to perform a field reconnaissance to observe site conditions in the vicinity of the proposed water supply well field, off-channel reservoir site(s), and the water distribution system. However, at the initiation of this study, it was determined that a field visit was not necessary to provide an alternative screening assessment since we visited the Weber Dam and

Schurz area of the reservation in association with the EIS kick-off meeting held in May, 2000. Instead, the funds slated for the field visit were used to research and provide a preliminary cost estimate for construction, operation and maintenance of the well field included below.

Key References

Several investigations have been performed to evaluate the groundwater and surface water resources in the Walker River Indian Reservation and surrounding area. The first report addressing the hydrology (including groundwater resources) on the reservation is a reconnaissance-level evaluation by Everett and Rush (1967) of the Walker Lake area prepared by the U.S.Geological Service (U.S.G.S.) for the Nevada State Engineer. Boyle Engineering Corporation (Boyle, 1976) investigated various options for development of surface and groundwater resources in Mineral County to mitigate the deterioration of the Walker Lake and supply the town of Hawthorne's potable water requirements. Schaefer (1980) performed a comprehensive evaluation of the potential groundwater and surface water resources available on the reservation, and feasibility of constructing additional wells for stock water and irrigation. Schaefer's report includes an estimate of the water balance in the Schurz subarea. Kleinfelder Inc. (Kleinfelder, 1995) performed aquifer pump testing and analyses on a high capacity well south of Schurz to evaluate the potential to pump groundwater on the reservation to supplement flows to Walker Lake to decrease the rate of lake level decline.

Hydrographic Setting

This screening assessment focuses on the groundwater resources in the Walker River Valley (excluding Rawhide Flat) located within the Walker Indian Reservation. This portion of the Walker River Valley is referred to in reports by the U.S. Geological Survey as the Schurz subarea. The Walker River Valley in the Reservation is a northwest trending valley bordered by mountain ranges. The principal drainage in the valley is the Walker River that flows southeast towards Walker Lake. The floodplain of the Walker River in this area has a gentle gradient that averages approximately 4 feet per mile.

Hydrogeologic Setting

The following discussion of the hydrogeology of the reservation is based on discussions provided in Everett and Rush (1967) and Schaefer (1980) unless otherwise noted. The complex geology on the reservation can be simplified into three hydrogeologic units with distinct water bearing properties: consolidated bedrock, basin fill deposits, and playa deposits.

The consolidated rock consists primarily of Precambrian to Tertiary age rocks consisting of intrusive igneous rocks (quartz monzonite, and granodiorite), and volcanics (basalt, rhyolite and andesite) that forms the resistant mountains and underlies the unconsolidated sediments in the basins and valleys. These rocks are relatively impermeable and water within the rocks is stored and transmitted through fractures. Because of their low storage and yield potential, the consolidated rocks are not considered an important source of groundwater.

Basin fill deposits (late Tertiary and Quaternary age) consists of unconsolidated to poorly consolidated, interbedded and lenticular sand, silt and clay, and gravel deposits deposited in an alluvial or lacustrine environment. These deposits include both alluvial fan deposits derived from erosion of the adjacent mountain ranges, and predominantly fine-grained lake sediments deposited in the Pleistocene Lake Lahontan. (At the end of the Pleistocene, most of the valley floor areas within the reservation were occupied by Lake Lahontan. Walker Lake is a remnant of Lake Lahontan.) Seismic refraction/reflection investigations on the Reservation indicate that basin fill sediments average about 1,000 feet in thickness. Where saturated, these deposits yield water freely to wells. In the upper several hundred feet of basin fill sediments, groundwater occurs in primarily in unconfined aquifers.

Playa deposits (Quaternary age) underlie several dry lakes on the reservation. These deposits consist of clay and evaporate beds and minor amounts of sand and silt. Groundwater generally occurs in confined beds within the playa deposits. Due to low yields and poor water quality, playa areas are considered undesirable areas for groundwater development.

Ground Water Elevation and Flow

Drillers logs for wells located within a mile of the river, and between Weber Reservoir and Schurz, indicate that the depth to groundwater ranges from 5 feet to 55 feet, with most wells being less than 25 feet. Similarly, Everett and Rush (1967) indicated that the depth to water in most wells located near the river averaged less than 40 feet. In the Schurz subarea groundwater flows in a southeasterly direction, parallel to the general flow direction of the Walker River.

Water Balance Estimates

An understanding of the water balance is critical to evaluating how substituting water stored in Weber Reservoir with water pumped from the groundwater system would affect the hydrologic system. An estimate average annual water balance for surface water and groundwater resources is summarized in Table 1. This budget estimate is based on the information provided in Schaefer, 1980. For details on how these estimates were determined refer to the U.S.G.S report (Schaefer, 1980). Note, that these water balance estimates should be updated and verified to reflect the current understanding of the surface water and groundwater resources. However, updating and verification of these water balance estimates was beyond the scope of this screening assessment.

Because the surface water and groundwater systems are interconnected, the surface and groundwater budgets have been combined. The surface water inflow components include (1) average annual streamflow at the Wabuska gage, (2) precipitation on the Walker River and Weber Reservoir, and (3) estimated return flow from irrigation. Surface water outflow components include (1) Walker River flow to Walker Lake, (2) evaporation from Weber Reservoir, (3) diversions for irrigation, and (4) losses from Walker River from infiltration.

Groundwater inflow components include (1) infiltration from runoff of small streams (mountain front recharge), (2) infiltration along the Walker River, and (3) recharge from the infiltration of irrigation flows, and (4) subflow from adjacent basins. Groundwater outflow components include (1) evapotranspiration from playa areas, (2) evapotranspiration at riparian wetland areas, (3) discharge to Walker Lake, and (4) groundwater pumping. (Note that the groundwater pumping estimate does not include the current pumping from two high capacity wells discussed below.)

Groundwater Storage Estimates

Using an estimated average specific yield of 14 percent for the basin fill sediments, there is an estimated 9.1 million acre-feet of groundwater stored in the Schurz area (an area extending from Weber Dam to approximately 10 miles south of Schurz). In the upper 200 feet of saturated thickness (the zone that can readily be exploited with water supply wells), this area has an estimated usable storage of 1.8 million acre-feet (Schaefer, 1980). These storage estimates do not take into account zones of localized poor quality water that exist in areas within the aquifer system.

Existing Irrigation Wells

Five 16-inch diameter irrigation wells have been completed on the reservation . All of the these wells are located in the Walker River Valley, approximate 4 to 5 miles south and southeast of Schurz (see Plate 1), and were completed in basin fill sediments. A summary of the well completions, static water level, and specific capacity determined during pump tests is provided in Table 1. The well completion depths range from 360-520 feet; and hole diameters range from 24-29 inches. All of the wells were constructed with gravel packs and perforated casing. Mr. Randy Emm indicated that he currently operates Wells #4 and #5 for seasonal irrigation using pivot sprinklers (personal correspondence, February 6, 2002). He also indicated that Well # 4 is pumped at a rate of approximately 1,200-1,500 gpm, and Well #5 is pumped at approximately 1,800 gpm. Mr. Emm also indicated that Wells #1 and #2 do not have pumps, or pumps that are operational, and that Well #3 has caved and is no longer functional. Because of inadequate filter pack and screen designs, all of these wells have been subject to sand infiltration.

Table 1. Estimated Average Annual Water Budget for the Walker Indian Reservation Area (all values in acre-feet)

Inflow Components	Surface Water	Groundwater
Surface Water Inflow		
Walker River	113,800	
Precipitation on rivers and reservoirs	410	
Return Flow from Irrigation	5,200	
Groundwater Recharge:		
Runoff Infiltration		650
Walker River Infiltration		14,000
Irrigation Recharge		14,000
Groundwater Subflow		
Underflow from Mason Valley		1,400
Total Inflow (rounded)	119,000	30,000
Outflow Components		
Surface Water Outflow		
Walker River flow to Walker Lake	69,600	
Evaporation from Weber Reservoir	3,800	
Diversions for Irrigation	32,000	
Walker River Infiltration to Groundwater	14,000	
Groundwater Evapotranspiration		
Playa Areas		9,400
Riparian Phreatophytes		9,700
Ground Water Outflow		
Underflow to Walker Lake		11,000
Ground Water Pumping:		
Irrigation		-----
Domestic and Stock		250
Total Outflow(rounded)	119,000	30,000

Source: Schaefer, (1980)

Existing Aquifer Test Results

Short term aquifer pump tests performed by the drilling contractor during well completion demonstrated yields up to 2,500 gpm in all of the wells. However, the duration of the constant rate pump test only ranged from 3.5 - 16 hours. In 1994, Kleinfelder conducted a longer term pump test on Well #1 that included installing and monitoring drawdown in three adjacent monitoring wells. The three monitoring wells were located at 50 ft, 100ft, and 300ft from the pumping well. During the pump test, Well #1 was pumped at an approximate rate of 2,500 gpm (2,500 – 2,350 gpm) for a period of 50.7 hours with a total drawdown of 173.3 feet. Drawdown vs. time plots for the test indicate that the rate of drawdown increased at approximately 200 minutes (3.3 hours) into the test. Although no explanation is provided in the Kleinfelder report, we interpret the inflection in the drawdown curve as an indication that a negative boundary was encountered at 200 minutes.

Based on the results of the aquifer test, Kleinfelder, concluded that the potential sustained yield of a properly designed well at the Well #1 location is approximately 3,450gpm with a calculated drawdown of 157 feet. They also concluded that "new wells can be designed and constructed to pump 3,000 gpm without adversely impacting the Walker River aquifer or hydrology. The wells should be located at least one mile apart."

Water Quality

Kleinfelder (1995) reported the results of laboratory analysis for a water sample collected during aquifer pump testing of Well #1. This water sample had a total dissolved solid concentration of 556 mg/L, and sulfate concentration of 89 mg/L. The sample had a boron concentration of 1.2 mg/L which exceeded the 0.75 mg/L Nevada water quality standard for agricultural irrigation. All other constituents reported were below the Nevada standards for irrigation. Everett and Rush (1967) noted that the groundwater between Schurz and the northern end of Walker Lake was too mineralized in places for agricultural use. But that groundwater northwest of Schurz was probably suitable for agricultural use. Schaefer concluded that excluding wells drilled in playa areas, the groundwater quality on the reservation was generally similar to the Walker River.

Well Field Assumptions

Based on the available information, it appears that there is a potential to develop additional high capacity wells on the reservation. Water supply wells could be used to supplement, or possibly replace the water supplied for irrigation provided by Weber Reservoir. However, the long-term sustainable yield of the groundwater system and potential impacts to flows in the Walker River have not been estimated.

For the purposes of evaluating the use of groundwater as a replacement for water from Weber Reservoir, we assume that the existing canal distribution system and irrigation practices would continue to be use without improvement. John McMasters, *title*?, Walker River Indian Reservation, indicated that we should assume a peak demand of 80 cfs to meet the current irrigation demands. The peak flow corresponds to both canals flowing at full capacity. Mr. McMasters also indicated that this peak flow was required for approximately 15 days per year, and lower flows are required during the rest of the irrigation season.

Under Decree C-125, the tribe is entitled to 26.25 cfs (with an 1859 priority date) for 2,100 acres, with an irrigation season of 180 days. Assuming that the surface water right of 26.25 cfs will be delivered to the reservation throughout the 180 day growing season, an additional 53.75 cfs (80 cfs – 26.25 cfs) would need to be required from water supply wells to meet the current peak demand. The flow required from water supply wells (53.75 cfs) corresponds to a total pumping rate of approximately 24,000 gpm.

To minimize cost for constructing new canals, or pipelines to deliver water from the production wells it would be desirable to locate production wells as close as possible to the existing canal system. In addition, it would also be advantageous to locate the wells near the upgradient end of the irrigational canals to avoid having to pump from the production wells (or well field) to an upstream discharge point.

An example layout of the well field that attempts to place wells close to the existing canal system is presented on Figure 1. The layout consists of production wells located approximately 1 mile from adjacent high capacity wells to minimize the potential for well interference. The 1 mile spacing was recommended by Kleinfelder (1995) based on the results of aquifer pump tests. It is important to understand that this is just one of many layouts that could be considered for a production well field. The actual location of wells would need to consider land ownership and the ability to get approval from the landowners to construct the wells and any necessary feeder canals or pipelines for water transmission.

For cost estimating purposes, we have assumed that properly designed production wells drilled in this area would have an average yield of 2,500 gpm. This assumed yield is based on the aquifer pumping tests performed on Well No.1 in 1994 (Kleinfelder, 1995). Although Well No.1 is located approximately 4 miles south of the Schurz, and the wells shown on Figure 1 (example well field) are located between 5 miles and <1 mile north of Schurz, existing data suggest that both areas are located in the same general hydrogeologic setting. For this assessment, it is assumed that the yields and water quality for wells located in the alluvial basin fill sediments located between Weber Dam and Schurz would be similar to those encountered at Irrigation Well No.1. In actuality, each area selected as a possible well site would need to drilled and tested to verify both the water quality and quantity available for groundwater production. It is also likely that additional subsurface investigation and aquifer testing will prove that some areas are more favorable than others due to localized variations in the groundwater aquifer.

Using a peak demand from the well field of 24,000 gpm, the irrigation requirements could be met by 10 production wells with an average yield of 2,400 gpm. For cost estimating purposes, we have assumed the well field would consist of 10 wells with an average pumping rate of 2,500 gpm. This is slightly greater than the calculated peak requirement and allows for minor losses between the well head and discharge point at the canal system.

Feasibility Level Cost Estimate
A preliminary cost estimate to drill, construct and operate a well field to meet the tribes current irrigation demands was prepared for a hypothetical well field located between Little Dam and Schurz (see Attachment 1). Humboldt Drilling and Pump Co. Inc, (Humboldt Drilling) was requested to provide an estimate of (1) the cost to drill and install new high capacity wells, and (2) the annual operating and maintenance cost per well. Humboldt Drilling was considered to be

a good source for estimating these costs since they drilled and developed a large diameter irrigation well (referred to as Irrigation Well # 5, Table 1) on the Reservation in 1992, and had pump maintenance records for this well. In addition, they are familiar with the electrical and maintenance costs to operate these types of wells in the region. The following assumptions were used in the cost estimate.

Well Construction:

- Total depth of borehole: 500 feet
- 30-inch conductor casing for surface seal (0-50 feet below ground surface)
- 26-inch borehole (50-500 feet below ground surface)
- 16-inch casing (with 400 feet of steel wire wrap screen)
- Designed filter pack to minimize sand infiltration

Pump Assembly Assumptions:

- 2500 gpm average pumping rate
- Maximum drawdown 100-150 feet
- Static Water Level 40 feet

The assumptions for the well design (26-inch borehole, 16-inch casing) are consistent with the 5 existing high capacity wells that have been constructed on the reservation to date. The steel wire wrap screen is different from the existing wells but is intended to minimize sand infiltration and maximize well efficiency. The assumptions for the pump are based on the static water levels in the area, and maximum anticipated drawdowns that have been recorded from previous aquifer tests on wells located in the Schurz area (Kleinfelder, 1995).

Using these assumptions, Humboldt Drilling estimated cost for well construction and pump installation for a typical well is $88,000 (Attachment 1). The annual operating cost, including power cost and pump maintenance and well cleaning, and assuming operating cycle of 180 days per season, running 24 hours a day, is approximately $24,000 per well. The estimated cost to install the well field (assuming 10 production wells to meet the peak irrigation demands) is on the order of $890,000.

Well Field Cost Estimate:

10 wells x 88,000/well= $880,000.
<u>Contingency (10%) = $88,000.</u>
Total Cost Well Field = $890,000. (rounded)

The estimated operating and maintenance cost per well is approximately $24,000/year per well, or $240,000/year for the entire well field. No contingency is assumed for the operation and maintenance since this estimate assumes the wells would be operated continuously for 180 days – 24hours/day. In reality, in a typical year, the well field would only operate at full capacity during the middle of the irrigation system, and at less than full capacity during the early and late parts of the growing system. For this screening level assessment, no attempt was made to estimate the variations in pumping demands that would be required for a typical irrigation season. The operating and maintenance costs of $24,000/year per well represent costs to pump at full capacity continuously, and therefore, should be considered conservative. It should also be noted that the costs to construct and maintain additional canals or pipelines to transfer water from the wells into the existing irrigation canals are not included in these estimates but would need to be estimated if this alternative is considered in the EIS.

Discussion and Conclusions

Based on our understanding of the hydrogeologic setting and results of limited aquifer testing data, there appears to be a potential to develop high capacity water supply wells that could supplement, or possibly replace water previously provided by Weber Reservoir. Considering the geologic setting, it is likely that the transmissivity (and yield) varies substantially over relatively short distances (100's of feet). Therefore, exploration drilling, test well construction, long-term aquifer pumping, and water quality sampling would be required to further evaluate the feasibility of this alternative, and determine the site specific hydrogeologic conditions.

From a preliminary standpoint, a well field consisting of 10 wells, pumping at an average rate of 2,500 gpm could provide the peak water requirement for irrigation. If possible, the wells should be located near existing canals to further minimize the cost of constructing new canals or pipelines to deliver the water from the production wells to the irrigation system (preferably between Weber Dam and Schurz).

It is likely that fine-grained sediments that have flushed into, and settled out in Weber Reservoir since 1935 have resulted in the formation of low permeability lake beds. These low permeability deposits tend to act as a partial barrier, or severely restrict the movement of water into, or out of the base of the floor of the reservoir. For this reason, it seems reasonable to assume that the amount of water that currently infiltrates from the reservoir to the groundwater system is minimal. Removal of the dam and subsequent downcutting of the stream channel through the lake deposits and into the underlying higher permeability basin fill sediments is likely to increase the amount of stream water infiltration that occurs through this reach.

Removal of Weber Dam and development of a well field to meet the peak irrigation demands would significantly change the hydrologic water balance in the reservation. Because the Walker River is connected to the groundwater system, it is assumed that increased pumping will also increase the infiltration from the river to the basin fill aquifer. This will be offset by the surface flows gained from elimination of evaporation from Weber Reservoir (3,800 AF), and reduction in the amount of surface water diversion for irrigation. If this alternative is carried forward for detailed analyses in the EIS, (1) the baseline water balance needs to be updated, (2) potential changes to the overall hydrologic water balance resulting from dam removal and groundwater development needs to be quantified, and (3) potential drawdown impacts to the river, and riparian wetland areas, needs to be evaluated.

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Attachments

Table 2. Summary of Existing High Capacity Irrigation Wells Drilled on the Reservation.

Plate 1. Possible Well Field Location (to be provided)

Appendix C- Geomorphic Evaluation

DRAFT
SUMMARY OF GEOMORPHIC EVALUATION
REMOVAL OF WEBER RESERVOIR

1.0 General

The results of a geomorphic evaluation of the Walker River fluvial system from Walker Lake to approximately 10 miles upstream of Weber Reservoir are presented in this summary. The evaluation focused on the geomorphic response of the system to alternative conditions as indicated below:

- Existing Condition. Presence of Weber Dam as originally constructed with no reduction in available storage.
- Removal of Weber Dam. Reflects the removal of Weber Dam and the replacement of storage with an off-channel reservoir or the construction of groundwater well fields.

A qualitative assessment was conducted with respect to the fluvial response of the Walker River to the alternative conditions previously described. The assessment was based on a review of available reports, mapping, and pertinent data; interpretation of historical aerial photography; and data collected during a field reconnaissance of the Walker River study reach.

In conjunction with the use of existing information, a number of geomorphic relationships are available that can provide insight on the general characteristics of a channel and its response to various impacts or changes. These relationships provide a qualitative understanding that can assist in the evaluation of each alternative described above.

A basic physical process that occurs in a channel is the long-term tendency to achieve a balance or equilibrium between the product of water flow and channel slope and the product of sediment discharge and sediment size. Lane's principle (Lane, 1955) is the most widely known geomorphic relation embodying this equilibrium concept and is described as follows:

$$QS \infty Q_S D_{50} \qquad (1)$$

Where Q is the water discharge, S in the channel slope, Q_S is the sediment discharge and D_{50} is the median diameter of the bed material. Lane's principle was utilized to qualitatively characterize the geomorphic response of the Walker River to the two alternative conditions.

1.1 Existing Condition

This alternative represents the existing channel conditions within the study area. The results of the geomorphic evaluation of this alternative will be utilized as the baseline to measure the trends associated with the remaining alternatives.

Within the study area, several manmade or natural features exist that are noteworthy and pertinent to the geomorphic evaluation of the Walker River. From upstream to downstream, these features include Weber Reservoir, Little Dam, the Lateral 2-A Siphon near Schurz, and Walker Lake. To facilitate the geomorphic evaluation, the study area was divided into four reaches; the Walker River above Weber Reservoir, Weber Dam to Little Dam, Little Dam to the Lateral 2-A Siphon, and the Lateral 2-A Siphon to Walker Lake.

Reach 1. Above Weber Reservoir

In the study reach above Weber Reservoir, the Walker River transitions from a meandering channel that is incised into alluvial deposits to a system of multiple anastomosed channels that actively migrate within the floodplain. The channel gradient varies from a slope of 0.001 ft/ft in the upstream portion of the study reach to a slope of 0.0007 ft/ft near the reservoir (obtained from profile data of the Lower Walker River, Huffman & Carpenter, Inc., September 1999).

Application of Lane's principle in this study reach explains the impact associated with the original construction of Weber Dam. The construction of Weber Dam raised the base level of the channel and created a backwater effect upstream of the dam. As the water and sediment conveyed within the channel encounters the reservoir pool, most of the sediment deposits in the form of a delta that slowly advances downstream. The deposition of sediment at the entrance to the pool induces aggradation in the upstream channel. The channel aggradation may extend many miles upstream of the reservoir and after long periods of time, produce significant changes in channel geometry and increased flood stages. Lane's principle provides an indication of the response. The decrease in slope (S^-) created by the sediment deposition must correspond to a decrease in sediment discharge (Q_s^-) as indicated below:

$$Q^0 S^- \propto Q_s^- D_{50}^0$$

Reach 2. Weber Dam to Little Dam

The river channel from Weber Dam to Little Dam exhibits a meandering pattern within the existing floodplain. The channel is deeply incised into the alluvial and old lake bed deposits and signs of active bank erosion provide evidence of channel bed degradation and potential channel migration. Sediment deposition presently occurs immediately upstream of the Little Dam where two irrigation canals divert water from the channel. The diversion structure serves as a manmade grade control structure to hold the channel bed elevation at this location. The review of existing profile data indicated a channel gradient of 0.0007 ft/ft immediately downstream of Weber Dam and a transition to a gradient of 0.0003 ft/ft in the channel upstream of Little Dam.

Construction of Weber Dam provides a basin for the accumulation of sediment transported from the upstream watershed. The release of sediment-free water from the dam results in significant degradation in the downstream reach until the capacity of the water to transport sediment has been realized. Channel banks in this area may become unstable due to degradation and there is a possibility that the river, as the channel slope is reduced, may change its plan form. Through Lane's principle, the decrease in slope (S^-) created by the channel degradation corresponds to a decrease in sediment discharge (Q_s^-) as indicated below:

$$Q^0 S^- \propto Q_s^- D_{50}^0$$

The potential for channel degradation is limited by the manmade diversion structure also known as Little Dam. Upstream of Little Dam, sediment deposition will likely occur until the sediment storage capacity of the ponded area behind the diversion structure is satisfied. This conclusion was confirmed by the profile data and field observations.

Reach 3. Little Dam to Lateral 2-A Siphon

The Walker River in this reach is characterized by a meandering sand-bed channel that is entrenched into the lacustrine and alluvial deposits. Immediately below the Little Dam, noticeable channel degradation is occurring and is reflected by a drop in channel grade of several feet. Further downstream of the diversion structure, the channel appears to be aggrading and is encroached by vegetation on bars that are deposited within the channel. In the reach upstream of the Lateral 2-A Siphon, sediment deposition has greatly reduced the channel gradient and promoted the establishment of sand bars that are heavily encroached with vegetation. The Lateral 2-A Siphon is presently acting as a manmade grade control structure thereby holding the existing grade of the channel (0.001 ft/ft) at the location of the crossing.

Immediately downstream of Little Dam, an initial lowering of the channel bed is anticipated due to deposition upstream of the diversion structure and the release of essentially clear water. In this short reach, Lane's principle would predict a decrease in slope (S^-) created by the channel degradation corresponding to a decrease in sediment discharge (Q_s^-) as indicated below:

$$Q^0 S^- \propto Q_s^- D_{50}^0$$

As the pool behind the diversion dam fills with sediment, the sediment discharge is increased and is available to the downstream reach. Except for local scour below the diversion structure, the gradient will likely increase to the original channel slope to transport the increase in sediment load as indicated below:

$$Q^0 S^+ \propto Q_s^+ D_{50}^0$$

In general, the reach downstream of the diversion structure will likely aggrade due to the excess of sediment remaining in the river as less sediment laden water is diverted. As aggradation within the channel occurs, the channel slope increases until the gradient is sufficient to convey the sediment load.

$$Q^- S^+ \propto Q_s^0 D_{50}^0$$

The channel gradient upstream of the Lateral 2-A Siphon reflects the presence of this manmade grade control structure. Field observations suggest an aggradational trend in the lower portion of the study reach.

Reach 4. Lateral 2-A Siphon to Walker Lake

The river channel in this reach transitions from a deeply incised and actively eroding channel immediately downstream of the siphon to a much wider, braided channel in the vicinity of Walker Lake. Channel erosion has manifested itself in active meander migration and the creation of multiple sand bars within the active channel. Incision of the channel is evident immediately below the siphon and is estimated to range from five to eight feet in magnitude. Based on a review of the existing profile data, the channel gradient increases below the siphon to approximately 0.0018 ft/ft.

In this reach, the river channel is adjusting to a long-term trend associated with the lowering of the level of Walker Lake. The elevation of Walker Lake acts as a base level for the transport of water and sediment into the lake. As the lake lowers, the channel slope increases and must be balanced by an increase in sediment discharge.

$$Q^0 S^+ \propto Q_s^+ D_{50}^0$$

The result of lowering the base level of Walker Lake is headcutting (degradation) in the upstream channel, bank instability, and possible change of plan form in the river (i.e., from a meandering channel to a more braided pattern).

1.2 Removal of Weber Dam

This alternative represents the removal of Weber Dam. As such, the alternative reflects removal of Weber Dam and potential replacement of lost storage with an off-channel storage reservoir or water provided from groundwater well fields. For the purposes of this evaluation, the following assumptions were made:

- The off-channel storage reservoir is located upstream of Weber Reservoir. In conjunction with the storage reservoir, a channel structure is constructed to divert all flows in excess of that required to deliver water to satisfy the historic irrigation diversions at Little Dam. Water available from the storage reservoir will be conveyed to Little Dam for direct diversion into the irrigation canals.

- In general, the groundwater well fields are located downstream of Weber Reservoir. Excess flows previously captured by Weber Reservoir are conveyed past Little Dam and into Walker Lake. It is assumed that ground water wells will not increase the base flow in the river. Water available from the ground water wells will be conveyed to Little Dam for direct diversion into the irrigation canals.

The removal of Weber Dam will significantly impact the fluvial system both upstream and downstream of the existing structure. The loss of Weber Dam will lower the base level thereby creating severe channel erosion and potential change in plan form upstream of the reservoir, similar to those conditions that presently exist in the channel reach from the Lateral 2-A Siphon to Walker Lake. Furthermore, a portion of the sediment deposited within Weber Reservoir will be removed and re-deposited in downstream reaches as the river channel searches for a more stable grade. Downstream of Weber Reservoir, the result of the increased sediment load will likely be manifested in reduced channel capacity, increased potential for flooding, widening of the existing channel and potential change in plan form from a meandering to a more braided pattern. Both impacts can be explained through Lane's principle as:

$$Q^0 S^+ \propto Q_s^+ D_{50}^0$$

Given the dramatic impacts associated with the removal of Weber Dam on the fluvial system, it is reasonable to implement measures that: (a) stabilize the base level associated with the existing reservoir; (b) minimize the removal of sediment deposited within the reservoir, and (c) limit the re-deposition of sediment in the downstream river channel. Consequently, both alternatives to the Removal of Weber Dam are assumed to integrate stabilization measures to achieve these goals. The following geomorphic evaluation focused on the impact of the removal of Weber Dam assuming installation of the stabilization measures.

Reach 1. Above Weber Reservoir

Stabilizing the base level associated with Weber Reservoir assumes placement of a grade control structure at elevation 4208 ft and re-establishment of a single conveyance channel and floodplain through the reservoir bed and the reach immediately upstream of the reservoir maximum pool elevation. Given the stabilization of the base level in this reach, the response of the fluvial system to the two alternatives is described below.

Construction of an upstream, off-channel storage reservoir. This alternative will reduce the historic streamflows that developed the character and nature of the fluvial system above Weber Reservoir. The structure constructed to divert water into the storage reservoir will tend to initially degrade the downstream channel bed due to the release of essentially clear water. As the pool behind the diversion dam fills with sediment, the sediment discharge is increased and is available to the downstream reach. Except for local scour below the diversion structure, the gradient will likely increase to the original channel slope to transport the increase in sediment load. In general, however, the reach downstream of the diversion structure will likely aggrade due to the excess of sediment remaining in the river as less sediment laden water is diverted. As aggradation within the channel occurs, the channel slope increases until the gradient is sufficient to convey the sediment load.

$$Q^- S^+ \propto Q_s^0 D_{50}^0$$

The channel will also respond to a reduction in the historic flow regime. A smaller, incised channel may develop and actively migrate within the fluvial deposits of the existing channel bed. The reduction in the historic flow regime may correspondingly reduce the riparian/wetland vegetation along this reach of the river channel. This impact will be most evident in the area of deposition that is estimated to be approximately 2.5 miles upstream of the maximum pool elevation of 4208 ft.

Construction of ground water well fields. This alternative will not reduce the historic streamflows within the Walker River. The removal of Weber Dam will confine flows upstream of the reservoir high water line to the channel and floodplain. This will likely result in a reduction of adjacent riparian/wetland areas immediately upstream of the reservoir. As a minimum, this impact will be evident in the area of sediment deposition that is estimated to be approximately 2.5 miles upstream of the maximum pool elevation of 4208 ft.

__Reach 2. Weber Dam to Little Dam__

As indicated previously, placement of grade control structures and/or drop structures are required to minimize the impact of increasing the sediment discharge in this reach of the Walker River. In conjunction with removal of the existing dam, placement of a drop structure will be required to convey the streamflow in a non-erosive manner to the existing channel bed below the dam. Given the placement of the stabilization measure in this reach, the response of the fluvial system to the two alternatives is described below.

__Construction of an upstream, off-channel storage reservoir.__ In this reach, the hydrologic flow regime will reduced by the upstream diversions. Although the flows will be reduced, sediment-laden water will be conveyed through the reach. The elimination of the clear water releases from Weber Dam, however, will likely be offset by the reduction in annual streamflow. Minor aggradation may occur within the reach immediately below the dam and similar to Reach 1, a smaller, incised channel may develop and actively migrate within the fluvial deposits of the existing channel bed.

$$Q^- S^+ \infty Q_s^+ D_{50}^0$$

__Construction of ground water well fields.__ With this alternative, historic streamflows previously captured or attenuated by Weber Reservoir, will be conveyed through the reach. The streamflows will be laden with sediment that will likely deposit within the channel. Channel aggradation may lead to channel widening and reduced capacity to convey flood flows.

$$Q^+ S^+ \infty Q_s^+ D_{50}^0$$

Aggradation within the reach may result in a reduction of existing riparian/wetland areas. This loss, however, may be offset by the creation of additional riparian/wetland areas attributable to channel widening.

__Reach 3. Little Dam to Lateral 2-A Siphon__

This reach is controlled by manmade structures consisting of Little Dam and the Lateral 2-A Siphon. The response of this reach to the alternatives is primarily attributed to the change in flow regime as indicated below.

__Construction of an upstream, off-channel storage reservoir.__ In general, the hydrologic flow regime in this reach will not substantially change. Consequently, the reach downstream of Little Dam will continue to aggrade due to the excess of sediment remaining in the river as less sediment-laden water is diverted.

$$Q^- S^+ \infty Q_s^+ D_{50}^0$$

__Construction of ground water well fields.__ Similar to Reach 2, historic streamflows previously captured or attenuated by Weber Reservoir, will be conveyed through the reach. Channel aggradation will increase and channel widening may occur thereby reducing the capacity of the channel to convey flood flows.

$$Q^+ S^+ \infty Q_s^+ D_{50}^0$$

Aggradation within the reach may result in a reduction of existing riparian/wetland areas. Again, this loss may be offset by the creation of additional riparian/wetland areas attributable to channel widening.

Reach 4. Lateral 2-A Siphon to Walker Lake

This reach is controlled by the Lateral 2-A Siphon at the upstream limit and the pool level of Walker Lake at the downstream limit. The response of this reach to the alternatives is also largely attributed to the change in flow regime as indicated below.

Construction of an upstream, off-channel storage reservoir. Similar to Reach 3, the hydrologic flow regime will not be significantly changed in this reach through implementation of this alternative. In general, the reach downstream of the Lateral 2-A Siphon will continue to adjust to the lowering of the level of Walker Lake. As the lake continues to lower, the channel slope will increase and must be balanced with an increase in sediment discharge.

$$Q^0 S^+ \infty Q_s^+ D_{50}^0$$

Degradation of the channel will continue along with bank stability and a potential change in plan form.

Construction of ground water well fields. Similar to Reach 3, historic streamflows previously captured or attenuated by Weber Reservoir, will be conveyed through the reach. The increase in discharge will exacerbate the existing trends in this reach of the river. Channel degradation will be accelerated along with bank instability in the area below the Lateral 2-A Siphon. The potential for changing plan form from a meandering channel to a more braided pattern will be increased.

$$Q^+ S^+ \infty Q_s^+ D_{50}^0$$

1.3 Summary of Geomorphic Response to Removal of Weber Dam

The results of the geomorphic evaluation are summarized in Table 1. The existing condition as well as the alternatives to removal of Weber Dam is presented, along with the response of the fluvial system on a reach-by-reach basis.

1.4 Cost Estimate Associated with Removal of Weber Dam

Removal of Weber Dam will involve breaching the existing dam embankment and stabilization of the existing reservoir bed. Based on a review of the existing bathymetry data (Anderson Consulting Engineers, Inc.; January 2001), the following information was assumed to develop the cost estimate for the channel improvements:

- Design discharge of approximately 7,000 cfs (100-year, 24-hour peak discharge)
- Design slope of approximately 0.001 ft/ft

- Compound channel section including a bottom width of 50 feet, depth of 5 feet, channel sideslope of 4(H):1(V), floodplain terrace of 80 feet on both sides of incised channel with a maximum depth of 6 feet
- Channel length of approximately 4.5 miles
- One drop structure at the transition from the existing reservoir bed to the channel near the original spillway outlet
- Five grade control structures.

The cost estimate associated with the removal of Weber Dam assumed removal of the dam embankment over a breach length of 1,000 feet and demolition of the existing spillway and outlet facilities. The cost estimate associated with the Removal of Weber Dam and the channel improvements is presented in Table 2.

References

1. Anderson Consulting Engineers, Inc.; Stage-Storage Curve for Weber Reservoir, Nevada; January 2001.

2. Huffman & Carpenter, Inc.; Fluvial Geomorphic Setting and Response of the Lower Walker River to Removal of Weber Dam; September 1999.

3. Resource Concepts Inc.; A Report of Findings: Actions that May Increase Flows into Walker Lake; February 2000.

4. Resource Concepts, Inc. and Cordilleran Hydrology, Inc.; A Hydrologic Evaluation of Walker River Flows Between Wabuska and Weber Reservoir, Lyon County, Nevada; May 1999.

Table 1. Summary of Geomorphic Evaluation.

Alternative	Reach 1	Reach 2	Reach 3	Reach 4
Existing Condition	• Reservoir sedimentation. • Delta formation at inlet. • Reduction in channel slope. • Channel aggradation.	• Channel degradation below dam. • Bank instability. • Degradation limited by diversion structure. • Sediment deposition upstream of Little Dam.	• Local sour below Little Dam. • General channel aggradation. • Grade controlled by Lateral 2-A Siphon.	• Increase channel slope due to lower lake level. • Active channel degradation and migration. • Bank instability. • Potential change of river form as slope increases.
Off-Channel Storage	• Reduction of historic flows. • Local scour below diversion structure. • General channel aggradation. • Reduction of riparian / wetland areas.	• Minor channel aggradation. • Minor channel widening. • Minor reduction in flood capacity.	• Minor increase in channel aggradation.	• No significant change to channel.
Ground Water Well Fields	• No significant change to channel upstream of reservoir. • Confined channel will reduce riparian / wetland areas.	• Moderate channel aggradation. • Moderate channel widening. • Moderate reduction in flood capacity.	• Moderate increase in channel aggradation. • Channel widening. • Reduction in flood capacity.	• Increase channel degradation and migration. • Increase bank instability. • Increased potential to change river form.

Table 2. Cost Estimate for Channel Improvements and Dam Breach.

Item	Construction Cost ($)
1. Channel Improvements	
Excavation / Haul & Disposal	$3,520,000
Grade Control Structures (5)	$245,000
Drop Structure (1)	$240,000
Subtotal	***$4,005,000***
Contingency (25%)	$1,001,250
Total Construction Cost	***$5,006,250***
Engineering / Legal / Admin (20%)	$1,001,250
Project Cost	***$6,007,500***
2. Breach Dam Embankment	
Excavation / Haul & Disposal	$300,000
Demolition / Haul & Disposal	$150,000
Subtotal	***$450,000***
Contingency (25%)	$112,500
Total Construction	***$562,500***
Engineering / Legal / Admin (20%)	$112,500
Project Cost	***$675,000***

Appendix D – Surface Water Evaluation

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SUMMARY OF SURFACE WATER EVALUATION
DAM REMOVAL ALTERNATIVE FOR WEBER RESERVOIR

1.0 INTRODUCTION

This technical memorandum summarizes the results of a qualitative evaluation to estimate the effects of the removal of Weber Dam. This evaluation considered the potential for degradation of surface water quality from dam removal activities and subsequent downcutting of the exposed Weber Reservoir lakebed. Additionally, the evaluation considered the effects of a modified flow regime on the downstream environment. This evaluation focused on the response of the hydrologic system to the following conditions:

- Existing Condition – The presence of Weber Dam as originally constructed with no reduction in available reservoir storage.
- Removal of Weber Dam – Reflects the removal of Weber Dam and the replacement of storage with an off-channel reservoir or the construction of a ground water well field(s).

This qualitative evaluation was conducted based on a review of available reports, topographic mapping, and Walker River gaging records; interpretation of historical aerial photography; and observations made during a field reconnaissance of the Walker River from near Yerington downstream to Walker Lake. This evaluation was also conducted in close coordination with the geomorphic evaluation, since many of the study components overlap.

2.0 EXISTING CONDITIONS

Within the study corridor, several manmade or natural features are present that are pertinent to the river's hydrologic flow regime and water quality. These features were used to segregate river reaches into five separate study zones (or sub reaches) as follows:

- Reach 1: Walker River about 3-4 miles upstream from the high water level of Weber Reservoir,
- Reach 2: approximately 3-4 miles upstream from the high water level of Weber Reservoir downstream to Weber Dam,
- Reach 3: Weber Dam downstream to Little Dam,
- Reach 4: Little Dam downstream to the Lateral 2-A Siphon, and
- Reach 5: the Lateral 2-A Siphon downstream to Walker Lake.

Reach 1: Walker River about 3-4 Miles Upstream from the High Water Level of Weber Reservoir

This study reach represents the location above which there has been little historical backwater effect from the maximum water storage elevation in Weber Reservoir. As determined from channel profile data (Huffman & Carpenter, Inc. September 1999), the channel gradient in this reach is about 0.001 ft/ft. The channel is typically incised and meanders through alluvial deposits. Only a few minor sand bars and minor terracing are present. The upper surfaces of the small terraces are distinctive because they are covered by upland vegetation that appears much different from the riparian/wetland vegetation growing adjacent to the river channel. Very few of the oxbows adjacent to the river channel contain standing water during low flow conditions.

Reach 2: Approximately 3-4 Miles Upstream from the High Water Level of Weber Reservoir Downstream to Weber Dam

The 3- to 4-mile reach upstream from the high water elevation of Weber Reservoir is characterized by a change to a flatter channel gradient (0.0007 ft/ft) (Huffman & Carpenter, Inc. September 1999). Based on the geomorphic evaluation, the construction of Weber Dam raised the base level of the channel and created a backwater effect upstream of the dam. As the water and sediment conveyed in the channel encounters the reservoir pool, most of the sediment deposits in the form of a delta that slowly advances downstream. The deposition of sediment at the entrance to the pool induces aggradation in the upstream channel. This aggradation may continue to migrate upstream after long periods of time. Presently, this effect is evident in the 3- to 4-mile reach upstream from Weber's high water elevation, where multiple anastomosed channels actively migrate within the floodplain. This condition has apparently been exacerbated by significant beaver activity. Field observations revealed that some of these channel bottoms consist of a thin layer of medium to coarse sand underlain by a dark gray to black organic clay. Both the main channel and secondary channels appear to have a low width:depth ratio (relatively deep compared to their width, indicating that they may be dominated by suspended load and fine bedload transport (Schumm 1985). The channels themselves are only slightly inset into the low gradient floodplain and have small steep banks commonly bound by the roots of abundant riparian/wetland vegetation. Few terraces are evident along this reach.

Within the full pool limit of Weber Reservoir, the reservoir is apparently effective in impounding most fine sediment (sand, silt, and clay). It is estimated that over 3.5 million cubic yards of fine-grained sediment has accumulated behind Weber Dam (Huffman & Carpenter, Inc. September 1999; Anderson Consulting Engineers, Inc. December 2000; Resource Concepts, Inc. 1999). Suspended sediment samples collected at various depths within the reservoir typically show an increase in sediment concentration with depth, as would be expected. Additionally, measured sediment concentrations in the inflow to Weber Reservoir were several times greater than the sediment concentrations in the water released through Weber Dam (Resource Concepts, Inc. 1999). Weber Reservoir also serves to reduce the turbidity of water moving through the reservoir, and the temperature of water released from the dam is typically cooler than inflow water temperature.

The quality of sediments deposited in Weber Reservoir and upstream has been evaluated based on a very limited number of grab samples. Preliminary results indicate that metals have not accumulated within these sediments (Huffman & Carpenter, Inc. September 1999). However, the results are only a preliminary assessment, and do not provide a guarantee that different stratigraphic layers within the accumulated sediments are free of metals and pesticide contamination.

Long-term average annual flow into Weber Reservoir is approximately 108,580 ac-ft (150 cfs). This rate was determined by a regression relationship between the Wabuska gage (located about 16 miles upstream from Weber Dam) and the gage located 6 miles upstream from Weber Dam and about 2 miles upstream from the inflow to Weber Reservoir when the reservoir is full (Resource Concepts, Inc. 1999). The average annual flow measured at the upstream Wabuska gage (1902-1998) was 123,300 ac-ft. The average annual inflow rate to Weber Reservoir is highly variable on an annual basis; recorded values have varied more than an order of magnitude. Instantaneous flows into Weber Reservoir also vary significantly, from near zero during low-flow periods to more than several thousand cfs during flood events. Even though the capacity and length of Weber Reservoir is relatively small, the impoundment has the ability to reduce peak discharges below Weber Dam by storing some of the flood water, and also attenuating the peak by spreading the channelized inflow over the surface area of the reservoir

Reach 3: Weber Dam Downstream to Little Dam

The potential for channel degradation in this reach is limited by the Little Dam manmade diversion structure. Although there is evidence of active bank erosion and channel bed degradation just downstream from Weber Dam where the channel gradient is about 0.0007 ft/ft, the channel begins to flatten to a gradient of 0.0003 ft/ft near Little Dam (Huffman & Carpenter, Inc. September 1999). The channel immediately below the Weber Dam is incised about 7 to 10 feet into the floodplain, probably caused by both scouring by high velocity water pouring over the spillway and an attempt by the river to replenish its sediment load. Exposed cutbanks along the river reveal that most of the floodplain is comprised of sand with a little gravel. Sediment deposition presently occurs immediately upstream of Little Dam, where the diversion structure serves as a manmade grade control to hold the channel bed elevation at this location.

Observations of this river reach following the 1997 flood indicate that the river remained within its banks. It is believed that the peak flow attenuation provided by Weber Reservoir was enough to limit downstream flooding.

Reach 4: Little Dam Downstream to the Lateral 2-A Siphon

The Lateral 2-A Siphon, similar to Little Dam, presently acts as a manmade grade control and maintains the channel gradient (0.001 ft/ft) at the location of the crossing.

Immediately below Little Dam, channel degradation is occurring as a result of sediment deposition upstream of the structure and the subsequent release of clearer water with a lower sediment concentration, and from increased energy in the system as a result of the drop over the structure (where local scour is evident). Over time, the channel will likely aggrade in an upstream direction from the Lateral 2-A Siphon until the increase in channel gradient is sufficient for the channel to convey the sediment load.

Reach 5: Lateral 2-A Siphon Downstream to Walker Lake

In this reach, the river channel is actively adjusting to a long-term trend associated with the lowering of Walker Lake. As the lake lowers, the channel slope increases. The additional energy imparted to the stream flow associated with the steeper gradient must be balanced by an increase in sediment discharge. As a result, this reach is degrading (headcutting) in an upstream direction from Walker Lake in the upper reach of the channel near the Lateral 2-A Siphon.

3.0 IMPACTS FROM REMOVAL OF WEBER DAM

The Walker River below the Lateral 2-A Siphon is actively changing. This reach of river is not presently a stable fluvial system in equilibrium. Between the siphon and Weber Dam, the system is relatively stable as a result of the grade control provided by the siphon and Little Dam. As discussed above, an estimated 3.5 million cubic yards of fine-grained sediment has accumulated within Weber Reservoir, and significant aggradation is evident within the channel and floodplain upstream from the reservoir. Presently, Weber Reservoir removes sediment from the system and reduces the turbidity, suspended sediment concentrations and temperature of the outflow from the Dam. Weber Reservoir also has a small but significant attenuating effect on flood flows passing through the reservoir.

Removal of Weber Dam will likely have immediate and dramatic effects on the fluvial system both upstream and downstream of the existing structure. Dam removal will eliminate the upstream effects of the reservoir pool, thus lowering the base level of the system and creating severe channel erosion and potential change in plan form upstream of the reservoir. Two to three miles of upstream wetlands could be adversely impacted. The resulting situation will be similar to the unstable conditions that presently exist in the channel between the Lateral 2-A Siphon and Walker Lake. As indicated in the geomorphic evaluation, a portion of the sediment deposited within Weber Reservoir will also be re-suspended and re-deposited in downstream reaches as the river searches for a more stable grade. Downstream of Weber Dam, the result of the increased sediment load will likely be manifested in reduced channel capacity, increased potential for flooding, widening of the existing channel and potential change in plan form from a meandering to a more braided pattern (see the geomorphic evaluation).

The downstream deposition of sediment will likely adversely impact wetland and riparian vegetation. Increases in suspended sediment concentrations, turbidity, and water temperature are expected downstream from Weber Dam.

4.0 MITIGATION TO LIMIT ADVERSE EFFECTS OF DAM REMOVAL

This evaluation clearly demonstrates that sediment deposited within Weber Reservoir and in the Walker River floodplain 2-3 miles above the reservoir must be managed to avoid negative impacts to the system both upstream and downstream from the reservoir, including impacts to water quality, aquatic organisms, channel flood-carrying capacity, wetlands, and downstream structures and communities. The most reasonable mitigation measures should: (a) stabilize the base level associated with the existing reservoir and upstream fluvial system, (b) minimize the removal and re-suspension of sediment deposited in the reservoir and the upstream channel, and (c) limit the re-deposition of sediment in the downstream river channel.

Control structures would need to be placed as proposed in the geomorphic evaluation to stabilize the bed of Weber Reservoir and the channel upstream from the reservoir. These structures would be designed to pass the 100-year, 24-hour peak flow of approximately 7,000 cfs, and readily provide fish passage. One drop structure would be required at the transition from the existing reservoir bed to the channel near the original spillway outlet. Five additional grade control structures would be required upstream. The estimated cost to breach the existing dam and construct the channel improvements is $6.68 million. A more detailed accounting of costs is provided in the geomorphic evaluation.

APPENDIX E – WETLANDS EVALUATION

DRAFT
WEBER DAM ACTION ALTERNATIVES: JURISDICTIONAL WETLANDS POTENTIAL IMPACT ANALYSES

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Overview

Weber Dam is located on the Walker River north of Schurz, Nevada. Weber Dam was constructed to impound runoff from the Walker River drainage basin for agricultural uses down stream. The dam was constructed in the 1930's and overlies a secondary fault zone. The USF&WS has issued an adverse finding that the Weber Dam represents a threat to the Lahotan Cutthroat trout ("LCT"), a listed threatened species. The LCT inhabits the Walker River and Walker Lake. Walker Lake is at the terminus of the Walker River; the Walker River basin is a closed drainage system. Due to ongoing drought, and the collection and removal of irrigation water upstream from Walker Lake, levels in the lake have dropped and TDS concentrations have risen. TDS concentrations in the lake are approaching levels that may potentially impact the LCT during its life cycle.

Due to public safety considerations, removal or modification actions are currently being evaluated for Weber Dam. Alternatives being considered would eliminate or minimize potential public safety hazards, and potentially reduce or mitigate adverse impacts on the LCT. Some of the Actions being considered for Weber Dam potentially impact jurisdictional wetlands and other waters of the United States. This document contains analyses of potential impacts on wetlands that would be affected by removal or modification actions being proposed for Weber Dam.

Wetland impact analyses consider five potential options for Weber Dam including:

- **No Action**-Retain the dam in its current condition and configuration;
- **Dam Removal**-Completely remove the dam eliminating the public safety failure issue and allowing unimpeded runoff through the lower Walker River;
- **Alternative Action 1**-Construct an off-channel reservoir within the Walker Paiute Tribal Reservation to provide irrigation water to the existing canal system;
- **Alternative Action 2**-Develop and use groundwater supply for irrigation purposes; or
- **Proposed Action**-Realign the dam downstream so that it no longer overlies the secondary fault zone and install fish ladders to allow viable passage for the LCT during migratory seasons;

Potential impacts on jurisdictional wetlands and other waters of the United States related to these five alternative actions are presented categorically below.

In characterizing alternative action impacts to jurisdictional wetlands, existing environmental conditions and historic activities associated with Weber Dam were reviewed and taken into account. This qualitative evaluation of potential impacts to jurisdictional wetlands has been developed based on a review of:

- Available reports, topographic mapping, and Walker River gauging records;
- Interpretation of historical aerial photography; and

- Observations made during several field trips to the lower Walker River.

The estimation of potential impacts to jurisdictional wetlands has been closely coordinated with the current geomorphic and surface water alternatives impact evaluations, since changes in surface water and geomorphic conditions will directly and indirectly impact the distribution and nature of jurisdictional wetland resources in the lower Walker River.

Projected drainage channel geomorphologic responses and consequences, and projected alterations to surface water flow, have been identified for discrete sections of the lower Walker River by the geomorphic and surface water alternative action impact analyses. These discrete sections of the Walker River will experience a variety of impacts specifically associated with the various proposed alternative actions. Current geomorphic and surface water impact analyses have been used to predict and characterize potential jurisdictional wetland impacts. Costs to construct mitigative wetlands required by the COE to offset potential losses associated with the various alternatives are also included.

Clean Water Act Section 404 Applicability & Policy Issues

Section 404 of the Clean Water Act applies to this project because the Walker River is considered waters of the United States and federal funds would be used to finance removal or modification of this facility. Projects receiving federal funding are required to comply with the laws and regulations of the United States without regard to land ownership. Dredging or filling operations that directly or indirectly impact jurisdictional wetlands are regulated under Section 404. Dredge and fill activities being considered under the Weber Dam proposed and alternative actions will or are likely to damage or destroy habitat and adversely affect the biological productivity of wetlands by smothering, dewatering, flooding, altering substrate elevation or affecting periodicity of water movement. Contemplated dredge and fill activities will also destroy wetland vegetation and result in community succession to upland plant species.

Replacement of jurisdictional wetlands directly impacted by dredge and fill activities will be required. Direct dredge and fill impacts are typically straightforward in their quantification and establishment of mitigation requirements. This holds true for the various alternatives being considered for Weber Dam. Direct disturbance zones associated with the proposed and alternative actions are readily identified and characterized.

Jurisdictional wetlands existing along the Walker River channel are expected to experience a wide range of indirect impacts under the various proposed alternative actions. The nature and extent of indirect impacts to jurisdictional wetlands provides challenges for COE policy application. Interpretation and application of COE rules, regulations and policies will have a major impact on mitigative wetland requirements for alternative actions. Three policy areas will need to be interpreted and applied to determine the extent of jurisdictional wetland loss and associated mitigative wetland requirements. Considerable variance in mitigative wetland requirements may be realized depending upon interpretive outcomes. The following policy areas will require resolution:

Man Made Impoundment Exemption

COE allows the application of special policies for wetlands that develop in association with stock ponds or similar manmade impoundments while they are in use. Under current COE policy, wetlands that form in and around impoundments may be disturbed for routine repair and maintenance activities. Wetland communities disturbed by such activities are exempt from mitigative requirements. This policy applies to wetlands that are located within those areas associated with maintenance of the impoundment that would be disturbed by normal repair and maintenance activities. Extent of application of this policy to Weber Dam needs to be determined. Weber Dam presents a manmade feature larger than that typically considered under this policy. COE may be reluctant to apply exemptions to Weber Reservoir wetlands due to the size of this structure.

Indirect Impacts-Surface Water Removal

Removing or modifying Weber Dam will indirectly impact wetlands that have developed in response to surface waters made available by its operation. If manmade impoundment policies do not apply to Weber Dam and reservoir, the extent of wetlands along the shoreline, potentially affected indirectly by dam removal or lowering of reservoir elevation, can represent a considerable mitigation requirement. Also, the extent of indirect jurisdictional wetland loss associated with removal of Weber Dam is subject to a wide range of interpretation in the vicinity of the Walker River inlet and channel immediately upstream from the reservoir. Lowering the shallow water table associated with the reservoir pool elevation that has developed over the last 75+ years is expected to be highly disruptive to wetlands that have developed in these areas. The extent and timing of impacts to these wetlands is difficult to project, because meteorological and soil conditions in the watershed can't be accurately predicted. Therefore, determining the extent of indirect impacts and establishing appropriate mitigation requirements is potentially contentious.

Indirect Impacts: Groundwater Well-Field Dewatering

Indirect impacts to jurisdictional wetlands may occur if the alternative action to develop a well field to pump groundwater for irrigation is chosen. The Walker River and groundwater sources that may be used for irrigation have a high degree of interconnectivity. Reduction in surface flows attributable to groundwater pumping are likely to indirectly impact wetlands along the Walker River corridor adjacent to and below such a well-field. COE policy will need to be evaluated to determine the extent, if any, of 404 jurisdiction in this situation.

Previously at one location in Nevada the COE determined that it did not regulate impacts to wetlands that were realized when a mining company ceased operations that required dewatering. Mine dewatering had created a groundwater resource that surfaced and created a large wetland area. Dewatering ceased and these wetlands dried up, but no mitigation work was required. Because dredge and fill activities within the waters of the United States were not associated with cessation of dewatering, the COE had no authority to require wetland mitigation when the pumping ceased.

The COE may interpret differently for Weber Dam, since groundwater pumping would be required in order to offset irrigation resource losses if Weber Dam is removed. Since groundwater pumping is an integral component of this alternative action, and the overall action includes dredge and fill activities, indirect jurisdictional wetland losses associated with groundwater pumping may be considered within the COE's authority under section 404. If the COE finds that it does have this authority, determining the extent to which groundwater pumping indirectly impacts wetlands may be difficult.

Delineation Acceptance Timeframes

A COE policy that may affect Weber Dam alternative action economics are time limitations placed on acceptance of wetland delineations. Currently COE places a 5-year limit on acceptance of wetland delineations. If a project has not commenced or has not been completed within the five-year period following COE approval of its wetland survey, and additional disturbance to wetland is expected, the COE requires resurvey to confirm the presence and extent of potentially affected jurisdictional wetland. Due to the size of Weber Dam and reservoir, the repair, modification or removal of Weber Dam may require time periods longer than 5 years. This 5-year policy for delineations may add to project costs for some of the alternative actions.

COE Policy Recommendations

Additional research regarding the status of these jurisdictional wetland policies and an assessment of their treatment by the COE should be undertaken if more accurate cost estimates are required for the action alternatives analyses. Potential disturbance exemptions and the extent to which the COE will claim jurisdiction over indirect impacts should be high priorities for this research.

Walker River Drainage Conditions

Anthropomorphic activities within the drainage basin have had various impacts on the Walker River. Primary impacts that have affected the distribution, development and quality of jurisdictional wetlands include:

- Flow Reduction-Volume, velocity, and flooding have been reduced by irrigation activities and altered by dam building throughout the Walker River watershed;
- Sediment Retention-Flow reduction and the construction of multiple reservoirs have resulted in the removal, retention and accumulation of salts and suspended solids;
- Creation of Degradation & Aggradation Zones-Segments of the Walker River have been subject to accelerated rates of erosion and deposition in channel reaches impacted by historic use and development activities; and

- Groundwater Levels-Shallow ground water resources have come into equilibrium with current flow regimes and drainage basin conditions.

Most significant changes in the drainage basin have occurred over the last 75 to 125 years. During this time changes in land use, and the placement of water control and use structures to support these land use changes, have had the greatest impacts on the Walker River system. At present the Walker River channel is in relative equilibrium with the land uses, and major drainage control and use structures that have been implemented and constructed in the watershed. Wetland communities have responded to such drainage modifications, with their current distributions being based on existing hydrologic conditions and associated soil moisture conditions.

POTENTIAL IMPACT ZONES

The surface water and geomorphologic analyses identified key manmade structures and natural features present in the lower Walker River that have significant influence on hydrologic flow regime and water quality. These structures and features have been used to segregate the lower Walker River into five separate and distinct zones or reaches that can be expected to experience their own unique modifications/adjustments associated with the proposed and alternative actions. The five reaches identified by the geomorphic and surface water studies include:

- Reach 1: About 3.5 miles upstream from the high water level of Weber Reservoir (33.5 miles above Walker Lake) and continuing upstream to mile 40 above Walker Lake;
- Reach 2: From approximately 3.5 miles upstream from the high water level of Weber Reservoir downstream to Weber Dam (33.5 miles to 29.5 miles above Walker Lake, respectively);
- Reach 3: Weber Dam downstream to Little Dam (29.5 miles to 25 miles above Walker Lake, respectively);
- Reach 4: Little Dam downstream to the Lateral 2-A Siphon (25 miles to 16.5 miles above Walker Lake, respectively); and
- Reach 5: the Lateral 2-A Siphon (at 16.5 miles above Walker Lake) downstream to Walker Lake.

These reaches can generally be expected to react similarly along their length to modifications in the watershed considered by the proposed and alternative actions. The exceptions to this are: 1) Site-specific activities with limited areal disturbance and potential to disrupt hydrologic characteristics, and 2) the upper and lower portions of Reach 2. Reach 2 includes the lotic environment of the Walker River in its upper portion and the lentic environment of Weber Dam reservoir in its lower portion, two distinctly different types of wetland habitat (i.e., running and standing water, respectively).

WALKER RIVER CHANNEL GRADIENTS

Longitudinal channel gradients have been used in the surface water and geomorphologic assessments to characterize the relative stability of the Walker River channel. Current channel elevations used in these analyses were taken from "Fluvial Geomorphic Setting And Response of The Lower Walker River To Removal of Weber Dam" (Huffman and Carpenter). Projected channel elevations were established by plotting a constant slope gradient between the upstream and downstream elevations of the river channel's longitudinal profile for the specified reach.

Projection of channel gradients in the five identified reaches allows general analyses of potential aggradation and degradation zones. Zones where aggradation or degradation is projected to be a foot or less may be expected to realize minor or no impacts to wetlands through fluvial processes associated with normal flow conditions. Sections of Walker River channel reaches that may experience from 1 to 2 feet of aggradation or degradation may experience moderate losses of wetland through fluvial processes associated with normal flow conditions. Sections of Walker River channel reaches that may experience more than 2 feet of aggradation or degradation may experience large losses of wetland through fluvial processes associated with normal flow conditions. Profiles of existing and potential channel gradients that identify potential aggradation and degradation zones in the aforementioned depth range categories for the lower Walker River channel are presented in Exhibits 1 through 3. In this document, potential impacts to jurisdictional wetlands have been characterized for the No Action, Proposed Action and Alternative Actions. Analyses use existing hydrologic regimes and drainage conditions in the lower Walker River as the baseline against which to project potential changes in wetland hydrologic conditions associated with the various actions. Existing and projected gradient profiles, existing watershed conditions, and the surface water and geomorphic analyses have been taken into account in characterizing potential jurisdictional wetland losses. Potential changes to surface water quality and quantity, and geomorphic changes in channel characteristics, projected by the surface water and geomorphic studies have been used to generally predict and characterize jurisdictional wetland impacts within the five distinct reaches. The anticipated nature and extent of impacts to jurisdictional wetlands for the proposed alternative actions for each distinctive reach are described by proposed and alternative actions. For the impact and cost analyses contained in this document, worst-case wetland disturbance and mitigation costs have been used, unless otherwise noted.

No Action

If Weber Dam is not modified or removed, the maximum pool elevation allowed in the reservoir will be lowered. Lowering the maximum reservoir pool elevation will have some impacts on jurisdictional wetland. Analyses of potential wetland losses associated with lowering the pool elevation are described by reach in this section.

No Action-Reach 1

Lowering the maximum pool elevation of Weber Reservoir will not impact wetlands in the upper portion of the Walker River channel. Hydrologic conditions are expected remain at their current equilibrium.

No Action-Reach 2

This reach is evaluated based on the distinctively different hydrologic conditions existing within its length. Weber Reservoir provides a lentic environment with a shoreline that frequently changes due to fluctuations in reservoir levels. The Walker River above the reservoir provides a low gradient lotic environment that floods periodically creating ephemeral pools and saturated soil conditions. A healthy beaver population has capitalized on water availability immediately above the inlet to the reservoir and colonized the channel bottom about 2 miles upstream from the reservoir.

Wetlands that have established along the perimeter of the reservoir can be expected to migrate into habitat niches similar to the ones they currently occupy along the lowered pool elevation. This migration will probably result in a small net loss of wetland, since the perimeter of the reservoir will be reduced at the lower maximum pool elevation. As discussed above wetlands in reach 2 that exist within the high water zone of the reservoir and in close proximity along its shoreline may be exempt from mitigation requirements under COE manmade impoundment policy. Certainly, existing wetlands at Walker Lake are subject to disturbance by periodic maintenance activities or repair, or removal through lake levels that are lowered or raised resulting in dewatering or prolonged inundation, respectively.

Within the Walker river portion of reach 2 under the No Action scenario permanently lowering the reservoir's maximum pool elevation will have its greatest affect on wetlands that have developed in the Walker river channel and flood plain from above the reservoir's inlet (outside of its shoreline perimeter) upstream to about 2 miles upstream. Nominal impacts are to be expected in the upper 1.5 miles of the river located within reach 2.

Wetlands in the lower section of the Walker River channel above the reservoir can be expected to respond to lowered reservoir water levels by migrating down gradient with changes in wetland hydrologic conditions. Portions of the peripheral wetlands above the inlet in the sediment delta will be lost due to lowered water tables, while other wetlands in the river channel above the reservoir's current sediment delta will not be affected. The down gradient migration will also form new wetlands in newly exposed areas that provide wetland hydrology without excessive inundation. Ongoing runoff will continue to deposit sediment and a new delta will form at the inlet to Weber Reservoir. Hydrophytic plant species can be expected to establish themselves in such depositional areas. Wetland losses will probably not exceed 20 acres, and will likely occur incrementally over extended timeframes.

No Action-Reaches 3, & 4

Retaining the dam and reservoir will maintain hydrologic conditions below the reservoir in reaches 3, 4 and 5 in their current state. Wetlands below the dam will experience minor impacts from changes in flow regime, but wetland hydrologic conditions in the Walker River will remain virtually intact.

No Action-Reach 5

Reach 5 is unique in that The Siphon provides grade stability to the upper end of the channel. The level of Walker Lake controls channel grade at the lower end. The level in Walker Lake is decreasing steadily causing the Walker River channel to degrade. Reduced flows in this reach (due to water usage in the watershed above) limit the rate at which the channel scours and erodes. The level in Walker Lake has dropped faster than the channel creating the potential for 2 or more feet of erosion in 11 of the 17 miles included this reach. Any activities that increase the peak or total flows in the river channel will accelerate erosion in this reach 5. The No Action alternative would increase flows nominally and only minor indirect impacts to wetlands may be realized. Assuming a 5 % worst-case loss, about 8.5 acres of wetland would be indirectly impacted.

No Action Summary

The net result of lowering the reservoir water level under the No Action option will be a nominal loss of wetland as hydrologic conditions adjust to modified reservoir pool elevations. Within Reach 2, the most significant area of loss is expected to be within the Walker river channel above the inlet to the reservoir. Colonization by wetland vegetation communities on the inlet's sediment delta is expected to offset most, if not all, wetland losses in the river channel 2 miles above the reservoir. Similarly, wetlands along the reservoir shoreline will colonize along the new reservoir shoreline. Reaches 1, 3, 4 & 5 are expected to remain in their current relative states of hydrologic equilibrium and significant wetland losses are not anticipated.

Dam Removal

Dam removal would cause large impacts on the wetlands in the Walker River channel above and below Weber Reservoir. Impacts would be caused primarily by changes that increase erosion processes in the channel. As noted in the geomorphic evaluation, gradient control structures will be required if large-scale wetland losses are to be avoided. Projected impacts to wetlands within the five reaches are described below for dam removal.

Dam Removal-Reach 1

Removal of the dam is expected to have nominal effect on wetlands in this reach. Minor diminution of flow may occur in its lower end as Reach 2 groundwater levels recede. This reduction is expected to occur very slowly and will be of minor consequence to hydrologic conditions in this section of the Walker River. Minor wetland losses may occur over extended time periods, but should be limited to 5 acres or less.

Dam removal-Reach 2

Dramatic changes will occur to the Walker River channel and groundwater resources in Reach 2. Degradation of the Walker River channel is of primary concern (Exhibit 1). About 4 of the 8 miles of river channel plotted will be subject to potential degradation ranging from 2 to 9 feet. Since larger flows in the Walker River tend to be flashfloods, potential channel down cutting may be expected to occur relatively quickly during such events. When the channel is lowered, the soil saturation zones adjacent to the channel (that support wetland communities) may be expected to react in a similar fashion and experience proportional drops in elevation. Channel down cutting can be expected to result in the lowering of groundwater tables and significant losses of wetlands. Rapid channel gradient changes will result in more pronounced wetland losses.

The "Walker River Jurisdictional Wetlands/Waters of the United States Survey identified approximately 2,000 acres of jurisdictional wetland along 19 miles of river channel above Weber Dam (jbr Environmental Consultants, Inc.). For the purposes of this analysis, it was assumed that these wetlands are distributed evenly along this section of the Walker River. Pro-rating wetland community acres for the 2 miles of Walker River channel within Reach 2 potentially degraded 2 or more feet, a maximum of about 210 acres are currently located here. Channel stabilization measures will be placed along the reservoir bottom and at the former reservoir's inlet. The upper channel control structure will retard loss rate and potentially limit losses in the 2-mile reach immediately above it. Wetland loss may be protracted over a significant time period as groundwater tables lower and reach their new equilibrium levels. Worst-case wetland loss in this portion of Reach 2 should not exceed 75% or 158 acres (Table 1).

In the lower portion of Reach 2 wetlands will be lost along the shoreline of Weber Reservoir. Since these wetlands may be exempt from mitigation requirements, they have not been factored into loss and mitigation costs in this document. Opportunities to create mitigation wetlands along the reconstructed river channel in the bottom of the reservoir will exist.

Dam removal-Reach 3

Reach 3 has the potential for up to 3 feet of channel down cutting within a 1-mile section of its length (Exhibit 1 and Exhibit 2). This down cutting can be expected to de-water and impact wetland communities as described previously for the reach above Weber Dam. The previous wetland survey determined that there were about 400 acres of wetland along the 26 miles of the Walker River between Weber Dam and Walker Lake (jbr Environmental Consultants, Inc.). Linearly proportional distribution of this wetland is assumed for calculating potential wetland losses in this section of the drainage (15.4 acres per mile). A loss of 90% associated with this down-cutting depth is assumed for this 1-mile section for a worst-case total of 13.9 acres (Table 1).

Dam removal-Reach 4

Significant amounts of sediment can be delivered to the reach below Weber Dam, especially during larger, flashy flow events. Immediately upstream from the Weber Dam site, tons of sediment will be subject to erosion and entrainment as the river channel seeks to re-establish gradient equilibrium. Sediment will also continue to be transported from the upstream drainage basin, particularly during spring runoff periods and during flashfloods. Rapid delivery of sediment to the aggradation zones identified by the channel profile analysis has the potential to smother wetlands in these portions of the river channel reach.

In Reach 4, about 1 mile of channel may experience aggradation depths up to 3 feet, and 4 miles of channel aggradation depths up to 2 feet. For worst-case calculation purposes, wetland losses in these portions of the channel are assumed to be 90% and 50% for the 3-foot and 2-foot depths, respectively. Total worst-case loss of wetlands in Reach 4 is projected at 44.7 acres.

Dam removal-Reach 5

With removal of the dam, the potential for larger disruptive flows manifests itself in Reach 5. In the worst-case, large disruptive flows will occur immediately following removal of the dam. Maximum impacts to wetland will be realized, with up to 90% or greater losses being realized. Using a 90% loss rate, the 11 miles of channel may lose as much as 152 acres of wetland following dam removal. The depth of down cutting that may be realized in Reach 5 will potentially severely limit the ability of wetlands to migrate with wetland hydrologic conditions and will minimize the area that they can occupy when the channel reaches equilibrium.

Dam Removal Summary

If Weber Dam is removed, potential jurisdictional wetland losses may approach 379 acres. Loss of this wetland may occur over extended periods of time if precipitation patterns are in drought cycles when the dam is removed. If wetter precipitation cycle conditions prevail, the loss may occur within shorter timeframes with the delivery of larger volume flow events to the river.

Alternative Action 1

Alternative Action 1 requires the removal of Weber Dam, the construction of an off-channel reservoir on reservation land and construction of a stream diversion in the Walker River. Diversion of runoff into the off-channel reservoir will have considerable impact on flow volumes in the lower Walker River. On average about 62,000 acre-feet of water flow through this section of river during May, June and July. An off channel reservoir will require about 15,000 acre-feet of water to supply tribal irrigation requirements. This is about 25% of the volume through the lower Walker River each year. Removal of this quantity of water has the potential to dry up peripheral wetland areas located along the river below the required in-stream diversion. Preliminary analyses indicate that the in-stream diversion would have to be located about 32 miles upstream from Weber Dam.

Alternative Action 1-Reach 1

As discussed above under Dam Removal, nominal impacts on wetlands in Reach 1 will be realized that are associated with dam removal. Construction of the diversion inlet will probably directly impact an acre or less of wetland. However, a significant area of jurisdictional wetland occurs along the 26 miles of the Walker River between the in-stream diversion point for the off-channel reservoir and the lower end of Reach 1. If the following assumptions are made: 1) the ratio of 105 acres per mile is representative of the Walker River along this section, and 2) the 25% reduction in flow will cause a linearly proportional decrease in wetlands, then a worst-case indirect impact wetlands loss of about 79 acres can be expected below the diversion inlet within the portion of Reach 1 that falls within the diversion inlet impact zone. This value does not take into consideration the wetlands that will be impacted by the diversion inlet flow reduction between the inlet and the top of Reach 1.

Alternative Action 1-Reach 2

Alternative action 1 impacts to Reach 2 will be similar to those described above under Dam Removal. The principal difference is that the reduction in flow will probably cause the loss of wetlands within this reach to occur more quickly. There may also be a greater loss of peripheral wetlands, since reduced flows will provide less capacity for shallow groundwater recharge. For these reasons, Alternative Action 1 impact analyses uses an 80% loss factor for Reach 2, resulting in a predicted worst-case indirect wetland loss of 168 acres.

Alternative Action 1-Reach 3

As discussed above under Dam Removal, channel down cutting will occur that is expected to indirectly impact wetlands. Because flow volumes will be reduced about 25%, the rate of down cutting is expected to proceed at a slower rate. This will provide more time for existing wetlands to adjust to modified flow volumes and a loss factor of 67.5% has been used for the affected sections of Reach 3. The factor is the product of 90% times the reduced flow volume of 75%. This results in a predicted wetland loss of 10.4 acres in Reach 3 for alternative option 1.

Alternative Action 1-Reach 4

As discussed above under Dam Removal, channel aggradation will occur that is expected to indirectly impact wetlands. Because flow volumes will be reduced about 25%, the rate of channel elevation change is expected to proceed at a slower rate. This will provide more time for existing wetlands to adjust to modified flow volumes and loss factors of 67.5% and 37.5% have been used for 2+ and 1-2 foot depositional sections in this reach.

These factors are the products of 90% loss used previously for 2+ feet of aggradation multiplied by the reduced flow volume of 75%, and 50% loss used previously for 1 to 2 feet of aggradation multiplied by the reduced flow volume of 75%. This results in a predicted wetland loss of 33.5 acres in Reach 4 for alternative option 1.

Alternative Action 1-Reach 5

As previously discussed, removal of the dam creates the potential for larger disruptive flows to occur in Reach 5. In the worst-case, larger disruptive flows will occur immediately following removal of the dam. However, the potential for wetland impact will be reduced with the diminished flows associated with the off-channel reservoir diversion. Using the adjusted loss rate of 67.5%, the 11 miles of channel may lose up to 114 acres of wetland following dam removal in Reach 5 if Alternative Action 1 is implemented.

Alternative Action 1 Summary

Worst-case predicted wetland impacts associated with Alternative Action 1 are the largest of all the options. A maximum of 405 acres of jurisdictional wetland could be impacted if the dam is removed and the off-channel reservoir is constructed. Diversion of water from the main channel adds significantly to the impacts associated with dam removal.

Alternative Action 2

Implementing Alternative Action 2 requires removal of Weber Dam with the impacts to jurisdictional wetlands associated with the river channel described above under Dam Removal being realized. In place of the off-channel reservoir a well field will be constructed to pump groundwater resources to provide irrigation water.

Indirect impacts to jurisdictional wetlands can be expected to occur in association with this groundwater pumping. The river and groundwater resources are highly interconnected. Annual removal of 12,000 acre-feet of groundwater for irrigation (evaporation and leakage are expected to be less within this type of closed system) has the potential to lower groundwater tables and reduce surface water flows in a fashion similar to the off-channel diversion in Alternative Action 1. To evaluate groundwater removal impacts on wetland hydrology, it is assumed that pumping volumes will have the same linearly proportional effect on wetland resources as diverting surface waters. While groundwater infiltration and transmissivity rates may be slower than direct surface water diversion, the net effects on surface water resource availability in the river channel are expected to be proportionally similar.

The advantages associated with the groundwater-pumping alternative include a reduction in the amount of water resource allocated for irrigation and the ability to place the groundwater field in closer proximity to irrigation supply structures. Placing the well field lower in the drainage limits flow reduction impacts to the lower reaches of the Walker River (i.e., Reaches 3, 4 & 5). Specific design and resource information on this alternative should be provided if more precise quantification of potential impacts to jurisdictional wetlands is needed in the decision process. For comparison purposes in this analyses the impacts to wetlands associated with groundwater removal have been calculated using the percentage reduction in need of water for irrigation purposes.

Finally, the reader should keep in mind that indirect wetland losses associated with groundwater pumping might not be regulated by the COE (see Indirect Impacts: Groundwater Well-Field Dewatering above). For this evaluation it has been assumed that indirect groundwater impacts on wetland resources will be regulated by the COE.

Alternative Action 2-Reach 1
Removal of the dam will have effects on Reach 1 similar to those described under Dam removal. The worst-case impact on wetlands is expected to be 5 acres or less.

Alternative Action 2-Reach 2
Removal of the dam will have effects on Reach 2 similar to those described under Dam Removal. The worst-case impact on wetlands is expected to be about 158 acres.

Alternative Action 2-Reach 3
Removal of the dam will have effects on Reach 3 similar to those described under Alternative Action 1. The worst-case impact on wetlands is expected to be 10 acres.

Alternative Action 2-Reach 4
Removal of the dam will have effects on Reach 3 similar to those described under Alternative Action 1. The worst-case impact on wetlands is expected to be 34 acres.

Alternative Action 2-Reach 5
Removal of the dam will have effects on Reach 3 similar to those described under Alternative Action 1. The worst-case impact on wetlands is expected to be 114 acres.

Alternative Action 2 Summary
Alternative action 2 results in a worst-case wetland impact of 366 acres. This impact may decrease significantly in size if COE does not have authority over indirect impacts to wetlands associated with groundwater pumping. For these analyses, these acres of potential wetland impact have been included.

Proposed Action

For the Proposed Action, Wetland impacts will be primarily limited to Weber Dam construction activities. Further lowering of reservoir water levels during construction periods may have minor additional impacts on jurisdictional wetland above the reservoir. Such impacts are expected to be short-term in nature; with the wetlands recovering rapidly once the reservoir is refilled. Modification to the existing dam would result in the dredge and fill of less than 1 acre of jurisdictional wetland. Following dam modification construction, the reservoir will be refilled, and existing streamflow and associated hydrologic balances would be maintained below and above Weber Dam. Therefore, impacts to jurisdictional wetlands along this reach of the Walker River will be limited and of a temporary nature.

Proposed Action-Reach 1
No impacts to jurisdictional wetlands are expected, since the existing hydrologic system remains in equilibrium.

Proposed Action-Reach 2
Short-term impacts to wetlands are realized. These impacts have already begun to occur with the lowering of the reservoir level pending repair or removal. They will be short-term in their duration, with wetland recovery occurring rapidly after the reservoir is refilled. Long-term indirect wetland losses are not realized in Reach 2 under the Proposed Action.

Proposed Action-Reach 3
Minor direct losses of wetland to dredge and fill are incurred during Weber Dam modification construction activities. These activities should impact less than 1 acre of jurisdictional wetland.

Temporarily routing floodwaters around the construction site may result in accelerated erosion processes in Reach 3. Impacts to wetlands associated with these releases should be temporary in nature and have not been considered in this evaluation.

Proposed Action-Reaches 4 & 5
These reaches should experience flow regimes similar to those projected for Reach 3. No long-term indirect impacts to wetlands should be realized in these reaches.

Proposed Action Summary
The Proposed Action will result in the least disturbance to jurisdictional wetland. About 1 acre will experience direct impacts due to dredge and fill activities associated with dam modification. While some shot-term impacts will be realized, they will be temporal in nature with no long-term wetland losses being incurred.

Wetland Loss & Mitigation Summary

A summary of worst-case jurisdictional wetland losses for the Proposed and Alternative Actions are provided in Table 1. Reach subtotals and action totals are included. This table also includes minimum anticipated mitigative wetland requirements and is used in developing wetland mitigation cost estimates for the various actions.

Mitigative Wetland Requirements & Costs

The general requirements and associated costs for constructing mitigative wetlands for the various actions being considered for Weber Dam are presented in this section. This information is general in nature and is not intended to represent the actual costs that could be incurred in the construction of mitigative wetlands for a given action. It is intended to provide general macroeconomic information required to assess the viability of the various actions being considered. Actual costs incurred by the various alternatives may vary considerably from the estimates provided depending upon the actual sites selected for mitigative wetland construction and their specific construction requirements. The analyses do allow relative comparison between the alternatives and from that standpoint may be used in evaluating the feasibility of the various alternatives.

Minimum COE replacement ratios for mitigative wetlands required to offset jurisdictional wetland losses are 1.1 to 1, respectively. Suitable sites and adequate water supply (natural or passive delivery is preferred) will need to be identified for required mitigative wetland acreage for each of the alternatives.

Costs do not include the following:

- Locating a suitable site and designing required mitigative wetlands;
- Performing excavation and earthwork to form the mitigative wetlands' topography (other than hydric soil salvage and redistribution which is included); or
- Providing passive or managed water sources.

Direct costs associated with preparing and planting mitigative wetlands required to offset maximum jurisdictional wetland losses are provided for each potential action (

Table 3).

No Action Alternative-Mitigation
The No Action alternative requires construction of 31.4 acres of wetland for mitigation. The cost to construct this wetland is projected at $130,479.

Dam Removal-Mitigation
Dam removal has the potential to affect 379 acres of jurisdictional wetland. This jurisdictional wetland loss would require the construction of a minimum of 417 acres of mitigation wetlands. The cost to construct mitigative wetland to replace this loss is projected to be at least $1,735,138. The placement of channel control structures is not included in these costs.

Alternative Action 1-Mitigation
Mitigation costs for Alternative Action 1 are estimated at $1,852,798 to provide 445 acres of wetland. Additional costs will be incurred in the design and construction of these wetlands as noted above. Impacts to wetlands associated with delivery of off-channel reservoir water to existing irrigation supply structures has not been identified or included in these costs.

Alternative Action 2-Mitigation
Mitigation costs for Alternative Action 2 are estimated at $1,524,614. Additional impacts to jurisdictional wetlands may be realized in association with irrigation supply

pipeline crossings. Additional design information is required to characterize such impacts; they are not included in this cost projection.

Proposed Action-Mitigation

The Proposed Action has the least impact on jurisdictional wetland affecting less than 1 acre. Jurisdictional wetland disturbance is limited to direct impacts below the dam where construction activities will result in the dredge and fill of a small area required to realign the dam itself. Adequate area exists below the dam to construct wetland that can be passively watered. Construction costs for soil placement, seeding and mulching will be similar to those for the other actions. The cost to conduct mitigation wetlands for the Preferred Alternative is $4,578.

Mitigative Wetland Construction Costs

Quantifiable costs for mitigative wetland construction include soil conditioning and preparation, the cost for wetland species seed mixtures needed to develop hydrophytic plant communities, and the cost to apply tackified straw mulch following seeding. In some cases special measures may need to be taken to adequately construct and establish mitigative wetlands. Such measures may include, but are not limited to:

- Earthmoving/excavation costs;
- Mulching with hydromulch;
- Using erosion control blankets or geotextiles to stabilize seedbeds;
- Transplanting containerized nursery stock; and
- Collection, propagation and transplanting site-specific plant materials.

Estimating the costs for such activities is outside of the scope of this document, since specific design details are needed to determine site requirements and implementation/application costs.

Proper soils are critical to successful mitigative wetland establishment. Prior to soil placement, the subsoil should be ripped in order to scarify its surface and to minimize the potential for soil slippage and loss. Suitable soil materials are then imported and spread across the site at an average depth of 6 inches. For this analysis the cost to salvage and import hydric soils from impacted jurisdictional wetlands has been used. Importation of hydric soils provides an additional benefit in that local wetland plant species will be transferred to mitigative wetlands, thereby reducing seeding requirements and associated costs. Salvage and importation efforts will require adequate quality controls to ensure that soils are placed in mitigative wetland habitats similar to their point of origin (emergent, wet meadow, etc.). This will ensure optimum growth of volunteer hydrophytic vegetation and serve to minimize augmentative seeding costs. The cost to salvage and apply wetland topsoil is estimated at $3.50 per cubic yard. The estimated cost to topsoil one acre of mitigative wetland with 807 yards is $2,823.

Mitigative wetland seeding costs include seed materials, and equipment and labor for planting. Seed costs represent the application of 10 pounds per acre with an average cost

of $8 per pound of seed ($80/acre). Seeding labor and equipment costs are $57.50 per acre. Seeding is performed using an ATV and broadcast seeder.
Tackified straw mulch is applied following seeding. Mulch is applied at 2 tons per acre, with tackifier being applied at 80 pounds per acre. The cost for mulching is $950 per acre. Total costs associated with establishing one acre of mitigative wetland are $4,162 (Table 2).

Proposed & Alternative Action Cost Comparisons
Costs to construct mitigative wetlands for the various actions considered for Weber Dam are summarized in Table 3. These costs represent worst-case jurisdictional wetland disturbance; actual wetland losses may be less than the acreages indicated in the table. Based on jurisdictional wetland impact analysis, the Proposed Action is the clear economic choice for Weber Dam. Modification to the structure addresses public safety issues, while concurrently minimizing jurisdictional wetland disturbance. LCT issues will also be addressed if dam modification includes allowances for their unimpeded passage through this barrier.

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Exhibit 1. Walker River Channel Gradients: Weber Dam to 12 Miles Upstream

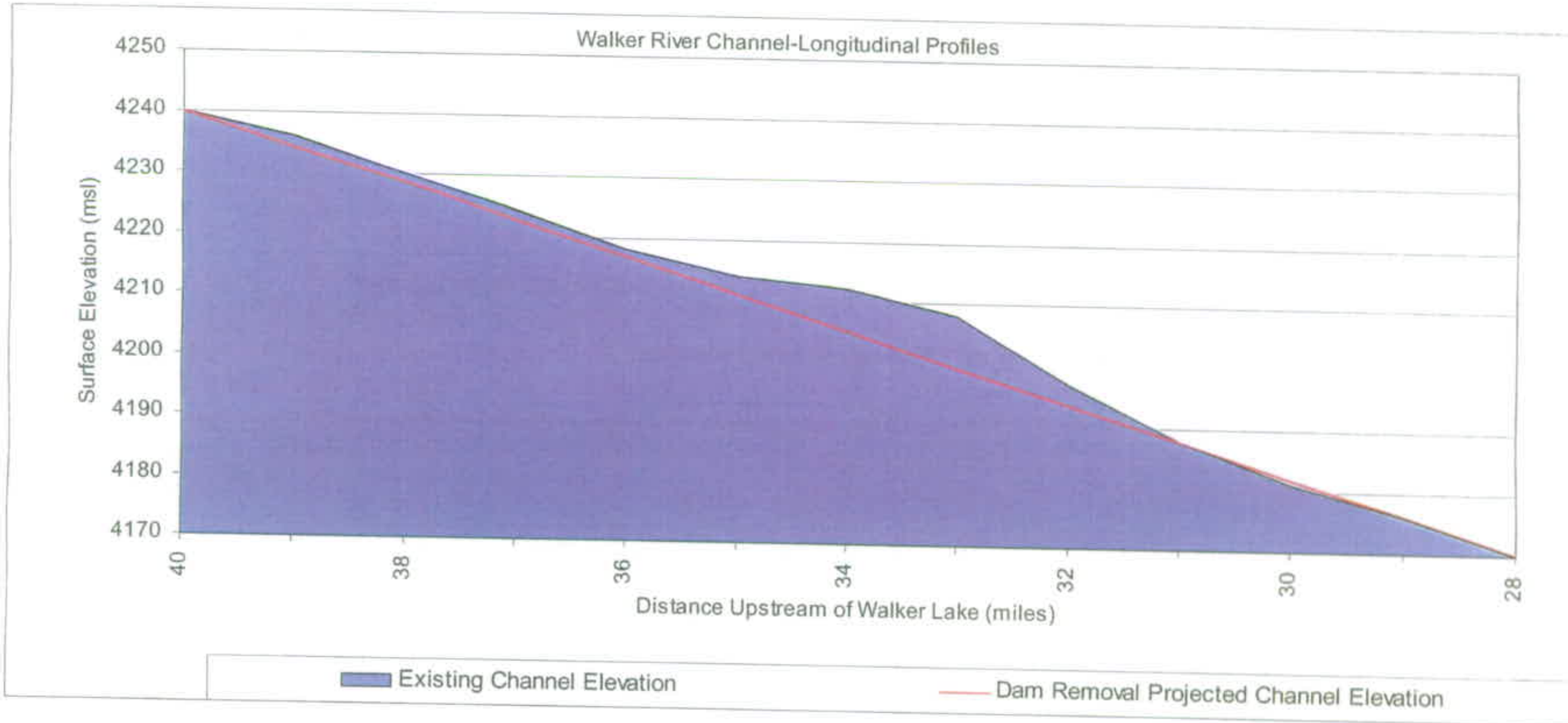

Exhibit 2. Walker River Channel Gradients: Weber Dam to The Siphon

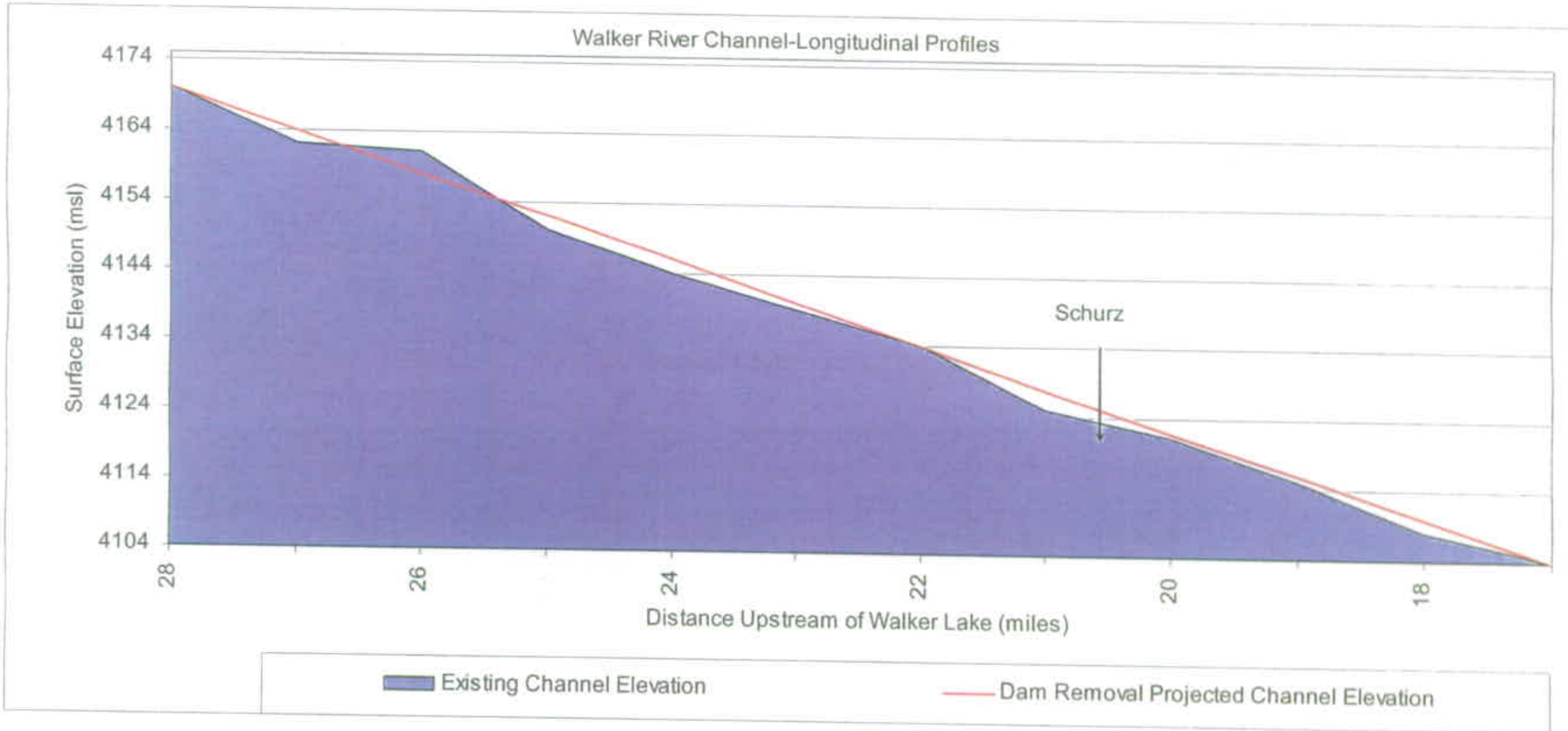

Exhibit 3 Walker River Channel Gradients: The Siphon to Walker Lake

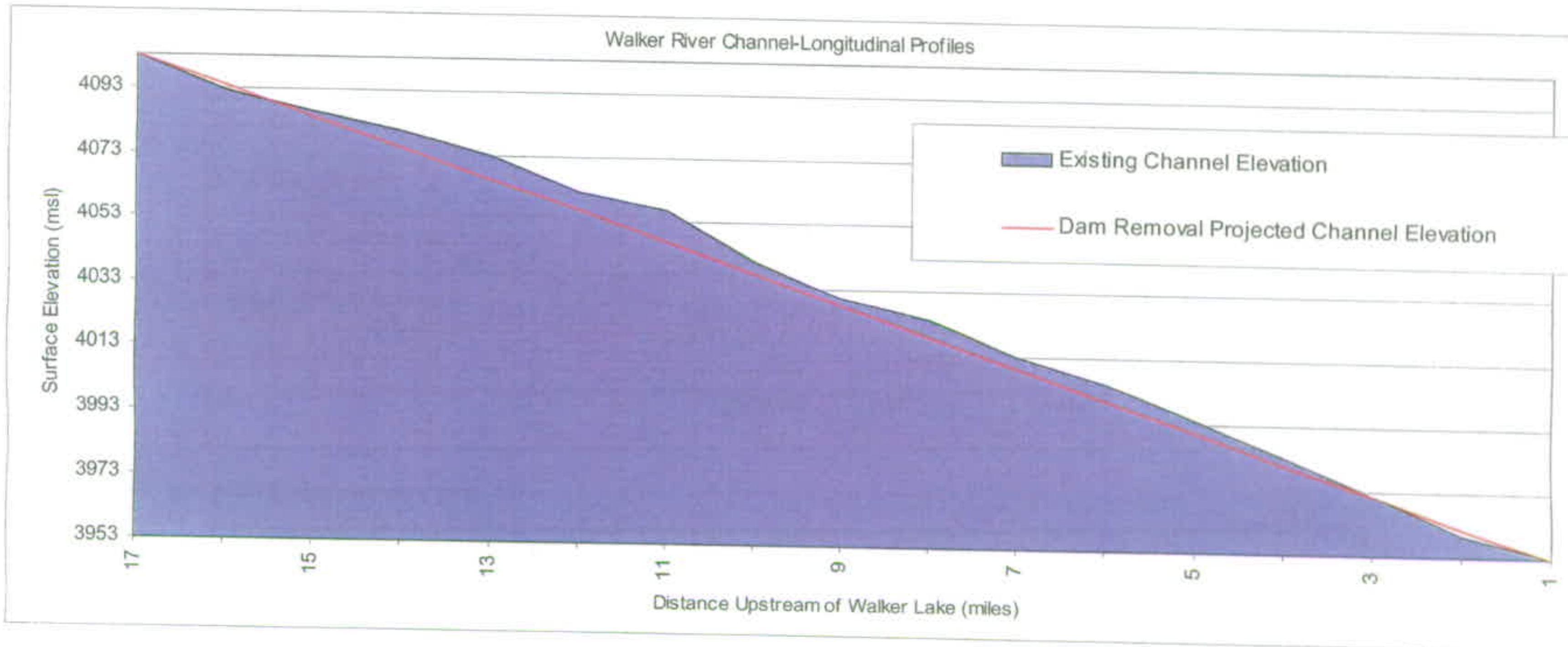

Table 1. Weber Dam Potential Actions: Projected Jurisdictional Wetland Impacts

Action Option	Reach					Impacted Wetland (Acres)
	1	2	3	4	5	
No Action	0	20	0	0	9	29
Dam Removal	5	158	14	45	157	379
Alternative Action 1	79	168	10	34	114	405
Alternative Action 2	5	158	12	36	122	333
Proposed Action	0	0	1	0	0	1

Table 2. Mitigative Wetland Construction Costs

Item	Quantity	Unit Type	Cost/Unit	Item Total
Scarifying	1	Acre	$ 125.00	$ 125
Soil Salvage/Redistribution	807	Cu. Yds.	$ 3.50	$ 2,825
Hydrophytic Species Seed	10	Pounds Pure Live Seed	$ 8.00	$ 80
Broadcast Seeding	1	Acre	$ 57.50	$ 58
Tackified Mulch-Materials & Application	1	Acre	$ 1,075.00	$ 1,075
Mitigative Wetlands Total Cost per Acre				**$ 4,162**

Appendix E – Section 404(b)(1) Evaluation

404(b)(1) Evaluation

Weber Dam Repair and Modification Project

Prepared for:

U.S. Department of the Interior
Bureau of Indian Affairs
Western Regional Office
Phoenix, Arizona

and

Walker River Paiute Tribe
Schurz, Nevada

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April 14, 2005

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Table 3. Weber Dam Potential Actions: Projected Mitigative Wetland Construction Costs

Action Scenario	Total Acres Impacted Jurisdictional Wetland	Mitigative Wetland to Jurisdictional Wetland Ratio	Mitigative Wetland Required (acres)	Construction Cost per Mitigative Wetland Acre	Projected Total Mitigative Wetland Cost for Action
No Action	29	1.1	31.4	$4,162	$130,479
Dam Removal	379	1.1	416.9	$4,162	$1,735,138
Alternative Action 1	405	1.1	445.2	$4,162	$1,852,798
Alternative Action 2	333	1.1	366.3	$4,162	$1,524,614
Proposed Action	1	1.1	1.1	$4,162	$4,578

1 INTRODUCTION

This evaluation under Section 404(b)(1) of the Clean Water Act (CWA) has been prepared by the U.S. Bureau of Indian Affairs (BIA) to analyze and describe the potential impacts from proposed discharges of dredged or fill material into the waters of the United States resulting from repair and modification of Weber Dam in Nevada. This 404(b)(1) evaluation was prepared in support of the requirements of Section 404 of CWA (Public Law (PL) 92-500, as amended), and U.S. Environmental Protection Agency (EPA) Guidelines (40 Code of Federal Regulations (CFR) Part 230 *et seq.* Guidelines), and specifically to meet the requirements of Section 404 (r) of CWA.

This 404(b)(1) evaluation followed EPA Guidelines, which are weighted toward restoring and maintaining the chemical, physical, and biological integrity of waters of the United States by controlling discharges. The evaluation addressed Weber Dam Repair and Modification Project purposes, practicable alternatives, cumulative effects, mitigation, and made factual determinations of the potential impacts of the Project to the waters of the United States.

The purpose of this 404(b)(1) evaluation is to document how the project minimizes adverse impacts on aquatic resources in fulfilling the overall project purpose and need.

1.1 404(b)(1) Guidelines

The 404(b)(1) Guidelines, contained in Title 40 of the CFR, Part 230 *et seq.*, are the criteria used in evaluation discharges of fill (or discharges of dredged materials) in waters of the United States under Section 404 of the CWA Act. These are applicable to all 404 permit decisions.

The Guidelines were developed by the EPA in conjunction with the Secretary of the Army acting through the Chief of Engineers and have the full force and effect of law. The Guidelines are consistent with policies expressed in CWA and are intended to implement those policies. The Guidelines are weighted toward restoring and maintaining the chemical, physical, and biological integrity of waters of the United States by controlling discharges. Basic to the Guidelines is an understanding that fill (or dredged) material should not be discharged into such waters unless it is demonstrated that such discharges would not have unacceptable adverse impacts either individually or in combination with existing and/or probable impacts of other activities affecting the environment. A Section 404(b)(1) evaluation is intended to provide demonstration of the compliance, or the lack thereof, with the Guidelines.

The Guidelines state that there must be no other practicable alternative which is less damaging to the aquatic environment, unless the least damaging alternative would have other significant adverse environmental consequences. This is a technical analysis based on many factors that are evaluated in light of the purpose and need for the project under review.

A number of critical items must be evaluated for each project. These include the basic project purpose, practicable alternatives, cumulative effects, and impact mitigation, as well as the factual determinations. Key issues must be decided in arriving at a determination of compliance or non-compliance. The project must not cause or contribute to significant degradation of waters of the United States, and all appropriate and practicable measures for avoiding or minimizing potential adverse impacts of the discharge on the aquatic ecosystem must be taken.

Section 230.10 (b) requires that the project comply with EPA water quality standards, the federal Endangered Species Act (ESA), and other pertinent statutory provisions. Section 230.11 of the Guidelines sets forth the factual determinations used in deciding compliance. These determinations are as follows:

- Physical substrate
- Water circulation, fluctuation, and salinity
- Suspended particulate/turbidity
- Contaminant
- Aquatic ecosystem and organism
- Proposed disposal site
- Cumulative effects on the aquatic ecosystems
- Secondary effects on the aquatic ecosystem

Section 230.12 requires a finding of compliance or non-compliance with the restrictions on discharge.

Subparts C through F of the Guidelines evaluate the potential impacts of the fill activity on physical and chemical characteristics of the aquatic ecosystem, special aquatic sites, and human use characteristics respectively. Subpart G of the Guidelines sets forth evaluation and testing procedures to provide information necessary to reach the determinations in Subpart B. Subpart H of the Guidelines lists actions to minimize adverse effects of the discharge.

The following sections discuss the definition of the basic project purpose, the selection process for project alternatives, and the Subparts B through H evaluations.

2 PROJECT PURPOSE

EPA 404(b)(1) Guidelines are the substantive environmental criteria used in evaluating activities that discharge dredge or fill material into the "waters of the United States." Section 230.10(a) of the Guidelines states:

> *"...no discharge of dredges or fill material shall be permitted if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences."*

The hierarchical structure of the Guidelines encourages activities that avoid discharges. The alternative analysis required by Section 230.10(a) is designed to achieve the basic project purpose with the minimal adverse environmental impact.

For the 404(b)(1) Evaluation for the Weber Dam Repair and Modification Project, the following steps were used in the Section 230.10(a) process to review potential alternatives:

- Project purpose and need were defined.
- A range of project alternatives was identified.
- Evaluation was undertaken to identify practicable alternatives.
- The environmental impacts of practicable alternatives were identified.

The definition of overall project purpose is essential to an adequate 404(b)(1) Evaluation of the least damaging practicable alternative. The overall project purpose drives the definition and evaluation of alternatives.

The initial proposal for repair and modification of the Dam was the result of the safety analysis conducted in 1989 under the BIA Dam Safety Maintenance and Repair Program (DSMRP), created as part of the Indian Dams Safety Act (IDSA) 25 U.S.C. §§ 3801-04. Under DSMRP, BIA must perform such rehabilitation work as is necessary to bring the dams identified as unsafe to a satisfactory condition, and each dam located on Indian lands shall be regularly maintained by BIA. IDSA requires that work authorized shall be for the purpose of dam safety maintenance and structural repair.

The Reservoir had a maximum surface area of about 960 acres and a storage capacity at the top of the spillway gates of 13,000 acre-feet (af) at completion (Kronquist 1939). Current capacity is about 10,700 af because of sedimentation (Katzer & Harmsen, 1973). Currently, BIA has a reservoir restriction in effect at Weber Dam, and the Interim Operating Criteria (IOC) limits the maximum Reservoir elevation to 4,200 feet mean sea level (msl) which equals approximately 4,766 af of storage. On an annual basis, the

Tribe can request BIA to modify the IOC to allow water to be stored behind Weber Dam up to an elevation of 4,202 feet msl, or 6,083 af, for a period not to exceed 30 days. After 30 days at elevation 4,202 feet msl, releases must be made to return the water elevation to 4,200 feet msl.

2.1 Overall Project Purpose.

Weber Dam is an earthern dam on the Reservation in Western Nevada that impounds waters of the Walker River,[1] a stream which originates in the Sierra Nevada Mountains and terminates at Walker Lake. Weber Dam is located on the Walker River Indian Reservation (Reservation) about 80 miles east of Lake Tahoe and 25 miles northwest of Walker Lake. It is about four miles upstream of the town of Schurz, Nevada, and seven miles upstream of the intersection of U.S. Highways 95 and 95A. Weber Dam is owned and operated by BIA for the benefit of the Tribe to provide irrigation water to Reservation lands. The Dam, Reservoir, and the lands it serves lie wholly within the boundaries of the Reservation.

The major portion of Weber Dam was built during 1933-35 and completed in June 1937 when the spillway gages were installed (Johnson, 1975). The crest is 16 feet wide, 1,950 feet long, and has an elevation of 4,217 feet msl. The structural height of the Dam, which is the distance from the base of the foundation to the crest, is 50 feet. The hydraulic height, which is the distance from the lowest point in the original streambed at the dam axis to the top of the spillway gates at 4,208 feet msl, is 36 feet (Carter and Heyder, 1993). The Dam has a homogenous silty sand core with riprap protection on the upstream face, and a thin rock shell on the downstream face.

Weber Dam was constructed as part of the Walker River Indian Irrigation Project in the mid 1930's. Its primary use is to maintain a water supply for the irrigation of Reservation lands. It also provides other benefits including flood protection, recreation, a fishery, and has historical and cultural values. Additionally, a need has been identified in the Walker River Basin to store dedicated water from Walker River water users to deliver such water in large blocks to Walker lake to enhance the lake ecosystem.

As a result of dam safety investigations conducted in 1989, the Dam was given a high hazard rating and poor overall safety rating. The investigations identified the presence of a secondary earthquake fault underlying the Dam embankment. With the Reservoir at full capacity in its current condition, movement along the existing fault could cause the outlet works to rupture. This would allow seepage to remove foundation and embankment materials. The material could pass into and through the ruptured conduit, which could lead to a breach of the embankment with a possible sudden uncontrolled release of the Reservoir. This breach could result in flooding of areas downstream from the Dam. That in turn could result in flooding. The hazard rating means that more than six lives could be lost should the Dam fail, and the safety rating means the overall risk of

[1] Annual river volume has varied greatly from year to year, ranging from 6,664 af to 601,218 af for the period 1903 through 2002.

overtopping by floods or structural failure during an earthquake is relatively high (USBR, 1993a). Rating factors include seepage, hydrology, static stability, liquefaction, and dynamic stability.

Since 1989, DSMRP has ranked Weber Dam as the number one facility in need of repair pursuant to the IDSA. This ranking means that Weber Dam is the most unsafe BIA dam in operation. The Tribe and BIA propose to repair and modify the Dam pursuant to the IDSA to reduce two risks: 1) the risk of loss of life should the dam fail; and 2) the risk of overtopping by floods or structural failure during an earthquake. Funding secured under the IDSA is authorized for the repair and modification of existing dams on Indian lands. The IDSA does not authorize new construction. Repair and modification of Weber Dam, therefore, is the federal action analyzed in this 404(b)(1) Evaluation.

Regulations governing the operation and maintenance of Indian irrigation projects are located at 25 C.F.R. Part 171. BIA Manual Part 55, Chapter 1, provides that it is BIA policy to construct, operate, and maintain irrigation projects in accordance with applicable technical and safety standards. IDSA requires that such repair and modification work be completed as necessary to bring the dams identified as unsafe to a satisfactory condition.

3 PROJECT NEED

Various repairs to the Dam are needed. The principal problems to be corrected are unsatisfactory static stability, potentially liquefiable materials in the lower portion of the embankment, and unsatisfactory properties with respect to seepage and rapid drawdown of the Reservoir (USBR, 1993). The proposed modifications and repairs would be funded by BIA.

In addition to addressing safety and hazard issues, the proposed repair and modification of the existing Dam would also provide a secure source of irrigation water, recreation, fish and wildlife habitat, and undetermined future uses for tribal members and Reservation lands. This action would include realigning the north side Dam embankment, widening the existing embankment at the outlet works, rehabilitating the outlet works and service spillway, extending the outlet works tunnel, enlarging the emergency spillway, and constructing access roadways.

4 ALTERNATIVE ANALYSIS

4.1 Alternatives Criteria

Chapter 2 of the Final Environmental Impact Statement (FEIS) provides an overview of the development and evaluation of alternatives (Miller 2004). The alternatives were developed through a public and agency process combined with environmental and technical analyses. BIA and the Tribe began the alternatives selection process based on the following screening criteria:

- Satisfy the statutory authorization, purpose, and need.
- Meet cost and construction time considerations.
- Deliver the same volume and quality of water to the Tribe for irrigation and with the same priority as would the present Weber Reservoir at full capacity, consistent with the claims of the Tribe and the United States in *United States v. Walker River Irrigation Dist.,* No. C-125-B (D. Nev.).
- Implemented on the Reservation.
- Readily deliverable for use by the Tribe.
- Comply with all applicable laws and regulations.

4.1.1 Evaluation of Alternatives Summary

Chapter 2 and Volume 2 Appendix D of the FEIS provide the details of the alternatives evaluation process involving the environmental impacts, purpose and need, and technical and economic factors of the Project. The selection is summarized in the following sections.

4.1.2 Selection of Practicable Alternatives

Identification of Alternatives

A range of alternatives to meet the overall project purposes was considered. These alternatives addressed off-channel areas to store water on Reservation lands with single locations and multiple smaller sites, well field and groundwater development, dam repair and modification, and no action (i.e. no repair).

A reconnaissance was conducted of potential reservoir sites throughout Reservation lands. No suitable sites were found that could store off-channel. The only natural site that had potential was downstream from Schurz and north of Walker Lake. That location precludes use of the water for irrigation by the Tribe. No other locations were found that would supply sufficient volume or have the ability to transfer water efficiently from the river to storage without considerable implications both technically and environmentally.

No Action

25 C.F.R. § 1502.14(d) of the NEPA regulations requires the alternatives analysis in the EIS to "include the Alternative of No Action." Under this alternative, the approval of the expenditure of federal funds for the repair and modification of Weber Dam would not occur and the Reservoir IOC implemented by BIA for dam safety (BIA 2002) would continue. The hazard and safety issues associated with non-repair of the dam would remain under the No Action alternative.

The no action alternative would result in maintaining the reservoir level lower than full capacity and would not allow full use of the Tribal water for irrigation and other needs for the Tribe. In addition, over the long term, the no action alternative could result in loss of wildlife habitat and recreation that are part of the overall project purpose.

Proposed Action

The Proposed Action is an integrated set of actions to insure safe operation of the dam while utilizing the maximum capacity of the reservoir. The proposed repairs involve all major features of the dam including rehabilitating the outlet works and service spillway, modifying a portion of the existing embankment, widening a portion of the existing embankment, enlargement of the emergency spillway, and construction of a fishway.

Two additional alternatives were evaluated for the Alternative Analysis. These alternatives were proposed during the scoping process for the Weber Dam Modification EIS. Alternative 1 is construction of an off-channel reservoir. This reservoir would be of sufficient size to provide water in the same quantity and quality as the current Weber Dam at full capacity for the irrigation on the Walker River Paiute Tribe reservation. Alternative 2 is development of ground water wells to supply water in the same quantity and quality as current Weber Reservoir at full capacity. Common to both alternatives is the removal of Weber Dam to remove the impact to passage of Lahontan cutthroat trout (LCT).

The current operation of the irrigation system relies on Weber Dam to provide sufficient water to the diversion dam at canal #1 and canal #2 to provide irrigation for the Walker River Paiute Tribe. The canal typically operates with a two weeks on and two weeks off sequence throughout the irrigation season. The water volume for each canal is approximately 40 cubic feet per second (cfs) for efficient distribution to the irrigators (Chuck O'Rourke, personal communication).

Based on the assessment of purpose and need and technical factors, the Proposed Action was identified for further consideration in the FEIS. The other alternatives considered but eliminated from further evaluation included removal of Weber Dam as part of each alternative. As noted in FEIS Volume 2, Appendix D, both of those alternatives resulted in significant impacts to wetlands upstream of Weber Reservoir with an estimated impact to over 450 acres of wetlands with either of those alternatives. The Proposed Action resulted in the least amount of impact to wetlands and waters of the United States and was selected as the practicable alternative.

Off-channel Reservoir Alternative

The off-channel reservoir was evaluated to provide a capacity of 10,700 af which is the current capacity of Weber Reservoir. Alternative reservoir sites off-channel were evaluated. There are no cross drainages or deep ravines of sufficient size close to the river upstream of Little Dam to provide a natural reservoir location on the reservation. There is one potential site approximately seven miles from the river and 450 feet higher than the present Weber Dam elevation. It would be uneconomical to construct a reservoir at this site due to the distance from the river and the pumping lift required to get water into a reservoir constructed at this location.

A constructed reservoir in the Sunshine Flats area was evaluated as an alternative to a natural reservoir site. The reservoir evaluated had a maximum storage of 5,000 acre feet. Assumptions for this alternative include: 1) the quantity of water was the minimum that could be stored in the reservoir that would supply full irrigation during the growing season; and 2) the water diverted into storage would only be diverted during high flows and the spring runoff season.

The reservoir would be constructed by excavating to a depth of 20 feet. Excavated material would be used as fill for the embankment to build up the reservoir size. It is estimated that the actual cost of construction, not including engineering, permitting and contingencies, would exceed $20 million for a reservoir of this size. The addition of engineering, permitting and contingencies would result in a cost of approximately $32 million. These cost estimates used the valuation provided in the Bureau of Reclamation (Reclamation) documentation for reservoir construction and the rehabilitation of Weber Dam. Engineering, permitting and contingency costs were based on Reclamation values for those tasks.

In addition to the reservoir construction costs, there would be a cost for construction of the diversion structure in Walker River, which would divert flow into the off-channel reservoir. This diversion would require electricity for pumping facilities to transport water to the reservoir. It would also need to include fish passage at the diversion dam. The pipeline cost is estimated at approximately $1.6 million per mile using a pipe of 33 to 36" diameter.

Estimated engineering costs for removal of Weber Dam, reconstruction of stream channel and wetlands mitigation is estimated to exceed $15 million. All of these costs would be added to the reservoir construction costs. The total estimated cost for the off-channel reservoir is approximately in the $50-60 million range for total construction.

It appears that, due to high cost, this alternative is not a feasible for replacement of Weber Dam. The cost per acre of irrigated land would be excessive (approximately $24,000 per acre) and would require new authorization for construction.

Ground Water Well Field Alternative

Development of ground water wells were proposed on the Walker River Paiute Reservation that would supply water in the same quality and quantity as Weber Dam and reservoir. The ground water technical memorandum shows that sufficient ground water resources exist on the reservation to develop well fields for irrigation of the 2,100 acres. These water supply wells could be used to supplement or possibly replace the water supply for irrigation from Weber Reservoir, however, the long term sustainable yield of the ground water system and potential impacts to flows in the Walker River have not been estimated at this time based on the lack of data.

Assumptions for development of the ground water were that the surface water rate of 26.25 cfs would be delivered to the reservation through the growing season and that an additional 53.75 cfs would be required from the supply wells to meet the current peak demand during the irrigation season. Weber Dam currently releases approximately 80 cfs during irrigation which is divided at approximately 40 cfs per canal to provide enough head to irrigate each of the fields along the canal in sequence.

Supplying the 53.75 cfs would correspond to a total pumping rate of approximately 24,000 gallons per minute. This demand could be met with ten production wells with an average yield of 2,400 gallons per minute (gpm). Typical costs for each well are approximately $88,000. Total estimated costs just to install the well field to meet irrigation demands are $890,000. This cost estimate does not include operation and maintenance, which is estimated at approximately $240,000 per year for the entire well field. In addition, there would be cost to construct supply lines from the wells up to near the Little Dam area into each canal. Estimated cost to transport the volume of water needed is approximately $1.6 million per mile for pipeline. The pipeline would extend at least five miles for about an $8 million cost for construction of the conveyance system.

In addition to water conveyance facilities, rights-of-way would need to be secured for well construction and the pipeline. The current well field locations seem to be best located in the upper flood plain area downstream of Little Dam. This area also includes the irrigated acreage and would need multiple rights-of-way from the allottees on these parcels.

In addition to the construction cost of approximately $9 million, there would be additional cost for wetland mitigation. Wetland mitigation for both the off-channel reservoir and the ground water facility is estimated at approximately $4.7 million for construction of wetlands that would be lost from the upper end of Weber Reservoir when the dam is removed. This cost does not include the long-term operation, maintenance, and additional water needed for irrigating the wetlands to provide the wetland function. Approximately 450 acres of wetlands would need to be mitigated with the removal of

Weber Dam (Table 1). Some of these wetlands could be mitigated along the stream channel but the majority of the wetland would need to be located off the stream channel either adjacent in the area that they currently exist and maintain through flood irrigation or a suitable location off-channel would be required and irrigation water supplied to maintain the wetland function. Irrigation surface water would be needed at approximately 10-15 acre feet per acre per year with a total supply of up to 7,000 acre feet needed for wetland irrigation needed to maintain the wetland function for mitigation.

It appears that, due to high cost, this alternative is not a feasible for replacement of Weber Dam. The cost per acre of irrigated land would be excessive and would require new authorization for construction.

Biological Resources, Other Values for Both Alternatives

Both alternatives would have impacts on terrestrial and aquatic resources with the removal of Weber Dam. Dam removal would result in the total loss of the reservoir fishery. The current water temperature regime downstream of Weber Dam would be elevated due to lack of cool water release from Weber Dam. This would make the water temperatures in Walker River unsuitable for LCT at an earlier date than currently exists. Elevation of water temperatures may make the river unsuitable for some of the warm water species that currently exist in the reservoir and river.

A fish passage facility would be required with the off channel reservoir. This facility is likely to be nearly as large as a fish passage facility proposed for Weber Dam. No fish passage facility would be required for the ground water well alternative.

The loss of wetlands and conversion of riparian to upland habitat in the upper end of the reservoir would result in loss of terrestrial habitat and species associated with those habitat types. The removal of the reservoir would result in a loss of habitat for waterfowl and shorebirds. It is anticipated that the riparian area upstream of the reservoir would become much smaller in size and be similar to the current narrow riparian corridor downstream of the reservoir. All of these features are part of the overall project purpose.

The removal of the dam and reservoir would result in the loss of fishing and camping opportunities as they currently exist. The flood attenuation that could be achieved with Weber Dam would be lost. The potential for flooding in downstream areas, including Schurz would be increased. Weber Dam was operated during the 1997 winter flood to prevent flooding in Schurz. This capability would be lost with dam removal.

Table 1. Summary of costs and impacts by resource category.

Resource area	Proposed Action	Off-Channel Reservoir	Ground Water Wells
Geomorphology	No change from current conditions	Channel change expected from Little Dam to upstream of current Weber Reservoir Channel stabilization required. In-channel structures required to stabilize channel in Weber Reservoir basin. Channel lowering expected of approximately 1 foot.	
Ground water	No change expected	No change expected	Sufficient ground water resource to replace Weber Reservoir Long term impact to ground water yield unknown Ten wells required to replace Weber Reservoir
Wetlands	Loss of small wetland (< 2 acres)downstream of current dam	Loss of up to 450 acres of wetlands Requires construction of new wetlands Requires additional surface water diversion to irrigate constructed wetland	Loss of up to 450 acres of wetlands Requires construction of new wetlands Requires additional surface water diversion to irrigate constructed wetland
Wildlife Resources	Temporary loss of habitat during construction, fish passage provided for LCT	Loss of habitat with loss of wetlands, displacement of species until new wetlands re-establish.	Loss of habitat with loss of wetlands, displacement of species until new wetlands re-establish.

Surface water	No change	Additional water needed for wetland irrigation No flood attenuation	Additional water needed for wetland irrigation No flood attenuation
Costs	Capital Cost: $8,000,000 Operation and Maintenance: $65,000 per year Mitigation costs: Fish passage $2,000,000 Wetland mitigation $100,000	Capital Cost:$50,000,000 + Mitigation costs: -Fish passage facility $2,000,000 -Wetlands- $3,590,000 Additional costs not quantified: -Construction of diversion dam and pumping facility -Additional surface water (7,000 AF) for wetland irrigation -Loss of reservoir fishery -Operation and maintenance of pumping facility -Securing rights-of way for reservoir site and pipelines.	Capital Cost:$9,000,000 Operation and Maintenance $240,000 per year Dam removal: $7,000,000 Mitigation costs: Wetlands- $3,260,000 Additional costs not quantified: Additional surface water (7,000 AF) for wetland irrigation Loss of reservoir fishery Loss of terrestrial habitat Securing rights-of way for wells and pipelines.
Total estimated cost	Capital $10,000,000 + O&M $65,000 per year	Capital $56,000,000 + O&M: not quantified	Capital $19,000,000 + O&M $240,000
Other considerations	Repair authorized under Indian Dam Safety Act Annual economic loss to irrigators and Tribe until dam at full capacity	New construction would require new source of funding for construction Annual economic loss to irrigators and Tribe until construction complete	New construction would require new source of funding for construction Annual economic loss to irrigators and Tribe until construction complete Obtaining rights-of ways may be a lengthy process.

4.2 Selected Alternative

The combined alternative identification and alternative evaluation process was used to determine which alternatives were practicable. Practicability is defined in 40 CFR 230.10(a)(2):

> *"An alternative is practicable if it is available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall Project purposes. If it is otherwise a practicable alternative, an area not presently owned by the applicant which could reasonably be obtained, utilized, expanded or managed in order to fulfill the basic purpose of the Project activity may be considered".*

In light of the economic costs and potential impacts from the alternatives described above, the most feasible alternative is repair and modification of Weber Dam with the addition of fish passage to mitigate the block and provide access to migrating LCT to upstream areas. Taking into account cost, technology, and logistics as discussed in this document and Chapter 2 of the FEIS, the Off-channel reservoir and Ground water alternatives are not practicable under Section 404(b)(1). The Proposed Action is deemed a practical alternative that could fulfill the basic purpose and need of the project. It was selected for additional evaluation steps in the 404(b)(1) process.

4.3 Impact of the Proposed Project

The impacts of this project would be the loss of approximately 2 acres of waters of the United States with the new embankment location for the dam and also the entrance to the fishway. There would be a short term loss of wetland function and wetland habitat for the footprint of the dam but an overall no net loss with construction of the proposed mitigation for the new wetland area. There would be minimal impacts to upland terrestrial habitat during construction. With revegetation there would be a reuse of that upland vegetation for habitat.

Threatened and endangered species impacts include a short term impact to bald eagles during construction due to disturbance from construction activities, not loss of habitat. There would be impacts to LCT with use of the fishway after it is constructed, but those would be minimized by implementing procedures as specified in the Biological Opinion.

4.4 Avoidance

The Proposed Action includes impact to jurisdictional waters and meets the purpose and need of the project. The siting for the embankment for modification of Weber Dam is such that a small amount of wetland and waters of the United States is impacted with the new embankment. Only a portion of the existing dam is reconfigured and this minimizes impact to waters of the United States. There is no practical way to avoid impacts.

4.5 Minimization

Alternatives that minimize impacts include the Proposed Action which impacts a small amount of jurisdictional waters at the base of the dam and also a small portion at the fishway entrance into Walker River. Alternative sites were evaluated for the placement of the fishway. The best function is gained by the proposed location downstream of Weber Dam. The embankment itself for the revised dam includes a wider, shallower sloped embankment for stability during earthquakes. That slope results in the footprint of the dam as seen on the plans in Chapter 2 and it is noted that the wetlands are avoided as best practicable to meet the safety requirements of the new structure and fulfill the purpose and need of the project. The construction activities occur in areas which were previously disturbed.

4.6 Proposed Compensatory Mitigation

The proposed compensatory mitigation for the project for the unavoidable impacts and impacts that cannot be minimized includes construction of a 2 acre wetland and waters of the United States to replace the impacted wetlands and waters of the United States at a 1:1 ratio. Siting for this location is downstream of the existing dam and it would be connected to Walker River so that it maintains connectivity to the river for aquatic species and also maintains the wetland function by increasing the contact shoreline to make up for the lost palustrine wetlands with the new embankment.

5 404(B)(1) ANALYSIS

5.1 Potential Impacts on Physical and Chemical Characteristics of the Aquatic Ecosystem (Subpart C)

The potential impacts from the proposed action and the practical alternative are considered minor because they consist of small disturbances in previously disturbed areas and mitigation is proposed to compensate for the same type and function of wetland at a 1:1 ratio. In addition, the construction activities would have a temporary disturbance but the disturbed substrates would be recolonized after construction of the project.

5.1.1 Substrate (230.20)

This section examines impacts of the Weber Dam Repair and Modification Project to the physical substrates of CWA, Section 404 jurisdictional waters of the United States.

The repair and modification of Weber Dam would include construction in an uplands section adjacent to the existing dam, removal of a portion of the existing dam, and construction in a small wetland area as part of the new embankment. The new embankment itself would impact approximately 1.6 acres of wetlands and waters of the United States (Miller 2004). This wetland and waters of the United States are portions of the historical channel for Walker River prior to the construction of the Weber Dam in 1933. The new design for the safety modification to Weber Dam rotated the embankment downstream slightly to avoid placement over a fault line and the new placement impacts existing wetlands and waters of the United States. In addition to the substrates disturbed in the waters of the United States and wetlands for the new dam embankment, a small area of Walker River whose substrates are mainly cobbles, gravels and sands would be disturbed with construction to the entrance to the fishway proposed as part of the action. This area of Walker River is downstream approximately .25 mile from the existing spillway pool and the area to be disturbed is approximately .25 acres.

Excavation at the fishway entrance would temporarily disturb stream substrates. Those substrates would be replaced and reconfigured with a larger substrate of cobbles and boulders placed as part of the construction of the fishway to enhance the attraction of fish to the fishway entrance when in operation. Material placed in the streambed would be natural streambed materials and large cobbles and boulders that would provide a natural habitat when the construction is finished.

5.1.2 Suspended Particulate Materials/Turbidity (230.21)

This section examines impacts associated with suspended particulate material and/or turbidity during construction or as a result of project operations.

Construction associated with the modification and repair of Weber Dam may cause minor short-term discharges of sediments during placement of new embankment material and construction of the fishway. With the use of routine turbidity controls (e.g., turbidity screens, filter materials, temporary coffer dams, proper dewatering procedures) no adverse impacts from suspended particulates or turbidity is expected.

5.1.3 Water (230.22)

This section examines impact to water quality. The fill material to be used for the project is clean. No water quality impacts are expected from that material.

Construction during repair and modification of Weber Dam would temporarily disturb bank material which could increase the suspended sediment load in the Walker River. In addition, ground water removed during construction dewatering would need disposal. Measures taken as part of the construction of the new embankment would include bank stabilization and revegetation. With those measures, no significant impact is expected to water quality from the Proposed Action.

5.1.4 Current Patterns and Water Circulation (230.23)

This section describes potential impacts to water currents, circulation patterns and related fluvial processes.

The Weber Dam Repair and Modification Project would not include a change in current patterns and water circulation. Operation of the reservoir would remain as it has in the past with water being released from the reservoir during high flows and also during the irrigation season.

The only substantial change would be release of water down the proposed fishway which would exit into Walker River approximately 0.25 mile downstream from the existing spillway. Operation of the fishway would be dependent upon availability of water and also coordination with Fish and Wildlife Service (FWS) to insure that the Lahontan cutthroat trout (LCT) that migrate from Walker Lake would have access to upstream spawning areas in the upper Walker Basin. Operation of the fishway would be a coordinated effort with the LCT recovery team and FWS. The operation of the fishway would not result in a different pattern of releases for the river itself but a small difference in location of a portion of the runoff water that would be released from Weber Dam.

5.1.5 Normal Water Fluctuations (230.24)

This section examines impacts to water-fluctuation patterns in waters of the United States affected by proposed Weber Dam Repair and Modification Project alternatives.

Water fluctuations in Walker River are characterized by spring or early summer peak flow periods in water years with sufficient flow for runoff followed by a long period of minimal or no flow. Occasional freshets provided by summer thunderstorms interrupt the low flow periods. Much of the channel bed downstream of Weber Dam is dry or has a minimal release during irrigation season. This same pattern of release would be maintained after repair and modification to Weber Dam. Reservoir fluctuations with the

Proposed Action would be the same as historical operation of Weber Reservoir with the exception that for the last three years the reservoir has been at a lower water surface elevation due to the interim operating criteria placed on the dam.

5.1.6 Salinity Gradients (230.25)

"Salinity gradients," as used in 33 CFR 230.25, refers to gradients derived from the mixing of ocean water and freshwater in estuarine systems. This section is, therefore, not applicable to the proposed Weber Dam Repair and Modification Project.

5.2 Potential Impacts on Biological Characteristics of the Aquatic Ecosystem (Subpart D)

5.2.1 Threatened and Endangered and Candidate Species (230.30)

Section 230.10(b)(3) prohibits the issuance of a permit for discharge of fill into waters of the United States, if the discharge would cause jeopardy to any federally listed threatened or endangered species. In 1999, the Service provided a list of endangered, threatened, and candidate species for evaluation (Tables 5-1).

Table 5-1
Special Status Wildlife and Fish Species Potentially Occurring Within the Weber Dam Repair and Modification Project

Common Name	Scientific Name
Federally Listed Species	
Bald eagle	*Haliaeetus leucocephalus*
Lahontan cutthroat trout	*Onchorhynchus clarki henshawi*

Construction-associated activities, however, may result in short-term impacts to the bald eagle. The reservoir may provide a food base for eagles. The surrounding trees may provide perch and temporary roosting habitat. Construction-related activities, noise, and line-of-site visual disturbances may affect eagles.

The biological opinion for Weber Dam Repair and Modification Project includes measures to offset impacts to listed, threatened and endangered species. The project will not jeopardize the continued existence of any of the federally listed species within the project area. The inclusion of the fishway as part of the Proposed Action offsets fish passage impacts at the dam and provides the ability for LCT to migrate past Weber Dam when deemed appropriate by the LCT recovery team and Fish and Wildlife Service. The construction related activities and the fishway may affect LCT but would not jeopardize the continued existence.

5.2.2 Fish, Crustaceans, Mollusks and Other Aquatic Organisms

Aquatic organisms include, but are not limited to, fish, crustaceans (e.g., crayfish), mollusks (e.g., snails, clams), aquatic insects, and aquatic worms. Discharges of fill materials to surface waters and wetlands could adversely affect populations of these organisms.

The construction required for modification and repair of Weber Dam could have temporary impact on habitat for fish, crustaceans, mollusks and other aquatic organisms. The construction of the new embankment and removal of the existing dam would require placement of fill material in existing wetland and waters of the United States of approximately 1.6 acres. That construction activity would permanently remove that habitat from the project area. A proposed wetland for mitigation would be constructed downstream of the new dam embankment with an attachment to Walker River so that it would function in the same manner as the existing wetland and waters of the United States. Wetland mitigation is proposed at a 1:1 ratio for replacement of the existing wetland that would be impacted by construction.

In addition, the construction of the fishway would require excavation of the stream channel and disturbance of approximately 0.25 acre of existing habitat which could impact fish, crustaceans, mollusks and other aquatic organisms in that section of the Walker River. The streambed would be replaced after construction and revegetated using native plant materials on the stream banks. The native material placed back into the stream would be recolonized and would become viable aquatic habitat after construction. The majority of construction would take place in previously disturbed areas. No significant impact to aquatic organisms is expected due to construction of the Proposed Action.

5.2.3 Impacts on Other Wildlife (230.32)

The repair and modification would be constructed mainly within upland sites containing habitat for a variety of terrestrial fauna. The construction of the new embankment would involve placement of native materials and riprap as well as revegetation and after construction the upland habitat would return. There would be a temporary loss of habitat during construction but the modification of the dam is not expected to cause significant adverse effects to wildlife associated with those habitats. The areas that would contact the historical river channel would be revegetated with native wetland vegetation and no impact to wildlife associated with those aquatic ecosystems is expected after revegetation.

5.2.4 Other Factors

Other factors related to the potential short-term or long-term effects on fish, crustaceans, mollusks, and other aquatic organisms in the food web and other wildlife were considered but expected to have little or no impact. The proposed project would not jeopardize the continued existence or adversely impact the critical habitat of any listed federal species.

5.3 Potential Impacts on Special Aquatic Sites (Subpart E)

5.3.1 Sanctuaries and Refuges (230.40)

This section examines the impacts upon federal and state-designated sanctuaries and wildlife refuges.

There are no federal or state designated sanctuaries and refuges associated with the Proposed Action and project area, therefore no impacts are expected to sanctuaries and refuges from the Proposed Action.

5.3.2 Wetlands (230.41)

This section examines impacts to areas that are potentially jurisdictional wetlands or other waters of the United States (Attachments A and B).

Impacts to jurisdictional wetlands and other waters of the United States were conducted as part of the EIS process. Delineation of wetlands in the footprint of the new dam embankment resulted in a classification of approximately 0.14 acre of delineated wetlands and 1.45 acres of waters of the United States (Miller 2004). The acreage impacted would result in loss of that habitat. To offset that loss, construction of a new wetland is proposed downstream of the new embankment with a connection to Walker River to supply water to the wetland and also provide additional waters of the United States. This construction is proposed in a upland habitat that would be modified to provide the wetland as shown in the delineation and also excavated to provide 1.45 acres of waters of the United States. The flood storage and habitat of the impacted wetlands would be recreated.

5.3.3 Mud Flats (230.42)

There are no mud flats identified within the Weber Dam Repair and Modification Project area.

5.3.4 Vegetated Shallows (230.43)

33CFR Part 230.43 defines "vegetated shallows" as permanently inundated areas that support aquatic vegetation. There are various areas in the area that meet this definition. These are covered under the discussion of wetlands in Section 5.2.

5.3.5 Riffle and Pool Complexes (230.44)

This section examines impacts that could affect riffle and pool complexes.

Riffle and pool complexes commonly occur in the Walker River downstream of Weber Dam. An evaluation conducted in 2000 reported that approximately 11 percent of the river channel was riffle habitat downstream from Weber Dam. That same survey showed

14 percent of the habitat is pool habitat (Miller 2001). The construction of the entrance to the fishway would result in disturbance of the river channel which would include both riffle and a small piece of pool habitat. Those two features would be reconstructed as part of the fishway entrance. Therefore, no significant impacts to riffle and pool complexes are expected with construction of the project.

5.3.6 Other

Other potential short-term or long-term adverse wetland impacts of the fill that may damage habitat and biological productivity by smothering or dewatering, flooding, or changing the periodicity of the water fluctuation; speed up wetland to upland conversion; reduce or eliminate nutrient exchange; degrade water quality via interfering with filtration functions; change water aquifer recharge capabilities; modify the capacity of the wetland to retain and store floodwaters that are associated with recreation, municipal, or industrial development; and serve as a shield to upland areas are expected to have little or no impact.

5.4 Potential Impacts on Human Use Characteristics

5.4.1 Municipal and Private Water Supplies

There are no municipal and private water supplies downstream for the Proposed Action. The water supplies downstream are from wells for human consumption. No change is expected to those water supplies from the Proposed Action.

5.4.2 Recreational and Commercial Fisheries

There are no commercial fisheries in the project area that would be impacted by construction and/or operation of the Project. The impact to recreational fisheries during construction and operation of the project is anticipated to be a net impact, as discussed below.

The recreational fishery at Weber Reservoir would be closed during construction and there would be a short impact during that time. After construction of the repair and modification to the dam is complete, the reservoir would return to full pool and the recreational opportunities for fishing would once again be open at the reservoir. Therefore, no significant impact is expected to recreational fisheries.

5.4.3 Water Related Recreation

Water-related recreation activities of a consumptive nature involving harvesting resources by fishing are addressed in Section 5.4.2 above. Additional recreation of boating and camping would resume after construction.

No impact to water related recreation is expected after the repair and modification to the dam. Short-term disruption of activities near the dam and construction area would exist during the construction time period. After completion of the repair and modification, water related recreation would return to Weber Reservoir. In addition, the reservoir could be maintained at full pool at which it has not been able to be maintained with the interim operating criteria for safety of the dam.

5.4.4 Aesthetics

There is no impact expected to aesthetics in the project area. The repair and modification of the dam are occurring to an existing structure and the status of the views in the area would remain as they are today with the revegetation of the construction areas. There would be minor impacts during construction.

5.4.5 Parks, Natural and Historical Monuments, National Seashores, Wilderness Areas, Research Sites, and Similar Preserves

No preserves consisting of areas designated under federal and state laws or local ordinances for their civic, educational, historical, recreational, or scientific value are included in the project area.

5.4.6 Other

Other factors related to the potential short-term or long-term effects on the municipal and private water supplies, recreational and commercial fisheries, water-related recreation, aesthetics, parks, national and historical monuments, national seashores, wilderness areas, research sites, and similar preserve are expected to have little or no impact.

5.5 Evaluation of Fill Material (40 CFR Subpart G 230.60-61)

Chemical and biological testing are unnecessary for the proposed fill because the subject fill is believed to be clean. The fill material is from an adjacent excavation site, and, therefore, is expected to have the same constituents or levels of contaminants as the disposal site. Therefore the discharge is not likely to result in degradation of the disposal site and pollutants would not be transported to less contaminated areas. Special conditions can be implemented to reduce contamination to acceptable levels within the disposal site and prevent contaminants from being transported beyond the boundaries of the disposal site.

5.6 Actions to Minimize Adverse Effects and Practicable Steps to Minimize Potential Adverse Impacts (Subpart H)

This section provides and discusses appropriate and practicable steps to minimize potential adverse impacts of the discharge of fill material on the aquatic ecosystem.

5.6.1 Actions Concerning the Location of the Discharge (230.70)

Under all alternatives, impact avoidance and minimization procedures are available during the construction of pipeline crossings of wetlands and riparian habitats occurring along intermittent and perennial drainages, or construction or enlargement of dams. The following minimization measures would be applied on a routine basis. Locating and confining the discharge to minimize smothering of organisms by use of preventative berms or coffer dams where appropriate and dewatering areas so that the discharge is contained to the fill area of the embankment. The discharge in the area near the fishway entrance would be of a material similar in size and type to that which is in place in the river to provide habitats for aquatic organisms. There would be some disruption and loss of habitat during construction but it will be recolonized after construction.

5.6.2 Actions Controlling the Material to be Discharged, the Material after Discharge, the Method of Dispersion and Related Technology (230.71, 230.72, 230.73, and 230.64)

Impacts to waters of the United States include the loss of 1.6 acres of jurisdictional waters including wetland and open water areas. The impacts to any additional waters of the United States would be minimized by the following measures. A range of routine sedimentation/turbidity control measures and technology would be employed to control the material to be discharged and the method of dispersion to downstream areas. These would include the following:

- Limiting all work, except for major construction elements (i.e., Weber Dam) to the drier seasons when high flow does not occur.
- Temporary cofferdams or berms would be used to contain fine materials and placement of fill material during periods of low water flows.
- Stockpiles of backfill materials would be placed above ordinary high water marks and protected by measures to prevent erosion of those materials into waters of the United States.
- Use of turbidity screens, filter materials and other technology as needed for all work in perennial drainages where surface water occurs. Silt screens or other appropriate methods would be used in and near intermittent drainage channels, creek beds, and river banks to confine suspended particulate matter and turbidity to small areas where settling or removal can be done.
- Heavy equipment movement would be routed around vegetated areas where feasible.
- Routine sediment retention methods as part of all dewatering procedures would be used. To the maximum extent feasible, dewatering would be directed to upland areas where runoff to drainages could be avoided.

- All work would be conducted in accordance with water quality restrictions contained in the required permit.

Actions would also be taken to avoid and minimize any potential pollutants in discharge material.

5.6.3 Actions Affecting Plant and Animal Populations (230.75)

BIA has identified general mitigation that would address the impacts to fish, wildlife, wetlands, and other natural resources. A specific measure would be compensation for the impact to 1.6 acres of wetland and waters of the United States. There is acreage with wetland mitigation potential in the project area. One option would involve the creation of 2 acres of wetlands downstream from Weber Reservoir.

The construction and placement of discharge would take place at a time when there is no spawning or migration of aquatic species (LCT) within the area impacted for both the wetland area at the base of the dam and also the entrance to the fishway downstream of the dam.

Special Status Species

BIA will implement conservation recommendations outlined in the Biological Opinion.

5.6.4 Actions Affecting Human Use (230.76)

A range of actions is proposed to avoid or minimize impacts on human use. These include dust abatement and noise control during construction. After completion there would be fishing access enhancement and improved access on the reservoir for recreation.

5.6.5 Other Actions (230.77)

BMPs are proposed to manage runoff water quality in construction zones.

6 COMPLIANCE WITH 404(b)(1) GUIDELINES

6.1 Restrictions on Discharage (40 CFR 230.10)

CWA Section 404(b)(1) Guidelines provide that no discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed activity that would have a less adverse impact on the aquatic ecosystem. Such a practicable alternative can be any alternative that could be reasonably obtained, utilized, or expanded in order to fulfill the basic purpose of the activity.

The analysis in Section 5, above, demonstrates compliance with the restrictions on the proposed discharge. The project is water dependent; therefore, unavoidable impacts are to be expected. Appropriate permit conditions will further minimize negative project impacts.

The project is not expected to violate toxic effluent standards (under Section 307 CWA (CERCLA)). The project will not jeopardize the continued existence of federally listed species or their critical habitat. The project is not in a marine environment, so there would be no impact on standards set by the Department of Commerce to protect marine sanctuaries.

To fulfill the overall project purpose, the Tribe and BIA have demonstrated that impacts cannot be avoided because there are no available, practicable alternatives that will avoid adverse impact on the aquatic ecosystem or special aquatic sites.

The Tribe and BIA have demonstrated impacts cannot be minimized because there are no available, practicable alternatives that will cause less adverse impact on the aquatic ecosystem or special aquatic sites and without other significant adverse environmental consequences that do not involve discharges into "waters of the United States" or at other locations within these waters.

7 FACTUAL DETERMINATIONS (230.11)

7.1 Physical Substrate Determinations

Impact 1: Loss of hydric or aquatic substrates.

There would be a loss of hydric or aquatic substrates with the placement of the embankment material for repair of the dam. The total loss of substrate and waters of the United States is 1.6 acres.

Mitigation Actions:

Mitigation for loss of hydric or aquatic substrates includes creation of a new wetland and waters of the United States downstream of the repaired Weber Dam embankment at a location that allows connectivity to Walker River to provide the aquatic habitat in the same acreage and function as that lost during placement of the structure.

Impact 2: Temporary disruption of hydric and streambed substrates.

There would be a temporary disruption of hydric and streambed substrates at the location of the fishway entrance to Walker River when that is constructed. This temporary disruption would last during the construction period but the hydric and streambed substrates would be replaced as part of the construction process.

Mitigation Actions:

Mitigation proposed for the temporary hydric and streambed substrates is revegetation of shoreline areas with wetland species similar to those found in the area of construction and the placement of natural stream substrates that will facilitate colonization by aquatic species.

7.2 Water Circulation and Fluctuation Determinations

There are no impacts expected to water circulation and fluctuations from the project.

7.3 Suspended Particulate Materials and Turbidity Determinations

Impact 3: Short-term suspended sediment load increases in Walker River

There will be a short term suspended load increase in the Walker River during construction of the fishway and possibly during placement of the embankment material with new construction in that area.

Mitigation Actions: A program would be implemented to reduce or eliminate temporary, short-term increases in suspended sediment loading or other water quality constituents, potentially caused by project construction, through the incorporation of permits, BMPs, and sediment control structures. Section 5 describe a range of avoidance and minimization measures that would be used routinely during and after construction. These measures would reduce the impact to a less than significant level.

7.4 Contaminant Determinations

The project will not introduce, relocate or increase contaminants due to the construction. The source material for the embankment includes material from the existing embankment as well as materials of similar nature from commercial sources. There should be no increase in pollution due to placement of the material. The material placed would be expected to be at the same level of constituents as that in the existing area.

7.5 Aquatic Ecosystem and Organism Determinations

Impact 4: Permanent loss of wetland/riparian habitats from dam construction.

There will be a loss of approximately 1.6 acres of wetland and riparian habitat from dam construction. This loss will occur in the footprint of the new dam embankment and the loss will be limited to palustrine wetlands and open waters of the United States.

Mitigation Actions:

Mitigation for loss of wetland riparian habitats includes construction of a new wetland and waters of the United States area of approximately 2 acres in size downstream from the modified dam embankment. The mitigation wetland will include shoreline area at the same acreage as that lost during construction of the new footprint of the embankment.

The fish ladder constructed as part of the project would provide benefits to aquatic species, in particular LCT, and provide access to habitat upstream of Weber Dam when appropriate.

7.6 Proposed Disposal Site Determinations

Substrate materials excavated from the Project area could be used as fill materials for various project features. Additionally, fill material could be brought into the site from local quarries.

7.7 Determination of Cumulative Impacts on the Aquatic Ecosystem

Section 230.11(g) of the 404(b)(1) Guidelines defines cumulative impacts as the changes attributable to the collective effects of a number of individual discharges to an aquatic ecosystem.

7.8 Determination of Secondary Effects on the Aquatic Ecosystem

Secondary effects (e.g., fluctuations in water levels, changes to fluvial dynamics, increased return flows) are treated extensively in Sections 3 through 6. The proposed project would not be expected to cause other secondary effects.

8 Findings of Compliance with the Restrictions on Discharge

The FEIS identified several alternatives. For purposes of the 404(b)(1) Evaluation process, the Proposed Action was deemed the practicable alternative and was evaluated in more detail in terms of the 404(b)(1) Guidelines. Based on overall impacts to wetlands and endangered species, Proposed Action is the Least Damaging Practical Alternative. BIA finds that Proposed Action would comply with the requirements of the 404(b)(1) Guidelines (Subparts C through G) with the inclusion of appropriate and practicable discharge conditions identified in Sections 5.0 through 7.0 of this evaluation. Implementation of Proposed Action will not result in the significant degradation of the aquatic ecosystem under Section 230(b) and (c) of the 404(b)(1) Guidelines.

The FEIS outlines other measures to mitigate the impacts to the aquatic ecosystem and organisms. The proposed discharge of fill material to waters of the United States will not result in the significant degradation of the aquatic ecosystem under Section 230(b) and (c) of the 404(b)(1) Guidelines.

The proposal will comply with the guidelines because appropriate and practical conditions will be specified to avoid, minimize, or compensate for adverse impacts. The permit will be conditioned to insure compliance.

Resource use conflicts identified by commenters can be satisfactorily addressed; no alternatives will resolve Corps-identified issues and applicant objectives better than the selected alternative.

The selected alternative is the preferred, most practical alternative. Based on 33 CFR 320(r), the applicant will complete mitigation to compensate for unavoidable impacts. The project, with mitigation, will not significantly degrade the aquatic environment.

Attachment A

Wetland Delineation Report

Walker River, Weber Dam

Prepared for

The Walker River Paiute Tribe
P.O. Box 402
Schurz, Nevada 89427

Prepared by

Habitat Management, Inc.
3571 E. Phillips Circle, Littleton, Colorado 80122

Table of Contents

Appendices

Property Owners

The Walker River Paiute Tribe
P.O. Box 402
Schurz, Nevada 89427

Location

Weber Dam is located on the Walker River north of Schurz, in Mineral County, Nevada. Located in the Southwest ¼ of Section 28, Township 14N, Range 28E (UTM. $^{43}23^{300m}$N. $^{3}39^{200m}$E) (Map1).

Nature of Proposed Development/Project History

Weber Dam was constructed to impound runoff from the Walker River Drainage basin for agricultural uses downstream. The dam was built in the 1930's and overlies a secondary fault zone, which currently poses public safety concerns. Furthermore, the US Fish and Wildlife Service has issued an adverse finding that the Weber Dam represents a threat to the Lahotan Cutthroat trout (LCT), a federally listed threatened species.

An analysis of alternative actions aimed at remedying both situations has found that realignment of the existing dam so it no longer overlies the secondary fault zone and modifying it to include fish ladders addresses both problems, while minimizing adverse environmental impacts (Weber Dam Action Alternatives, Feb. 2002).

Waters of the US including wetlands were surveyed along a 40-mile stretch of the Walker River, contained within the reservation boundaries (jbr Consultants Inc Nov.1994). This survey proved valuable for planning purposes and alternative analysis but was not intended for site-specific use and does not provide all of the specific information required for the US Army Corps to make a jurisdictional determination.

It is expected that a pre-Construction Notification will be submitted within 30 days of Army Corps verification of this wetland delineation.

Personnel and Methodology

In Accordance with section 404(b)(1) of the Clean Water Act (40 CFR 320) a routine wetland delineation was performed for the proposed project area. Wetland boundaries were determined in the field by Ken Carlson and Wayne Erickson of Habitat Management Incorporated, in accordance with the US Army Corps Wetland Delineation Manual (Technical Report Y-87-1, Jan. 1987). Wetlands and waters of the US within the project site were surveyed and mapped (Map 2).

Wetland Description and Justification

Field investigations were conducted on September 27th of 2001. The survey area was limited to the spillway and adjacent areas below the dam, which potentially would be impacted by realignment of Weber dam. It should be noted that this is typically the low flow period for the river and the water level in the reservoir has been lowered due to public safety concerns.

The channel is shallow and varies from 50-200 feet wide below the dam. Water depths varied from a few inches to no more than a few feet at the time of survey. There is very little flow below the dam as most of the water has been diverted for irrigation purposes.

Upland areas adjacent to the river are best classified as desert scrub, Dominant vegetation includes sagebrush and saltbush. Upland soils are well drained, have little structure, show no hydric indicators and are comprised primarily of fill material in the area around the dam.

As evidenced in Photo 1, the transition between upland and wetland areas is abrupt. Rush (*Juncus balticus*) is common in transitional areas.

Approximately 0.14 acres of Wetland were delineated. Classified as palustrine emergent, wetlands are confined to shallow pools within the river channel below the spillway and a narrow zone along the banks. These areas are generally within the defined channel of the river or below the T1 terrace. Field data sheets are contained in appendix two.

Dominant vegetation in wetland areas includes soft stem bulrush (*Schoenoplectus validus*), rabitfoot grass (*Polypogon monospliensis*), and cattail (*Typha lattifolia*).

Hydrology in wetland areas is present and is provided primarily by flows contained within the river channel.

Wetland soils are inundated or saturated within the upper 12 inches and have low chroma colors. Soils samples from wetland areas confirm soil types described by the Soil Conservation Service in the Mineral County Soil Survey (USDA,SCS). Fallon soils are found in the riverbed and along the low terrace and are included on the National Hydric Soils List (Table 2).

With the exception of a small area below the dam the wetland boundary is very distinct. This area identified as upland 1 in photos and data forms. Vegetation is co-dominated by rush and sweet clover (*melilotus officionalis*). One being facultative wet, the other facultative upland makes this a borderline wetland based on vegetation alone. Under normal circumstances hydrology would be supplied via seepage from the dam. Lowering the water levels in the reservoir has removed the hydrologic support suggesting this area is artificially maintained by anthropogenic activities and therefore not jurisdictional.

Soils in this area were also lacking hydric characteristics normally associated with wetlands. For these reasons this area was not included as wetland.

Table 1-Plant List

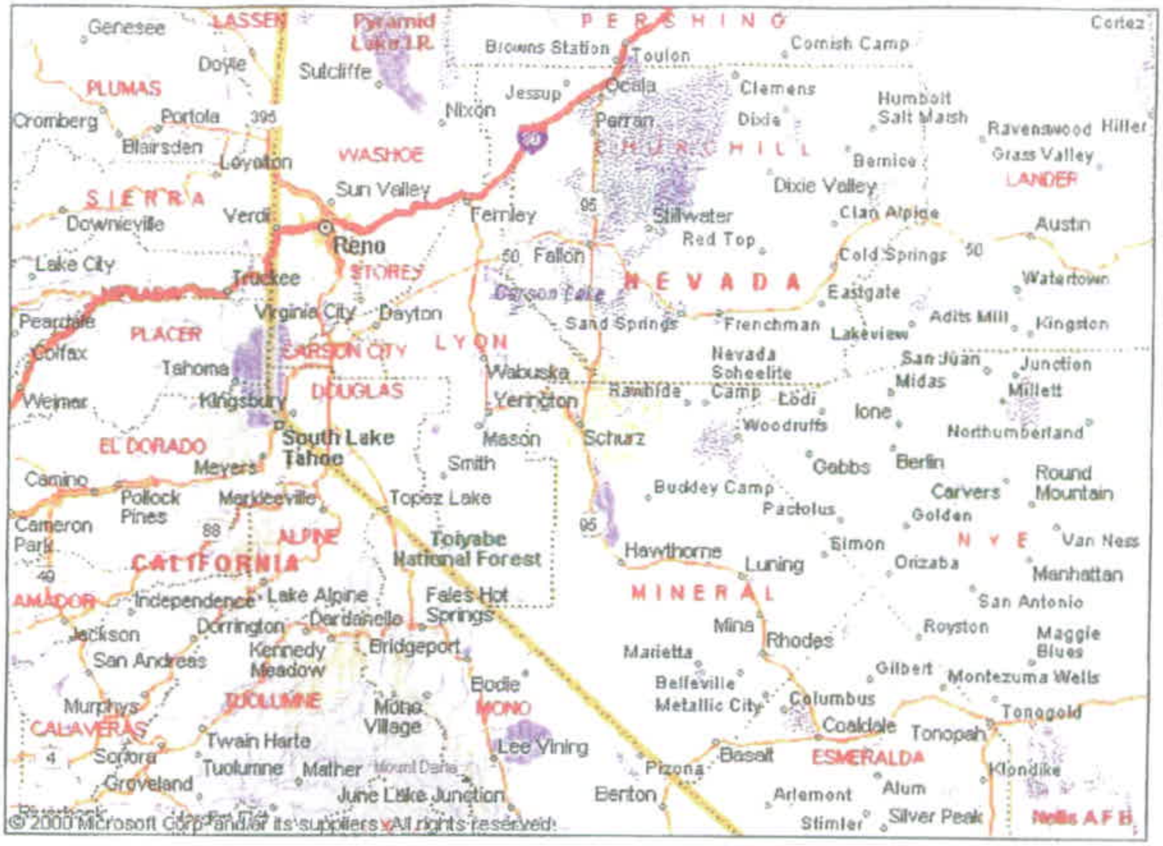
Site	Common Name	Scientific Name	Indicator Status R8
Transitional upland	Baltic rush	*Juncus balticus*	FACW
Transitional upland	Yellow Sweet clover	*melilotus officionalis*	FACU
Upland	Rabbitbrush	*Chrysothamnus nauseosus*	NA
Upland	Saltbush	*Atriplex sp.*	
Upland	Desert Saltgrass	*Distichlis stricta*	NA
Wetland		*Epilobium sp.*	
Wetland	Buttercup	*Ranunculus sp.*	
Wetland	Onley three square	*Scirpus americanus*	OBL
Wetland	Soft-stem bulrush*	*Schoenoplectus validus*	OBL
Wetland	Rabbit foot grass*	*Polypogon monospliensis*	FACW+
Wetland	Broad-leaf cattail*	*Typha lattifolia*	OBL

* Dominant wetland vegetation.

Table 2-Soil List

Soil Type	Site	Hydric Soils List
1342 Barnmot-Badland association	Upland	No
3212 Fallon-Slaw complex / Aquic Xerofluvents	Riverbed / T1 Terrace	Yes

From USDA Soil Conservation Service, Soil Survey of Mineral County Area, Nevada


Genesee
LASSEN
Pyramid Lake I.R.
PERSHING
Cortez
Browns Station
Toulon
Cornish Camp
Doyle
Sulcliffe
Jessup
Ocala
Clemens
Humboldt Salt Marsh
PLUMAS
Nixon
Cromberg
Portola
395
Perran
Dixie
Ravenswood
Hiller
Blairsden
WASHOE
CHURCHILL
Bernice
Grass Valley
Loyalton
LANDER
Sun Valley
Dixie Valley
SIERRA
Fernley
95
Stillwater
Clan Alpine
Downieville
Verdi
Reno
Austin
Red Top
Lake City
STOREY
50
Fallon
Cold Springs
Truckee
Carson Lake
NEVADA
Watertown
Eastgate
Virginia City
Dayton
Pearidale
Sand Springs
Frenchman
Adits Mill
Kingston
PLACER
CARSON CITY
LYON
Lakeview
Colfax
Nevada Scheelite
San Juan
Junction
Tahoma
Wabuska
Midas
Weimar
Kingsbury
DOUGLAS
Yerington
Rawhide
Camp
Lodi
Millett
Ione
Woodruffs
Northumberland
EL DORADO
South Lake Tahoe
Mason
Schurz
Meyers
Smith
Gabbs
Berlin
Camino
Round Mountain
Pollock Pines
Markleeville
Topaz Lake
Buckley Camp
Carvers
Pactolus
Golden
Cameron Park
88
ALPINE
Toiyabe National Forest
95
Hawthorne
Simon
NYE
Van Ness
CALIFORNIA
Luning
Orizaba
Manhattan
49
MINERAL
AMADOR
Independence
Lake Alpine
Fales Hot Springs
San Antonio
Jackson
Dorrington
Dardanelle
Mina
Royston
Maggie Blues
Rhodes
San Andreas
Kennedy Meadow
Bridgeport
Marietta
Gilbert
Montezuma Wells
Bodie
Belleville
Murphys
TUOLUMNE
Mono Village
MONO
Metallic City
Columbus
Tonopah
Tonogold
CALAVERAS
Coaldale
Twain Harte
Lee Vining
4
Sonora
Basalt
ESMERALDA
Tuolumne
Mather
Pizona
Klondike
Groveland
June Lake Junction
Benton
Arlemont
Alum
Stimler
Silver Peak
Nellis A F B
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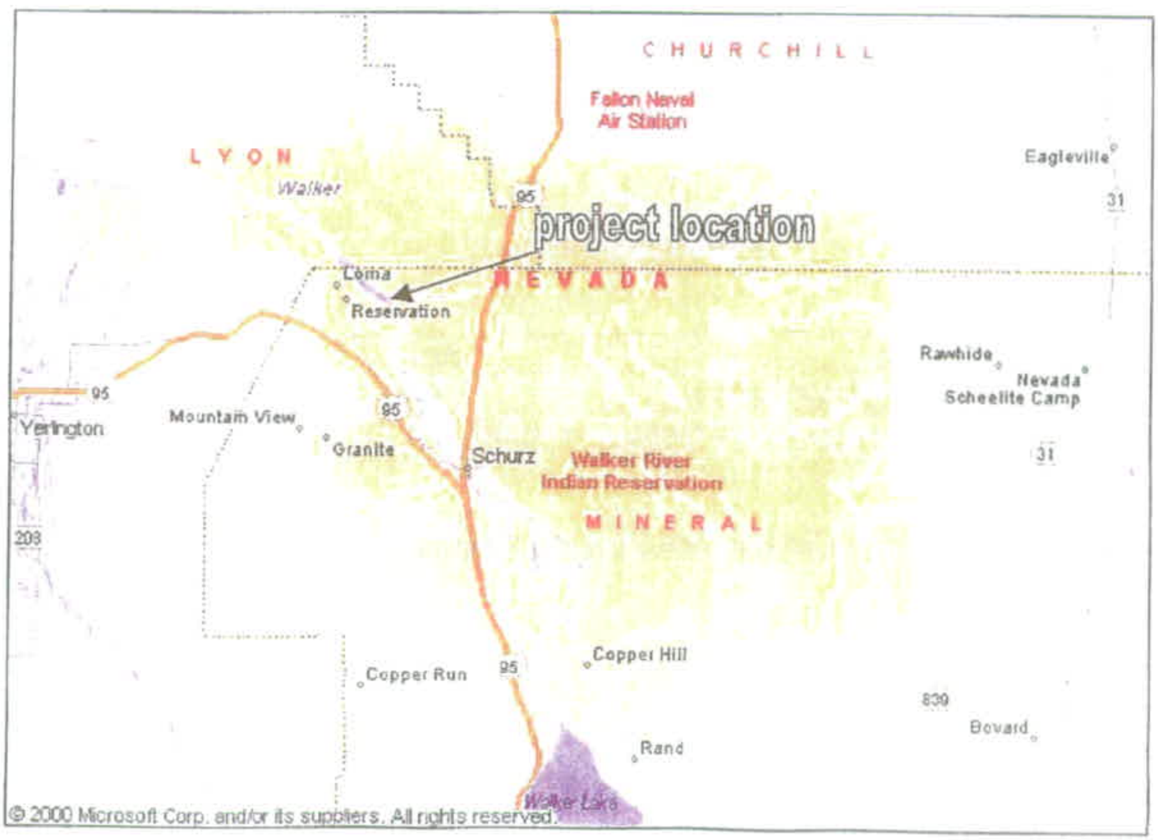
CHURCHILL
Fallon Naval Air Station
LYON
Walker
Eagleville
95
31
project location
Coma
NEVADA
Reservation
Rawhide
Nevada Scheelite Camp
95
Yerington
Mountain View
95
Granite
Schurz
Walker River Indian Reservation
31
208
MINERAL
Copper Hill
Copper Run
95
839
Bovard
Rand
Walker Lake
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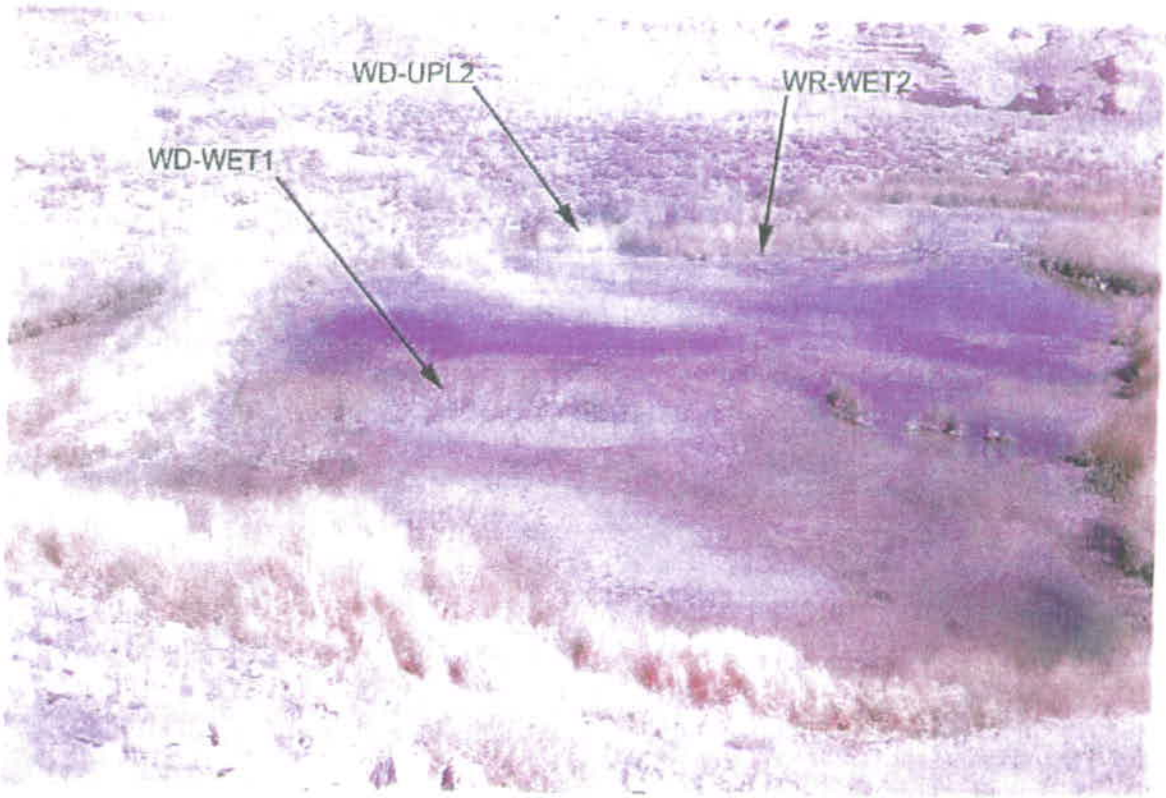


Photo 1: Spillway below Weber Dam. Photo facing east.

Photo 2: Spillway below Weber Dam, left of channel. Photo facing northeast

Photo 3: Spillway below Weber Dam, Right bank. Photo facing east.

Photo 4: Wetland area 1 (WD WET 1). Photo facing east.

Photo 5: Wetland area 2 (WR WET2). Photo facing west.

Photo 6: Upland area 1 (WD UP1). Photo facing east.

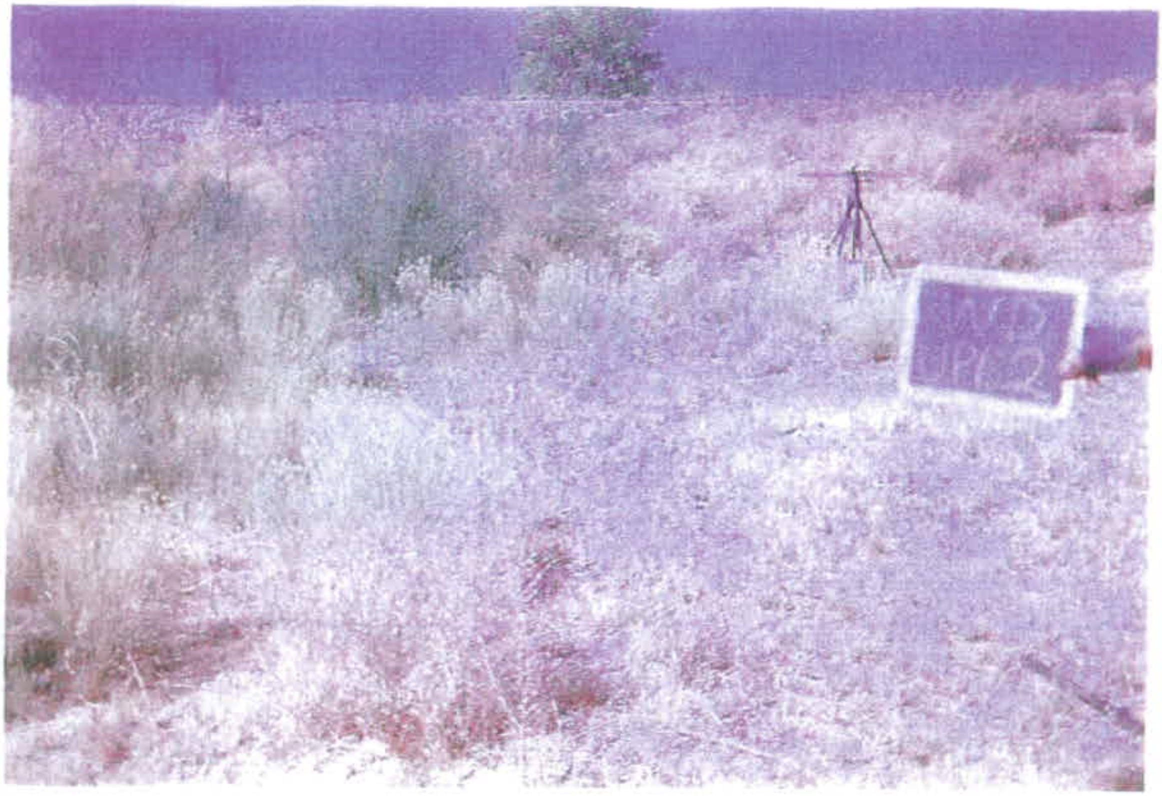


Photo 7: Upland area 2 (WD UP2). Photo facing west.

Appendix A

DATA FORM
ROUTINE WETLANDS DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project Site: Weber Dam Applicant/Owner: Walker River Paiute Tribe Investigator: Habitat Management, Inc.-- Carlson, Erickson	Date: 27-Sep-01 County: Mineral State: NV
Do Normal Circumstances exist on the site? ☒ Yes ☐ No Is the site significantly disturbed (Atypical Situation)? ☒ Yes ☐ No Is the area a potential Problem Area? ☐ Yes ☒ No (If needed, explain on reverse.)	Community ID: palustrine emergent Transect ID: ____ Plot ID: WR-WET1

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Scirpus validus*	Herbs	OBL	9. ____	-	-
2. Poly[pogon monospeliensis	Herbs	FACW	10. ____	-	-
3. Ranunculus sp.	Herbs	-	11. ____	-	-
4. Scirpus americanus	Herbs	OBL	12. ____	-	-
5. Typha lattifolia	Herbs	OBL	13. ____	-	-
6. Eliocharis palustris	Herbs	OBL	14. ____	-	-
7. ____	-	-	15. ____	-	-
8. ____	-	-	16. ____	-	-

Percent of Dominant species that are OBL, FACW or FAC (excluding FAC-). 100*

Remarks: Disturbed by dam construction and maintainance since 1943. Steep banks and slopes make for an abrubt transition from upland to hydrophitic vegetation.

HYDROLOGY

☒ Recorded Data (Describe in Remarks): ☐ Stream, Lake or Tide Gauge ☒ Aerial Photographs ☐ Other ☐ No Recorded Data Available Field Observations Depth of Surface Water: 0-6 (in.) Depth to Free Water in Pit: ____ (in.) Depth to Saturated Soil: 0 (in.)	Wetland Hydrology Indicators: Primary Indicators: ☒ Inundated ☒ Saturated Upper 12 Inches ☒ Water Marks ☐ Drift Lines ☐ Sediment Deposits ☐ Drainage Patterns in Wetlands Secondary Indicators (2 or more required): ☐ Oxidized Root Channels in Upper 12 Inches ☐ Water-Stained Leaves ☐ Local Soil Survey Data ☐ FAC-Neutral Test ☐ Other (Explain in Remarks)

Remarks:

SOILS

Community ID: WR-WET1

Map Unit Name
(Series and Phase): Fallon - Slaw com[plex Frequntly flooded

Drainage Class: _____
Field Observations
Confirmed Map Type? ☒ Yes ☐ No

Taxonomy (Subgroup): Aquic Xerofluvents

Profile Description

Depth (Inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-2	A	2.5Y 2/4			Loamy sand w/ coarse sand and roots
2-5	A/C	2.5Y 2/0			Sand w/ coarse sands,organic stains, roots
6-12	C	2.5Y 4/0			refusal on rock bed at 12 inches

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☒ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☒ Gleyed or Low Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☒ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Remarks: Disturbed by construction in 1934.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☒ Yes ☐ No
Wetland Hydrology Present? ☒ Yes ☐ No
Hydric Soils Present? ☒ Yes ☐ No

Is this Sampling Point Within a Wetland? ☒ Yes ☐ No

Remarks: Sample site in emergent bed six feet from dry arid shoreline.

DATA FORM
ROUTINE WETLANDS DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project Site: Weber Dam Applicant/Owner: Walker River Paiute Tribe Investigator: Habitat Management, Inc.– Carlson, Erickson	Date: 27-Sep-01 County: Mineral State: NV
Do Normal Circumstances exist on the site? ☐ Yes ☒ No Is the site significantly disturbed (Atypical Situation)? ☒ Yes ☐ No Is the area a potential Problem Area? ☐ Yes ☒ No (If needed, explain on reverse.)	Community ID: Sweetclover Transect ID: ____ Plot ID: WR-UPL1

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Juncus balticus*	Herbs	FACW	9. ____	-	-
2. Melilotus officinalis*	Herbs	UPL	10. ____	-	-
3. ____	-	-	11. ____	-	-
4. ____	-	-	12. ____	-	-
5. ____	-	-	13. ____	-	-
6. ____	-	-	14. ____	-	-
7. ____	-	-	15. ____	-	-
8. ____	-	-	16. ____	-	-

Percent of Dominant species that are OBL, FACW or FAC (excluding FAC-). 50

Remarks: Disturbed by dam construction in 1934. Marginal wetland vegetation.

HYDROLOGY

☒ Recorded Data (Describe in Remarks):
- ☐ Stream, Lake or Tide Gauge
- ☒ Aerial Photographs
- ☐ Other

☐ No Recorded Data Available

Field Observations

Depth of Surface Water: none (in.)

Depth to Free Water in Pit: none (in.)

Depth to Saturated Soil: none (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☐ Inundated
- ☐ Saturated Upper 12 Inches
- ☐ Water Marks
- ☐ Drift Lines
- ☐ Sediment Deposits
- ☐ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☐ Oxidized Root Channels in Upper 12 Inches
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Remarks: No wetland hydrology.

SOILS

Community ID: WR-UPL1

Map Unit Name
(Series and Phase): ____

Drainage Class: ____
Field Observations
Confirmed Map Type? ☐ Yes ☒ No

Taxonomy (Subgroup): ____

Profile Description

Depth (Inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-3	A	10YR 3/2	____	____	Lomy sand to sandy loam - many roots
3-12	C	10YR 5/3	____	____	Loamy sand to sandy loam - few roots
____	____	____	____	____	____
____	____	____	____	____	____
____	____	____	____	____	____
____	____	____	____	____	____

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☐ Gleyed or Low Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Remarks: Cored to 18", very dry, no mottles, no structure, compacted. No hydric indicators

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	☐ Yes	☒ No
Wetland Hydrology Present?	☐ Yes	☒ No
Hydric Soils Present?	☐ Yes	☒ No

Is this Sampling Point Within a Wetland? ☐ Yes ☒ No

Remarks:

DATA FORM
ROUTINE WETLANDS DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project Site: Weber Dam Applicant/Owner: Walker River Paiute Tribe Investigator: Habitat Management, Inc.– Carlson, Erickson	Date: 27-Sep-01 County: Mineral State: NV
Do Normal Circumstances exist on the site? ☐ Yes ☒ No Is the site significantly disturbed (Atypical Situation)? ☐ Yes ☒ No Is the area a potential Problem Area? ☐ Yes ☒ No (If needed, explain on reverse.)	Community ID: Palustrine emergent Transect ID: ____ Plot ID: WR-WET2

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Scirpus validus*	Herbs	OBL	9. ____	-	-
2. Polypogon monospeliensis*	Herbs	FACW	10. ____	-	-
3. Typha latifolia*	Herbs	OBL	11. ____	-	-
4. Epilobium sp.	Herbs	_	12. ____	-	-
5. Scicpus americanus	Herbs	OBL	13. ____	-	-
6. Melilotus officinalis	Herbs	UPL	14. ____	-	-
7. ____	-	-	15. ____	-	-
8. ____	-	-	16. ____	-	-

Percent of Dominant species that are OBL, FACW or FAC (excluding FAC-). 100

Remarks:

HYDROLOGY

☒ Recorded Data (Describe in Remarks): ☐ Stream, Lake or Tide Gauge ☒ Aerial Photographs ☐ Other ☐ No Recorded Data Available	Wetland Hydrology Indicators: Primary Indicators: ☐ Inundated ☒ Saturated Upper 12 Inches ☒ Water Marks ☐ Drift Lines ☐ Sediment Deposits ☐ Drainage Patterns in Wetlands Secondary Indicators (2 or more required): ☐ Oxidized Root Channels in Upper 12 Inches ☐ Water-Stained Leaves ☐ Local Soil Survey Data ☐ FAC-Neutral Test ☐ Other (Explain in Remarks)
Field Observations Depth of Surface Water: none (in.) Depth to Free Water in Pit: none (in.) Depth to Saturated Soil: 12 (in.)	

Remarks: Reservoir is low because of dam problems. Area would normaly be inundated.

SOILS

Community ID: WR-WET2

Map Unit Name
(Series and Phase): Fallon - Slaw com[plex Frequntly flooded

Taxonomy (Subgroup): Aquic Xerofluvents

Drainage Class: ____
Field Observations
Confirmed Map Type? ☒ Yes ☐ No

Profile Description

Depth (Inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-3	A	7.5 YR 4/2			Loamy sand w/ coarse sand
3-8	A/C	10YR 3/1			Loamy sand - large rush roots
8-14	C	2.5Y 3/0			loamy sand - dark

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☒ Gleyed or Low Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Remarks: disturbed during dam construction in 1934.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☒ Yes ☐ No
Wetland Hydrology Present? ☒ Yes ☐ No
Hydric Soils Present? ☒ Yes ☐ No

Is this Sampling Point Within a Wetland? ☒ Yes ☐ No

Remarks: Sample site half way between water line and upland boundary. Abrubt change from melilotus to rush, distinct boundary.

DATA FORM
ROUTINE WETLANDS DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project Site: Weber Dam Applicant/Owner: Walker River Paiute Tribe Investigator: Habitat Management, Inc.– Carlson, Erickson	Date: 27-Sep-01 County: Mineral State: NV
Do Normal Circumstances exist on the site? ☐ Yes ☒ No Is the site significantly disturbed (Atypical Situation)? ☐ Yes ☒ No Is the area a potential Problem Area? ☐ Yes ☒ No (If needed, explain on reverse.)	Community ID: Desert scrub Transect ID: ____ Plot ID: WR-UPL2

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Chrysothamnus nauseosus	Shrubs	-	9. ____	-	-
2. Distichlis stricta	Herbs	-	10. ____	-	-
3. Atriplex sp.	Shrubs	-	11. ____	-	-
4. Juncus balticus	Herbs	FACW	12. ____	-	-
5. ____	-	-	13. ____	-	-
6. ____	-	-	14. ____	-	-
7. ____	-	-	15. ____	-	-
8. ____	-	-	16. ____	-	-

Percent of Dominant species that are OBL, FACW or FAC (excluding FAC-). ____

Remarks: Hydrophitic vegetation not present. Reservoir has been lowered for public saftey concearns reducing seepage and overflow.

HYDROLOGY

☒ Recorded Data (Describe in Remarks):
- ☐ Stream, Lake or Tide Gauge
- ☒ Aerial Photographs
- ☐ Other

☐ No Recorded Data Available

Field Observations

Depth of Surface Water:	none (in.)
Depth to Free Water in Pit:	none (in.)
Depth to Saturated Soil:	none (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☐ Inundated
- ☐ Saturated Upper 12 Inches
- ☐ Water Marks
- ☐ Drift Lines
- ☐ Sediment Deposits
- ☐ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☐ Oxidized Root Channels in Upper 12 Inches
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Remarks: No wetland hydrology present.

SOILS

Community ID: WR-UPL2

Map Unit Name
(Series and Phase): _____

Drainage Class: _____

Field Observations
Confirmed Map Type? ☐ Yes ☒ No

Taxonomy (Subgroup): _____

Profile Description

Depth (Inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-12	A/C	10YR 7/2	_____	_____	Si ClL - No structure - few med. & fine roots
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☐ Gleyed or Low Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Remarks: Soil distrbed during dam construction in 1934. No hydric soil indicators.

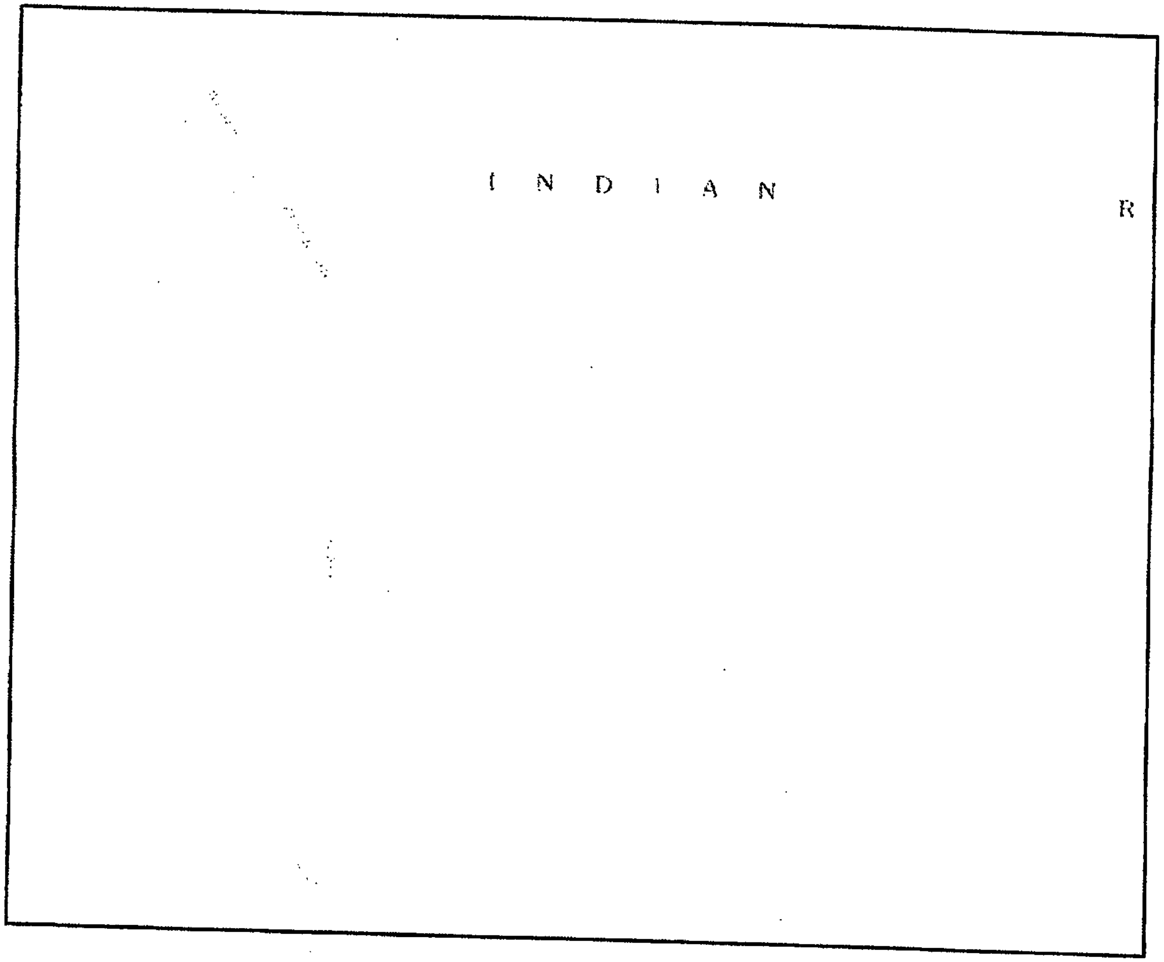
WETLAND DETERMINATION

Hydrophytic Vegetation Present?	☐ Yes	☒ No
Wetland Hydrology Present?	☐ Yes	☒ No
Hydric Soils Present?	☐ Yes	☒ No

Is this Sampling Point Within a Wetland? ☐ Yes ☒ No

Remarks: Does meet criteria for all three wetland parameters.

Appendix B



N

Walker River Paiute Nation Nevada
Weber Dam

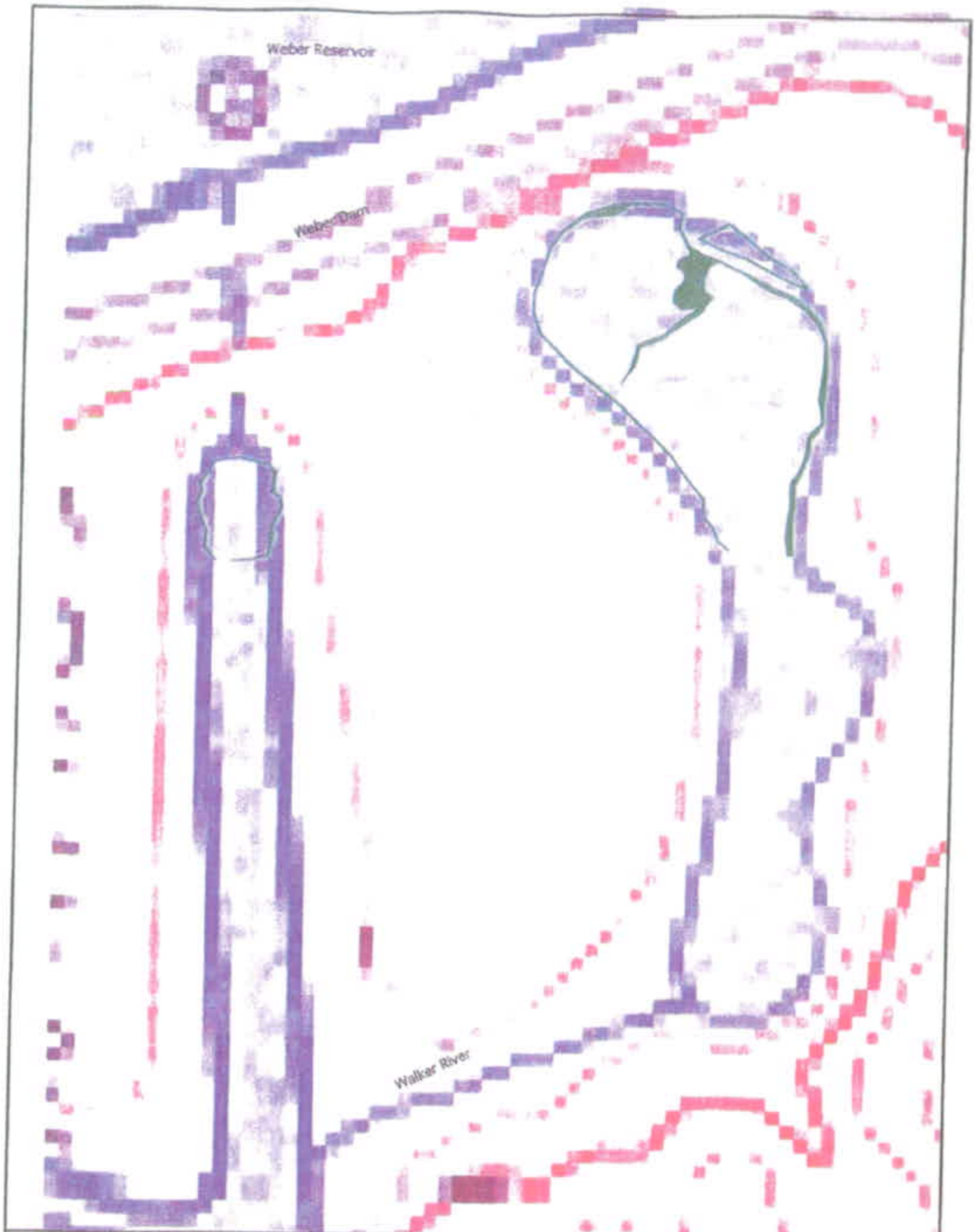
Map 1

Weber Dam General Location

Date: 05/26/02 | Scale: 1" = 100'

Prepared By:

Habitat Management, Inc



Walker River Paiute Nation Nevada
Weber Dam

Map 2

Jurisdictional Wetland

Date: 05/26/02 | Scale: 1" = 100'

Prepared By:

Habitat Management, Inc.

KEY

Palustrine Emergent Wetland

Waters of the United States are shown in shades of blue per USGS mapping

NOTE: The base for this map was enlarged from a 7.5' USGS Quadrangle. Locations of features and the map scale are approximate.

Attachment B

MILLER
ECOLOGICAL
CONSULTANTS
INC.

1113 Stoney Hill Dr, Suite A
Fort Collins, CO 80525
(970) 224-4505

MEMORANDUM

Date: October 13, 2004

To: File
From: Miller Ecological Consultants, Inc.
CC:

Subject: Wetland summary for Proposed Action

The total impact to wetlands for the proposed action was evaluated using the wetland delineation report from Habitat Management, Inc. and calculating the open water area under the proposed dam modification footprint. The open water area was calculated using ArcView and recent aerial photography to digitize the open water. The palustrine wetland was delineated at 0.14 acres. The open water area was calculated at 1.48 acres. Total waters of the United States impacted by the proposed modification at the dam is 1.62 acres.

The wetland delineation in relation to the proposed modification of the dam is shown on Figure 1.

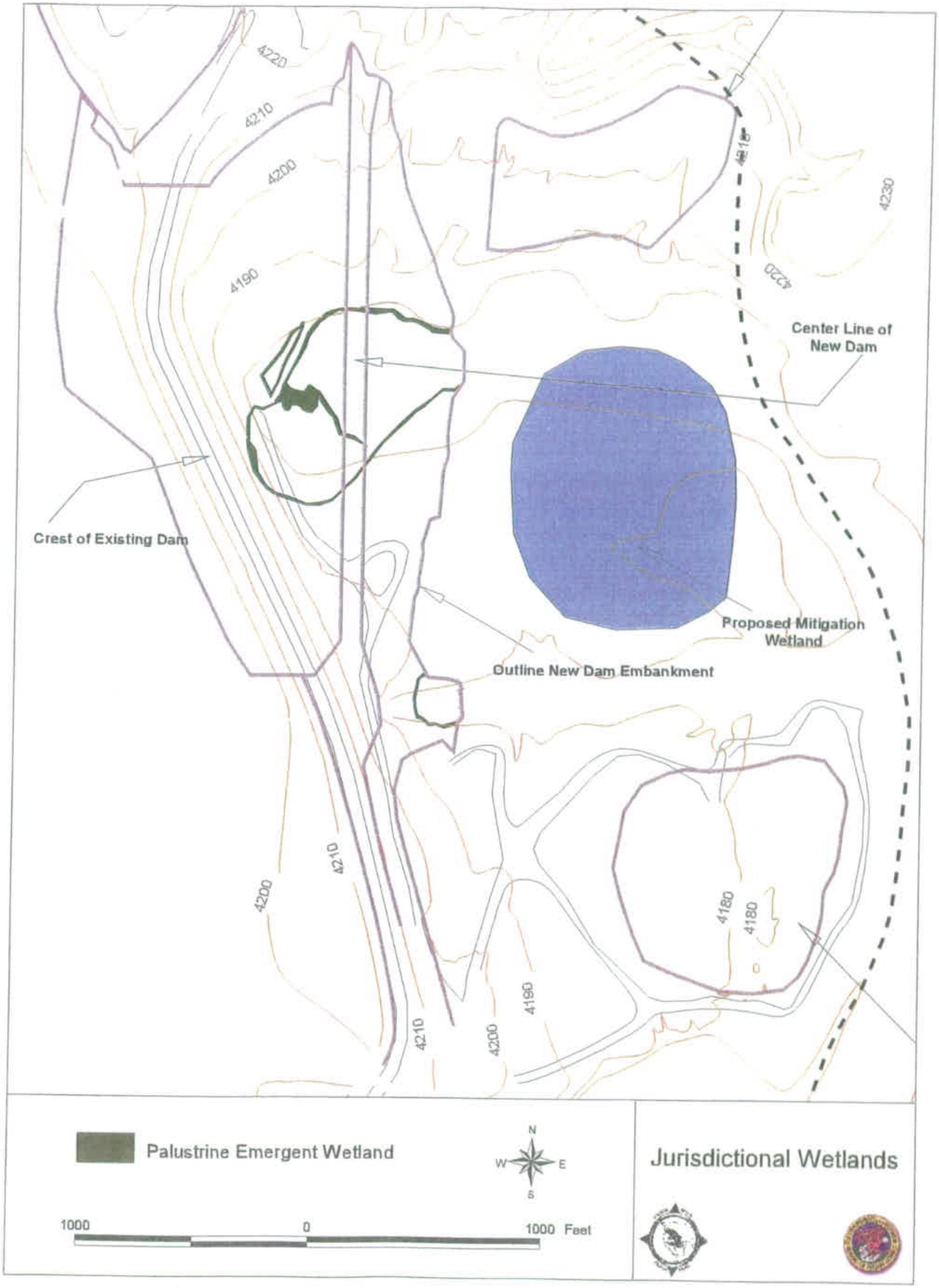


Figure 1. Wetland delineation for proposed dam footprint.

Appendix F - Public Comments on the DEIS and Response to Comments

Key for Appendix

Number	Comment	Response

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105

July 23, 2004

Dean Hagstrom
Bureau of Indian Affairs - Western Regional Office
PO Box 10
Phoenix, AZ 85001

Subject: Draft Environmental Impact Statement (DEIS), Weber Dam Repair and Modification, Walker River Paiute Indian Reservation, Mineral County, Nevada (CEQ #040237)

Dear Mr. Hagstrom:

The U.S. Environmental Protection Agency (EPA) has reviewed the DEIS for the above-referenced project. Our comments are provided under the National Environmental Policy Act (NEPA), the Council on Environmental Quality (CEQ) NEPA Implementing Regulations (40 CFR Parts 1500-1508), and Section 309 of the Clean Air Act.

The DEIS fully evaluates the Proposed Action and No Action. It also provides information on two action alternatives eliminated from detailed consideration (constructing a new off-channel reservoir or developing a system of ground water wells). The information on the two eliminated alternatives allows a reader to understand "the environmental impacts of the proposal and the alternatives in comparative form, thus sharply defining the issues and providing a clear basis for choice among options by the decisionmaker and the public." (40 CFR 1502.14). The DEIS states that a new off-channel reservoir and a system of ground water wells would both result in a loss of approximately 450 acres of jurisdictional wetlands along the lower Walker River (see pp. 2-14 and 2-18). The repair and modification of Weber Dam under the Proposed Action is expected to directly impact approximately 0.1 acres of jurisdictional wetland (p. 4-18). We commend the Bureau of Indian Affairs and the Walker River Paiute Tribe for crafting a Proposed Action having far less wetland impacts than the two eliminated alternatives.

EPA has no objections with the proposed project and Proposed Action. We rate the DEIS as "Lack of Objections" (LO). Please see the enclosed "Summary of EPA Rating Definitions" for an explanation of this rating system. We recommend that the Final Environmental Impact Statement (FEIS) clarify applicable requirements under Clean Water Act Section 404 and Federal regulations implementing Section 404(b)(1) (40 CFR Part 230). Please see our detailed comments (enclosed) regarding clarifications on Section 404-related issues that would strengthen the FEIS.

We appreciate the opportunity to comment. Please send one copy of the FEIS to my attention at the letterhead address (mailcode: CMD-2) when available. If you have questions, please call my staff reviewer, David Tomsovic, at 415-972-3858 or < tomsovic.david@epa.gov >.

Sincerely,

Lisa B. Hanf, Manager
Federal Activities Office

Enclosures: 2
Summary of Rating Definitions
EPA's Detailed Comments

cc: The Honorable Victoria Guzman, Tribal Chairperson, Walker River Paiute Tribe of the Walker River Reservation, Schurz, NV
Richard Gebhart, Army Corps of Engineers, Reno, NV

SUMMARY OF EPA RATING DEFINITIONS

This rating system was developed as a means to summarize EPA's level of concern with a proposed action. The ratings are a combination of alphabetical categories for evaluation of the environmental impacts of the proposal and numerical categories for evaluation of the adequacy of the EIS.

ENVIRONMENTAL IMPACT OF THE ACTION

"LO" (Lack of Objections)

The EPA review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

"EC" (Environmental Concerns)

The EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce the environmental impact. EPA would like to work with the lead agency to reduce these impacts.

"EO" (Environmental Objections)

The EPA review has identified significant environmental impacts that must be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

"EU" (Environmentally Unsatisfactory)

The EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potentially unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommended for referral to the CEQ.

ADEQUACY OF THE IMPACT STATEMENT

Category 1" (Adequate)

EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis or data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.

"Category 2" (Insufficient Information)

The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analysed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses, or discussion should be included in the final EIS.

"Category 3" (Inadequate)

EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analysed in the draft EIS, which should be analysed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the NEPA and/or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

*From EPA Manual 1640, "Policy and Procedures for the Review of Federal Actions Impacting the Environment."

U.S. EPA Comments on Draft Environmental Impact Statement (DEIS), Weber Dam Repair and Modification, Walker River Paiute Indian Reservation, Mineral County, Nevada - CEQ #040237, July 23, 2004

Aquatic Resources and the Clean Water Act

EPA does not object to this project or the Proposed Action. We ask that the Final Environmental Impact Statement (FEIS) clarify requirements under Clean Water Act Section 404(b)(1) and Federal regulations at 40 CFR Part 230. Section 404(b)(1) and 40 CFR Part 230 govern the placement of dredged or fill material into waters of the United States, including wetlands.

1 Page 4-18 states that the dam's realignment "is expected to directly impact 0.1 acres of jurisdictional wetland." The DEIS does not quantify the acreage of impacts to waters of the United States needing Section 404 authorization, i.e., requiring the placement of dredged or fill material in waters of the United States.

2 The DEIS does not address whether the Proposed Action avoids and minimizes, to the fullest extent practicable, the placement of dredged or fill material in waters of the United States.

3 The DEIS does not address whether the Proposed Action requires an individual Section 404 permit or may be authorized by a general permit (we understand that the Army Corps suggests that the project should be processed as an individual permit rather than as a general permit). Under 40 CFR Part 230.7, a condition for receiving a general permit is that a proposed discharge of dredged or fill material in waters of the United States meets applicable "restrictions on discharge" at 40 CFR 230.10.

4 The DEIS does not address what party would apply for Section 404 authorization: the Bureau of Indian Affairs (BIA), the Walker River Paiute Tribe, or both (i.e., joint permittees).

The Army Corps can authorize a discharge of dredged or fill material in waters of the United States only when a proposed project is consistent with 40 CFR Part 230, including applicable restrictions on discharge at 40 CFR Part 10(a)-(d). An applicant must comply with restrictions regarding: (a) practicable alternatives; (b) water quality and other effects; (c) aquatic degradation; and (d) the mitigation of unavoidable adverse impacts to aquatic resources. However, an analysis of alternatives is not required for a general permit. Although Weber Dam is a Federal facility owned and operated by the United States, because of its location on tribal land, water quality certification by EPA is required under CWA Section 401 prior to the Corps' approval under Section 404.

> *Recommendations*: The FEIS should quantify the acreage of waters of the United States requiring the placement of dredged or fill material. The FEIS should address whether the BIA, the Tribe, or both would apply for Section 404 authorization. The FEIS should address whether the Proposed Action needs an individual permit or could be authorized by general permit. Should the project be processed as an individual permit, the FEIS should address applicable restrictions on discharge at 40 CFR Part 230.10(a)-(d), including practicable steps to avoid and minimize the placement of dredged or fill material in waters of the United States. The FEIS should also address Section 401 water quality certification by EPA.

1. Additional narrative will be added in the section discussing impacts to wetlands that quantifies the total acreage of the waters the United States impacted.

2. Additional narrative will be added to the document to discuss avoiding and minimizing placement of dredged or fill material.

3. Additional narrative will be added to discuss the type of 404 permit needed for the action.

4. Additional narrative will be added to address and identify who will lead the permitting process.

5

United States Department of the Interior

FISH AND WILDLIFE SERVICE
1340 Financial Blvd., Suite 234
Reno, Nevada 89502
Ph: 775-861-6300 ~ Fax: 775-861-6301

TAKE PRIDE IN AMERICA

July 22, 2004
File No. BIA 3-3-1

Memorandum

To: Regional Director, Bureau of Indian Affairs, Western Regional Office, Phoenix, Arizona

From: Field Supervisor, Nevada Fish and Wildlife Office, Reno, Nevada

Subject: Comments on the Draft Environmental Impact Statement for the Weber Dam Repair and Modification Project, Mineral County, Nevada

We have reviewed the draft Environmental Impact Statement (EIS) for the Weber Dam Repair and Modification Project dated May 2004. The proposed project involves the repair and modification to Weber Dam, an earthen structure completed in 1937 on the Walker River. The dam serves to store water for irrigation of 2,100 acres of farmland on the Walker River Paiute Reservation. Other uses include recreation, flood protection, fish and wildlife habitat, and historical and cultural uses. Sedimentation over the years has reduced Weber Reservoir's storage capacity from approximately 13,000 acre-feet (af) (960 surface acres) to 10,700 af with a surface area of 650 acres. Weber Dam is situated on an earthquake fault, and under the Indian Dams Safety Act, the Bureau of Indian Affairs has determined that it is a high hazard dam and requires modification due to its unsafe condition. Safety concerns include risk of overtopping during floods or structural failure during an earthquake with potential loss of life. Current interim operating criteria, imposed in 2000 for safety reasons, allow a maximum reservoir storage of about 4,766 af. Completion of the proposed project would restore the maximum reservoir storage capacity to 10,700 af in Weber Reservoir. Our comments follow.

Chapter 1. Introduction: Background, Purpose and Need for the Action and Scoping Summary

1.1 Background, page 1-1. We recommend reviewing the document to confirm that all literature cited in the document is included in the References and Literature Cited section. For example, Carter and Heyer (1993) and Kronquist (1939) mentioned on this page were not listed in the References and Literature Cited section.

5. The document will be reviewed to confirm that all literature cited are included in the reference literature cited section.

6	Regional Director File No. BIA 3-3-1 1.2 Purpose and Need for Action, page 1-5, second paragraph. There should be a consistent explanation of the purpose and need for the proposed action. This paragraph and the paragraph in the Executive Summary on page xi, lines 10-12 should be consistent. As we understand it, the purpose of the project is to address safety concerns due to Weber Dam's location in the vicinity of three major seismic zones and as such is in danger of failing during a maximum credible earthquake or a flood; its repair would not increase its storage capacity beyond the 10,700 af available to secure irrigation water for the reservation prior to implementation of the Interim Operating Criteria. **Chapter 2. Description of Proposed Action and Alternatives**	6. The narrative will be checked for clarity and consistency in the document. The reservoir capacity will not be increased.
7	2.2.3 Proposed Action, page 2-3, lines 4-5. We suggest deleting the second sentence indicating the proposed action is "similar" to what was proposed in the previous Environmental Assessments. This section should indicate what the current project is without having to discuss the differences between past and current projects.	7. The second sentence will be deleted.
8	2.2.3 Proposed Action, page 2-3, line12. It is stated that the project construction will take 12 to 18 months to complete. It should be stated whether this would be a continuous construction period or if it will occur in phases over a few years. If construction is not continuous, the construction season (months) should be indicated. If construction is to occur in phases, the timing (order) of major construction actions should be indicated in the later paragraphs. There should be a discussion on the protective measures that will be employed to prevent erosion, etc. between construction periods.	8. The construction schedule will be clarified.
9	Proposed Action, 2.2.3.1-2.2.3.12, pages 2-3 to 2-9. To assist the reviewer, these paragraphs should be placed in the same order as these items were listed in the Proposed Action introductory paragraph. The paragraph on the fishway (2.2.3.12) should not be listed last as this is a major portion of the proposed project. It would be helpful if the same terms were used as headings to describe the different actions as were used in the introductory paragraph. Please check that all major construction items are mentioned in the introductory paragraph and are fully discussed in these sections.	9. The paragraph order will be checked against the introductory paragraph and discussed in the same order.
10	2.2.3.3 Modify a Portion of the Existing Embankment, pages 2-5, lines 10 and 11. This sentence indicates that "...a portion of the embankment would be relocated downstream from the fault zone." It should be stated what length of the embankment is to be relocated and the distance downstream from its current location to the relocated site.	10. The text will be modified at page 2.2.3.3.
11	2.2.3.12 Fish Passage, pages 2-8. Reservoir operations after completion of the proposed project needs to be discussed, including how the fishway would be operated. Also, include descriptions of the rock-lined pool and the rock barrier, depicted in Figure 2.2-3, and how they function as part of the fishway structure.	11. The fishway operation will be clarified to provide further information on operation as well as construction.

12 2.2.4 Alternatives Considered But Eliminated From Further Consideration, pages 2-12 to 2-20. We recommend retaining the off-channel reservoir and groundwater development alternatives for further analysis. It was stated on pages 2-16 and 2-20 that these two alternatives do not meet the purpose and need of the proposed project. The purpose and need for the project is to address safety concerns. The repair would not increase storage capacity beyond the 10,700 af for irrigation. Removal of the dam and pursuit of either an off-channel reservoir or a groundwater development alternative would eliminate any future risk of failure and loss of life during an earthquake event or overtopping during floods. Based on supporting documentation (Miller 2002), the off-channel reservoir and groundwater development alternatives were not eliminated because they would not provide an adequate water source to meet current demand. The stated needs attributed to flood protection, recreation, fish and wildlife habitat, and cultural values are actually benefits derived incidentally due to the existence of Weber Reservoir since its construction in the 1930's. An EIS should provide a full range of reasonable alternatives for disclosure and analysis. We recommend further consideration of these two options in the final EIS under the alternatives analysis.

13 The document states that for both the off-channel reservoir alternative and the groundwater development alternative, impacts to wetlands (an estimated 450 acres) would need to be mitigated (page 2-14, lines 19-20; page 2-18, line 4-5, respectively). However, the report by Habitat Management Inc. (2002) raises several questions regarding U.S. Army Corps of Engineers' jurisdiction and policy. We recommend that a more in depth investigation occur with regards to wetland mitigation as it may or may not contribute significantly to project costs for these alternatives. It is unclear how the wetland acreage estimation was determined as it does not appear a wetland delineation was performed for the project area.

Chapter 3. Affected Environment

14 3.6.3 Cultural Resources Identified in the Dam Project Area, page 3-42. As stated, Weber Dam has been recommended for listing under the National Historic Preservation Act. It is important to understand this process, its status for eligibility, and how it may affect the currently proposed alternative or options for its removal.

Chapter 4. Environmental Consequences

4.3 Water Resources

15 4.3.2.2 Proposed Action, Surface Water Resources, page 4-10, second paragraph. If straw bales are used as a sediment control measure, they should be certified weed-free to reduce/eliminate the potential for invasive weeds to be introduced into the project area.

12. BIA and the Tribe believe that the reasons for eliminating these two alternatives from further consideration have been thoroughly documented in the EIS and no further discussion is required.

13. The estimate for wetlands impact was derived from data in JBR Environmental Consultants, Inc. 1994. That information was a survey of Walker River jurisdictional wetlands and waters of the United States completed for the Tribe. Based on that data and the requirements for mitigation as listed in the cited U.S. Corps of Engineers' letter in Section 2, the estimate and impact for wetlands was determined to be approximately 450 acres. The citation for JBR Environmental Consultants will be added to the first sentence in the paragraph regarding wetland impacts.

14. Weber Dam has been determined eligible for the National Register of Historic Places (Register), which was established under the National Historic Preservation Act of 1966 (amended 1992). It is eligible for the Register under the criterion listed at 36 CFR 60.4(a), in that it is associated with important events of western Nevada history. The dam is not eligible under the criterion at 36 CFR 60.4(c) in that it does not embody distinctive characteristics of a type, work of a master, or possess high artistic value. The proposed alternative will have an effect on the dam, but it is anticipated that adequate documentation of the dam's history by means of a historical context study will lead to a finding of "no historic properties affected."

15. The sediment control measures will be part of the contractor's responsibility and the sediment control plan and water quality plan submitted during the construction phase will insure that the best management practices use weed free materials.

	Regional Director File No. BIA 3-3-1 **4.5 Biological Resources**	
16	4.5.2.2.1 Proposed Action, Wildlife Habitats, page 4-15. This paragraph indicates that a total of 3 acres of wildlife habitat would be impacted by the proposed project without describing what type(s) of habitat is being impacted. See also the paragraph under 4.5.3 Vegetation Resources.	16. Most of the wildlife habitat disturbance and impact will occur in previously disturbed areas of upland habitat. There will be additional loss of wetland and waters of the United States of approximately 1.6 acres. These acreages and habitat type descriptions will be added to Section 4.5.2 and 4.5.3.
17	4.5.2.3.1 Mitigation Measures, Wildlife Habitats, page 4-16. Some assurance needs to be made that mitigation measures proposed will be implemented for this project. The word "could" should be replaced by the word "would" throughout this section with regards to measures used to avoid or minimize project impacts. These measures need to be consistent with mitigation provided for vegetation resources.	17. The word "could" will be replaced with the word "would" throughout this section.
18	4.5.3.2 Vegetation Resources, Proposed Action, pages 4-16 to 4-17. The acreage of loss to the major vegetation/habitat types as listed in chapter 3 should be indicated in this chapter as a result of project construction. The ratio of replacement for lost vegetation types should also be indicated in this chapter. It should be stated in this section whether large cottonwoods in the project area would be removed or not as these are important roosting sites for bald eagles which are known to visit the vicinity. The statement in Chapter 2, page 2-11, that disturbing the seep area near the dam, where unavoidable, would be mitigated by creating a two acre wetland near the river is an environmental consequence which should be stated in Chapter 4. See also the paragraph above under 4.5.2.2.1 Proposed Action, Wildlife Habitats. Any restoration plan should include a period of monitoring to determine the success of the restoration effort. We recommend a 3 to 5 year monitoring period. A contingency plan to address unsuccessful revegetation efforts should also be included as a part of the restoration plan.	18. The mitigation ratios for wetland replacement are provided on page 4-18 of the DEIS. Further clarification will be stated that a two-acre wetland has been proposed but that final acreage and design will be determined during the 404 permit process. Large cottonwoods would not be removed.
19	4.5.4.2.1 Threatened and Endangered Species, Proposed Action, Bald Eagle, page 4-19, line 31. It is contradictory to indicate no impacts to bald eagle when there may be disturbance issues during construction. When impacts to listed species are expected to be insignificant, discountable, or completely beneficial, the conclusion should be may affect, not likely to adversely affect. However, section 7 consultation determinations related to project impacts are better suited for development in the Biological Assessment (BA) rather than the EIS.	19. Section 4.5.4.2.1 regarding impacts to bald eagle, will be updated and consistent with the Final Biological Assessment and the conclusions regarding impacts. Further, all impacts to T&E species will be consistent with the Biological Assessment.
20	4.5.4.2.2 Threatened and Endangered Species, Proposed Action, Lahontan Cutthroat Trout, page 4-19. During previous discussions with BIA and the Walker River Paiute Tribe, we have indicated our concerns, with not only the effect of Weber Dam on Lahontan cutthroat trout (LCT) passage upstream and downstream, but the effects of Weber Reservoir on LCT recovery and survival in the Walker River system as well. Reservoir operations must be managed to ensure adequate flows through the fishway during spawning migrations and potentially emigration. Non-native warm water fish populations will likely predate on LCT fry 4	20. A description of reservoir operations as presented in the Biological Assessment and also impacts from other species and water quality will be consistent with the discussion in the Biological Assessment.

emigrating to the lake. Additionally, Weber Reservoir has water quality conditions that may disrupt upstream migration of adults and emigrating juveniles. These project impacts need to be mentioned here and more fully discussed and analyzed in the BA.

21 4.5.4.3.1 Mitigation, Bald Eagle, page 4-21. Assurances of minimizing impacts need to be indicated. As a result, the word "could" should be replaced with the word "would" in the phrase, "... noise and dust impacts could be minimized using best management practices."

There is no mention of the camping restrictions that are to be implemented during project construction.

22 4.5.4.3.2 Mitigation, Lahontan Cutthroat Trout, page 4-21. As discussed above, additional mitigation measures may be necessary to avoid or minimize project impacts to LCT.

23 4.5.5.1 Conclusions, page 4-22, line 25. As stated above, it is contradictory to indicate no effects to bald eagles when there will likely be disturbance issues during construction.

24 4.5.5.1 Conclusions, page 4-22, line 40. We recommend rewording of this sentence to read, "Weber Reservoir would be managed in such a way to promote LCT passage..." rather than "Weber Reservoir can be managed in such a way to promote LCT passage..."

25 4.5.5.1 Conclusions, page 4-23. On page 3-40, line 1 to 2, the document indicates that white-faced ibis were observed in the project area in 2001. This contradicts the comment made on page 4-23, line 2, that no species of concern were observed.

4.8 Land Use

26 4.8.3 Mitigation Measures, page 4-27, line 36. We recommend that some assurance be made that mitigation measures proposed will be implemented for this project. We recommend that the work "could" be replaced with the word "would" with regards to measures employed to avoid or minimize project impacts.

4.10 Recreation

27 4.10.2 Proposed Action, page 4-29. As discussed above, camping may be restricted during the construction period when bald eagles are likely to be in the area to minimize impacts to them. Please review the measure and incorporate it as appropriate into this section.

5

21. The word "could" will be replaced with the word "would".

22. See response to comment 20.

23. See response to comment 19.

24. The wording will be changed to be consistent with the Biological Assessment regarding management of Weber Reservoir.

25. The white-faced ibis were observed in the study area, adjacent to Weber Reservoir and not directly in the project construction area near the dam. These sections will be clarified to make that distinction

26. See response to comment 21.

27. The wording regarding camping restrictions will be consistent with the wording in the Biological Assessment.

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Regional Director File No. BIA 3-3-1

4.13 Cumulative Impacts

28 4.13.2.1 Surface Water Resources, page 4-35, line 45. What is meant by the phrase, "...expansion of facilities at Weber Dam..."? It is our understanding that repair of Weber Dam will not increase storage capacity beyond 10,700 af.

29 4.13.2.2 Biological Resources, page 4-36, line 6. This is the first mention of a 20 and 5 acre estimate being provided for project impacts on Reservation and Bureau of Land Management lands, respectively. These impacts should be fully described earlier in the document.

30 4.15 Relationship between Local Short-term Uses of the Environment and the Maintenance and Enhancement of Long-term Productivity, page 4-40, line 6. It is stated that the life expectancy of the project is "over 50 years." This statement is rather open-ended. We recommend that this be reworded more accurately as "about 50 years", or "50 to 55 years", or "approximately 75 years", etc.

We appreciate the opportunity to provide comments on the draft EIS. If you have any questions or comments, please contact me at (775) 861-6300.

Jady E Brown
for Robert D. Williams

6

28. Weber Reservoir's storage capacity will not be increased beyond 10,700 acre feet with the repair and modification of the dam. The wording on page 4-35, line 45, will be reworded to the following: "Modification and repair of the facilities at Weber Dam".

29. The acreages of estimated disturbance area will be included in the description of the project in Chapter 2.

30. The life expectancy for the project is an estimate of years of serviceable life for the facility. The current facility at Weber Reservoir has been in operation for approximately 70 years without major repairs. It would be expected that the new facility would last 50 years and possibly as long as 75 years. Wording on the life expectancy of the project will be modified to reflect the best estimate of the Bureau of Indian Affairs for the facility.

Amy L. Heuslein
Regional Environmental Protection Officer,
Western Regional Office
Bureau of Indian Affairs,
Environmental Quality Services

USGS has no comments for Draft EIS for the Proposed Weber Dam Repair and Modification Project, Lyon and Mineral Counties, Nevada.

Thanks

****
Brenda Johnson
Office of Environmental Affairs Program
U.S. Geological Survey
423 National Center
Reston, VA 20192
Tele (703) 648-6832
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****

R. MICHAEL TURNIPSEED, P.E.
Director

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Division of Conservation Districts
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Division of Water Resources
Natural Heritage Program
Wild Horse Program

STATE OF NEVADA

Department of Conservation and Natural Resources

OFFICE OF THE DIRECTOR

July 9, 2004

Mr. Dean Hagstrom
Bureau of Indian Affairs
Western Regional Office
P. O. Box 10
Phoenix, AZ 85001-0010

The following are the comments of the Department of Conservation and Natural Resources for the State of Nevada.

RE: Draft Environmental Impact Statement for the Weber Dam Repair and Modification Project

Dear Mr. Hagstrom:

Two alternatives were discarded as not being feasible; therefore the Draft Environmental Impact Statement only addresses two alternatives; the no action alternative and the proposed action alternative. Obviously, when it comes to dam safety the no action alternative is not an alternative.

31 More specifically: Chapter 1, Section 2.2.4.2, the substitution of Weber Dam by groundwater development was discounted as not being feasible, but the alternative investigated included a series of wells parallel to Weber Reservoir to feed water to Little Dam which then diverts water into Canal One and Canal Two. The proposal also included the removal of Weber Dam. The conversion of tribal irrigation to groundwater need not necessarily include the removal of Weber Dam. Weber Dam could be kept in place if repaired for flood control and for the bundling of whatever water may become available to provide water for the survival of the Walker Lake ecosystem. Groundwater could be developed for direct application to tribal farms by sprinkler. This would be much more efficient and enhance the value of crops of the tribal farmers.

Multiple alternatives within this alternative should be studied or further reviewed with the associated costs and benefits. This item is the subject of the mediation process to resolve litigation and resolve the issues with Walker Lake.

31. The proposed alternative for groundwater development arose from the scoping meetings with the public. The proposal included removal of Weber Dam to remove the impediment to upstream migration for LCT. As such, the groundwater alternative included evaluation of Weber Dam removal. The groundwater could be developed in conjunction with Weber Dam remaining in place, however, the environmental benefit would be no different to LCT between that alternative and any alternative that did not have LCT passage included at Weber Dam.

Page 2
Mr. Hagstrom
July 9, 2004

32 **Table ES-1** In the Table ES-1, under long-term impacts, it states that warm water fisheries would recolonize Weber Reservoir. Warm water fisheries (bass) are not compatible with trout migration. Even if adult Lahontan Cutthroat Trout (LCT) were able to navigate the lower river, fish ladder, and reservoir to upstream spawning grounds, the juveniles would all be eaten on their migration back to Walker Lake. Warm water fisheries cannot be established in Weber Reservoir and at the same time provide a facility for Lahontan Cutthroat Trout to get to spawning grounds in the upper Walker River and return to Walker Lake.

33 **Chapter I, Section 2.2.2** There is a paragraph in this section that states that the tribe diverts 80 cfs at Little Dam for a period of two weeks and shuts off for two weeks. Gage records do not reflect this irrigation regime.

34 **Chapter I, Section 2.2.4.1, Page 2-13,** the statement reads that Weber Reservoir has a priority date of 1936 and that the priority might be 2003 or later if a new offstream reservoir were constructed. First there is no recognition of a water right for Weber Reservoir in the C-125 decree. However there is a water right for Weber Reservoir recognized in the California/Nevada Interstate Compact. Litigation began in 1989 in the decree court to recognize a water right for Weber Dam and Weber Reservoir storage. Assuming it is recognized through litigation or mediation, Nevada law allows for changes to point of diversion, place of use, and/or manner of use without loss of priority. See NRS 533.345.

35 **General:** No doubt the tribal irrigation (2100 acres decreed by the C125 decree) needs more than just 26.25 cfs at the Wabuska Gage for 180 days as decreed. There is much disagreement as to the duty (volume) of water required for the current irrigation of the decreed lands. Depending on distribution effiency and on farm effiencies, the tribal lands should require somewhere between four and a half acre feet per acre and six and a half acre feet per acre at the Canal One and Canal Two diversion points. Records reflect that there has never been less than 26.25 cfs at the Wabuska Gage for the 180 day decreed irrigation season. No doubt by gage records there is substantial loss of water between Wabuska Gage and Weber Reservoir, however this loss could be corrected or mitigated. There is a great deal of ineffiency in the entire system between water flows at Wabuska Gage and crop consumption on the tribal irrigated lands. If the effiency could be improved, then the need for supplemental storage at Weber Reservoir is greatly reduced.

36 This is also the subject of the mediation process to resolve the litigation issues on the Walker River system. I agree that neither the offstream reservoir alternative nor the substitution of groundwater provides any flood control for the community of Schurz. However neither of those alternatives necessitates the removal of Weber Dam. I believe that a conservation pool at Weber Reservoir maybe needed at times to supplement decreed water flows for the tribal irrigated lands, however it need not have to be 10,000 acre feet of storage.

32. The warmwater fish that recolonize the Reservoir (such as after the 2000 drought and fishkill at Weber Reservoir) are not stocked as part of fisheries management on the Reservation. The source of the fish is upstream river areas (Mason Valley) and downstream to the Reservoir. This source of warmwater fish will exist whether Weber Reservoir is in place or not. Overall management of the Walker River Basin for the recovery of LCT will likely require management of warmwater species so that LCT are not impacted as they migrate downstream from spawning areas. The upstream impediments will exist even with the modification of Weber Dam. The concerted effort of the recovery program in the basin should address all impediments, to upstream and downstream migration for LCT.

33. The referenced text has been edited to clarify questions.

34. Because Weber Dam and Reservoir are federal facilities owned and operated by the Bureau of Indian Affairs for the benefit of the Tribe, and located entirely within the exterior boundaries of the Reservation, Nevada State laws regarding changes in point of diversion, place of use, and/or manner of use are inapplicable. Rather, the applicable law for changes in points of diversion, place of use, and/or manner of use of the water rights adjudicated for the benefit of the Tribe is contained in the decree entered in 1936 and amended in 1940 in *United States v. Walker River Irrigation Dist.*, No. C-125 (D. Nev.). It is not clear whether the decree would identify a different priority date for a new, off-channel storage facility. The text in DEIS Section 2.2.4.1, page 2-13 has been revised.

35. While we recognize that there is potential for water loss between Wabuska Gage and the water delivery system on the Reservation, projects to reduce or minimize these losses are outside the scope of the Weber Dam Repair and Modification Project. Potential projects to address such water losses or water delivery system inefficiencies may be addressed in ongoing negotiations or future initiatives.

36. See response to comment 31.

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Mr. Hagstrom
July 9, 2004

This concludes the remarks on the Draft Environmental Impact Statement by the State of Nevada through the Department of Conservation and Natural Resources. If there are further questions about these comments, I can be contacted at (775) 687-4360.

Sincerely,

R. Michael Turnipseed, P.E.
Director

cc: Steve Robinson, Governor's Office
cc: Hugh Ricci, P.E., S.E.

KENNY C. GUINN
Governor

STATE OF NEVADA

R. MICHAEL TURNIPSEED, P.E.
Director

HUGH RICCI, P.E.
State Engineer

DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES

DIVISION OF WATER RESOURCES

123 W. Nye Lane, Suite 246
Carson City, Nevada 89706-0818
(775) 687-4380 • Fax (775) 687-6972
http://water.nv.gov

July 21, 2004

Dean Hagstrom
Bureau of Indian Affairs, Western Regional Office
P.O. Box 10
Phoenix, Arizona 85001-0010

Re: DEIS Weber Dam Repair and Modification Project

Dear Mr. Hagstrom:

Thank you for the opportunity to comment on the Draft Environmental Impact Statement (DEIS) for the proposed action to repair and modify Weber Dam (NID number NV10132). The Division supports efforts to increase the safety, reliability and utility of Weber Dam.

The plan, however laudable in concept, has presented the State Engineer with a bit of a conundrum. Specifically, in what manner can Nevada law be upheld and enforced when the project is on land not entirely subject to the provisions of Nevada Revised Statutes (NRS) chapter 535 and yet the impacts of an accident will affect citizens he is directed to protect under the same statutes?

The compromise has been to invoke NRS 535.010(7), which states in part that projects under the auspices of either the United States Bureau of Reclamation (BOR) or United States Army Corps of Engineers (COE), "…shall file duplicate plans and specifications with the state engineer." Although strictly in accordance with the letter of the statute, it leaves the State Engineer in the position of commenting on a project with inadequate information about the selection of various details regarding the design of the repairs and modifications to Weber Dam. Under normal circumstances, this limitation would not be a matter of concern due to the established expertise of the agencies involved. However, the State Engineer is concerned about the selection of the inflow design flood (IDF). Previous design documents indicated that the

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July 21, 2004

Page 2

effect of a dam break under overtopping conditions would approach a "break-even point" with respect to a natural flood at about 25% of the probable maximum flood (PMF). It would appear that choosing to design an emergency spillway that only allows a safe passage of about 13% of the PMF results in an inherently unsafe dam. Nevada safety of dams regulations under Nevada Administrative Code (NAC) chapter 535 requires that a high hazard dam be designed to accommodate an IDF equal to the PMF without failure. Even if the population at risk in Schurz were to be discounted, the Nevada hazard rating for Weber Dam would still be significant due to the US 95 crossing downstream. This rating would also require an IDF equal to the PMF under Nevada regulation (large dam). The IDF requirement may be relaxed if an incremental damage analysis indicated that a smaller flood was appropriate.

Additional discrepancies were noted in the document:

- Weber Dam and reservoir are referred to as "small" when by any reasonable standard they are at least of "medium" size and by Nevada regulation (NAC chapter 535) they are "large."
- The height of the dam is known to us as 50 feet. Nine (9) feet less height as indicated by the listed elevations would be 41 feet, not 36 feet as noted on page 1-1.
- It was implied in the DEIS that BOR would be designing and constructing the dam modifications. It would be helpful if these responsibilities were more specifically addressed.
- Title 25, Chapter 40 does not seem to require an Emergency Action Plan (EAP). Nevada regulation requires an EAP for Weber Dam. Although probably outside the scope of the DEIS, the State Engineer anticipates that an appropriate EAP will be developed and maintained for Weber Dam.

The water right issues must also be resolved to allow storage behind the reservoir. Please also see the comments dated July 9, 2004, from Mr. Michael Turnipseed for the Department of Conservation and Natural Resources.

37. An analysis was completed by the Bureau of Reclamation when determining the size of the emergency spillway. The analysis determined that an emergency spillway capable of safely passing flows greater than about 13 percent of the PMF was not justified and this appears consistent with State of Nevada requirements. In addition, an Emergency Action Plan has been developed and exercised and an Early Warning System has been installed to assist in warning the downstream populations should a large hydrologic or earthquake event occur.

38. The modifier was deleted.

39. Our records indicate the structural height of the existing dam to be 50 feet and the hydraulic height to be 36 feet. Structural height is defined as follows: "The vertical distance between the lowest point of the excavated foundation to the top of the dam." Hydraulic height is defined as follows: "The vertical difference between the maximum controllable water surface and the lowest point in the original stream bed at the axis of the dam."

The fourth sentence of the third paragraph on Page 1-1 has been changed to the following: "The hydraulic height, which is the distance from the lowest point in the original stream bed at the dam axis to the top of the spillway gates at 4,208 ft msl, is 36 feet (Cater and Heyder, 1993)."

40. The Bureau of Reclamation will be completing the design of the most of the modifications under contract to the Walker River Paiute Tribe in accordance with Federal guidelines and sound engineering practices. The fish ladder will be designed by a private consultant under contract to the Tribe and to the requirements outlined in the EIS and to sound engineering practices. The Tribe will contract the construction management to a private consultant familiar with construction of embankment dams and the designers from Reclamation will be on-site during critical stages of the construction.

41. BIA guidelines require the development and exercising of Emergency Action Plans for high and significant hazard dams on a regular basis. An EAP for Weber Dam has been developed and exercised in accordance with those regulations.

July 21, 2004

Page 3

If you have any questions, please contact either Michael J. Anderson, P.E. or the undersigned at (775) 687-4380, extension 4.

Respectfully submitted,

Robert K. Martinez, P.E.
Chief, Engineering and Dam Safety

RKM/MJA/jjs

KENNY C. GUINN
Governor

STATE OF NEVADA

JOHN P. COMEAUX
Director

DEPARTMENT OF ADMINISTRATION
209 E. Musser Street, Room 200
Carson City, Nevada 89701-4298
Fax (775) 684-0260
(775) 684-0209

July 21, 2004

Bureau of Indian Affairs
Western Regional Office
P.O. Box 10
Phoenix, AZ 85001

Re: SAI NV # E2004-220
Project: DEIS Weber Dam Repair and Modification Project

Enclosed are the comments from the Nevada regarding the above referenced document. These comments constitute the State Clearinghouse review of this proposal as per Executive Order 12372.

Please address these comments or concerns in your final decision. If you have questions, please contact me at (775) 684-0209.

Sincerely,

FOR Michael J. Stafford
Nevada State Clearinghouse Coordinator/SPOC

Enclosure

42

NEVADA STATE CLEARINGHOUSE

Department of Administration
Budget and Planning Division
209 East Musser Street., Room 200
Carson City, Nevada 89701-4298
(775) 684-0209
Fax (775) 684-0260

DATE: June 24, 2004

Governor's Office	Legislative Counsel Bureau	Conservation & Natural Resources - Director's Office
Agency for Nuclear Projects	PUC	State Lands
Energy Office	Transportation (General)	Environmental Protection
Agriculture Department	Transportation (Airspace)	Forestry
Minerals Commission	Office of Traffic Safety	Conservation Districts
UNR Bureau of Mines	UNR Library	State Parks
Economic Development	UNLV Library	Water Resources
Tourism	Historic Preservation	Natural Heritage Program
Fire Marshal	Emergency Management	Wild Horse Commission
Human Resources	Office of the Attorney General	Wildlife Department - Director's Office
Health Division	Washington Office	Region 1 - Fallon
Indian Commission	Nevada Assoc. of Counties	Region 2 - Elko
Colorado River Commission	Nevada League of Cities	Region 3 - Las Vegas
Animal Damage Control	Public Safety	

Nevada SAI # E2004-220
Project: DEIS - Weber Dam Repair Project

Yes No Send more information on this project as it becomes available.

CLEARINGHOUSE NOTES This Project may be viewed at: http://www.paiutewater.com
Enclosed, for your review and comment, is a copy of the above-mentioned project. Please evaluate it with respect to its effect on your plans and programs; the importance of its contribution to state and/or local areawide goals and objectives; and its accord with any applicable laws, orders or regulations with which you are familiar.

Please submit your comments no later than **July 21, 2004.** Use the space below for short comments. If significant comments are provided, please use agency letterhead and include the Nevada SAI number and comment due date for our reference. Questions? Michael Stafford, Clearinghouse Coordinator, (775) 684-0209 or mstafford@budget.state.nv.us

THIS SECTION TO BE COMPLETED BY REVIEW AGENCY:

- ___ No comment on this project
- ___ Proposal supported as written
- ✓ Additional information below
- ___ Conference desired (See below)
- ___ Conditional support (See below)
- ___ Disapproval (Explain below)

AGENCY COMMENTS:
The SHPO will await the BIA's submission of a cultural resource inventory for the borrow pit area before commenting on the possible effect of this project on historic properties. The SHPO recommends that the BIA consult w/ the BLM concerning this inventory at (775) 885-6177.

Rebecca L Palmer — Signature
Historic Preservation — Agency
7/14/04 — Date

42. BIA will submit a complete cultural resource inventory for the Weber Dam project's full area of potential effect (APE). This will include consultation with BLM over any effect to historic properties that may be present at the proposed existing borrow pit.

RICHARD O. KWAPIL
GORDON H. DEPAOLI
SUELLEN FULSTONE
JOHN F. FOWLER
JOHN F. MURTHA
STEPHEN S. KENT
W. CHRIS WICKER
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WILLIAM K. WOODBURN [illegible]
VIRGIL H. WEDGE [illegible]
CASEY W. VLAUTIN [illegible]

OF COUNSEL
JAMES J. HALLEY

July 26, 2004

Via U.S. Mail and Facsimile (602)-379-6835

Dean Hagstrom
United States Department of Interior
Bureau of Indian Affairs
P.O. Box 10
Phoenix, Arizona 85001-0010

Re: Draft Environmental Impact Statement for the Weber Dam Repair and Modification Project

Dear Mr. Hagstrom:

This office represents the Walker River Irrigation District (the "District"). The District recently received a copy of the Draft Environmental Impact Statement for the Weber Dam Repair and Modification Project (the "DEIS"). The cover letter accompanying the DEIS indicates that comments will be received through July 26, 2004. By voice mail left with my office on July 21, 2004, you indicated that written comments may be provided by facsimile on July 26, 2004. The District submits the following comments to the DEIS. The District's comments relate mainly to information present in the DEIS concerning water rights and water use and are organized in accordance with the chapters set forth in the DEIS.

<u>Chapter 1 - Introduction: Background, Purpose and Need for the Action and Scoping Summary</u>

43 The DEIS states that "a need has been identified in the Walker River Basin to use Weber Dam and Reservoir to store dedicated water from upstream users and deliver such water in large blocks to Walker Lake to enhance the lake ecosystem." Section 1.2 at page 1-5. The District does not necessarily agree that a need exists to store water in Weber Reservoir for delivery to Walker Lake. It also questions who identified this need as the DEIS does not reveal this information. Finally, assuming that such a need does exist, this statement should not be limited to water from "upstream users" but also include water users located on the Walker River Indian Reservation.

43. Line 20 on page 1-5 will be modified to delete the word "upstream" and insert the words "Walker River water users".

Chapter 2 - Description of Proposed Action and Alternatives

44 As a preliminary matter, the header on pages 2-1 through 2-20 states " Chapter 1 - Introduction: Background, Purpose and Need for the Action and Scoping Summary."

45 The DEIS states that one of the screening criteria for the alternatives presented was to "[d]eliver the same volume and quality water to the Tribe for irrigation and with the same priority as would the present Weber Reservoir at full capacity." Section 2.2.1 at page 2-1. It also states that "storage rights in Weber Reservoir currently have a priority date circa 1936." Section 2.2.4.1 at page 2-13. These statements and the DEIS as a whole assume that the United States and/or Tribe presently hold some recognized water right to store water in Weber Reservoir with a priority date. That assumption is incorrect. The United States and/or the Tribe do not hold such a water right under the Walker River Decree or any other permit or certificate to store water in Weber Reservoir. The DEIS should make this fact clear and that it is an issue currently pending in litigation.

46 In some instances the DEIS states that construction on Weber Reservoir began in 1933 while in other instances it states 1934. Compare sections 2.2.4.1 at page 2-16 and 3.10 at page 3-53 with section 4.5.4.1.2 at page 4-19.

Chapter 3 - Affected Environment

47 The DEIS states that the "flow in the Walker River that eventually reaches Weber Reservoir is largely controlled by extensive agricultural withdrawals and consumptive use along the River's length." Section 3.3.2.2 at page 3-16. This statement ignores the fact that flows reaching Weber Reservoir on any given year are also strongly influenced by the nature of the water year in question (wet, dry or average) and weather (hot, average or cool) during the spring and early summer months of that year.

48 The DEIS states that data from the gage located directly upstream of Weber Reservoir was "not used to characterize the base line hydrology" because the gage "does not measure all of the flow at high levels." Section 3.3.2.2 at page 3-17. Nevertheless, the DEIS apparently relies on data from this gage. For example, it states that USGS records show flows "immediately upstream of Weber Reservoir to be 0.1 cfs." Section 2.2.4.1 at page 2-16.

49 The DEIS states that Lahontan Cutthroat Trout ("LCT") migrate from Walker Lake to the base of Weber Dam during high flow periods. Section 3.5.1 at page 3-27; 3.5.4.2 at page 3-38 and 4.5.5.1 at page 4-22. The DEIS, however, offers no factual support for these statements.

44. The headers will be checked and made consistent with the chapter headings.

45. See response to comment 34. The text in Section 2.2.1, page 2-1 the third bullet of the screening criteria has been revised, consistent with the comment.

46. The text has been revised at Section 2.2.4.1, page 2-16, section 3.10, page 3-53, and section 4.5.4.1.2, page 4-19 to make the beginning date of dam construction consistent throughout the document.

47. The text has been modified to address the comment.

48. The statement will be modified to show that flow at the gage immediately upstream of Weber Reservoir does not measure all flow and clarification will be added to show that the minimum flows were observed at the Wabuska gage.

49. The observation of LCT at Weber Dam has been made by Tribal members during years when adequate runoff exists to pass Weber Reservoir and reach Walker Lake in the spring. Clarification will be added to this section to describe that observation.

Dean Hagstrom
July 26, 2004
Page 3

50 The DEIS offers a discussion of LCT at Section 3.5.4.2, page 3-36. While this section states that "[n]o reproducing or resident populations of LCT are found in the project area," the DEIS should make it clear that LCT are stocked or planted in Walker Lake and the fishery at the Lake is of a put and take nature.

51 The DEIS states that the "entire Walker River system discharge pattern is highly regulated through the two dams (Bridgeport and Topaz) near its headwaters. Except during periods of above normal snow pack and above normal reservoir storage, river flows are completely controlled to serve adjudicated water rights." Section 3.5.4.2 at page 3-37. The statements are misleading. The storage capacity in Bridgeport and Topaz Reservoirs is extremely small in comparison to the annual average flow of the Walker River. Therefore, the discharge pattern of the Walker River system cannot be fairly characterized as "highly regulated" by the reservoirs created by the Bridgeport and Topaz Dams. Furthermore, river flows are not and cannot be "completely controlled to serve adjudicated water rights." As stated above, Walker River flows are highly dependant on the nature of the water year in question (wet, dry or average) and weather (hot, average or cool) during the spring and early summer months of that year.

52 The DEIS is inconsistent in its statement of the quantity of land irrigated on the Reservation. On one hand, it states that "[a]pproximately 3,830 acres are currently irrigated or have been in the recent past, including both private land and common tribal pasture." Section 3.7 at page 3-46. On the other hand, the DEIS states that "Allottees irrigate approximately 2,100 acres of allotments, which consist primarily of alfalfa and grass hay. An additional 767 acres of tribal trust land are irrigated on the Reservation by center pivots. In some year, water from Weber Reservoir provides flood irrigation of up to 312 acres of pasture land, not including the center pivots and the 2100 acres of irrigated allotments." Section 3.8.1 at page 3-50. This would total 3,179 acres of irrigated land on the Reservation.

Chapter 4 - Environmental Consequences

53 The DEIS mentions "Court ordered mediation for settlement of federal water claims in the Walker River Basin" as an activity that could have future impacts. Section 4.13.1 at page 4-34. First, the Federal District Court did not order the parties to

54 participate in mediation. Second, the statement should also indicate that the mediation is intended to settle tribal water claims as well as federal water claims.

55 The DEIS states that "[s]everal entities holding decreed water rights within the Walker River basin have expressed the intent to request the use of Weber Dam and Reservoir to facilitate the movement of decreed water from upper basin to Walker Lake." Section 4.13.2.1 at page 4-35. At the present time, the only entities that the District is

50. The paragraph and statement in question discusses general life history and occurrence of LCT throughout western Nevada beyond the limited project area. There is a discussion of stocking LCT in Walker Lake two paragraphs further down the page; these paragraphs address the annual stocking and numerous stockings over many years into Walker Lake.

51. Lines 40 through 43 on page 3-37 will be revised as follows: "The Walker River discharge pattern is influenced by two dams (Bridgeport and Topaz) near its headwaters and direct flow diversions for irrigation. Except during periods of above normal snowpack and above normal reservoir storage, river flows mainly serve adjudicated water rights."

52. The text in Section 3.7, page 3-46 with the reference to 3,830 in the paragraph following Table 3.1-5 has been changed to 3,179, consistent with the sum of the numbers listed in section 3.8.1, page 3-50 (2,100 + 767 + 312).

53 and 54. The text in Section 4.13.1, page 4-34 has been revised to address the comments.

55. The word "several" will be deleted from the sentence.

Dean Hagstrom
July 26, 2004
Page 4

aware of that have made any request of this nature are the Nevada Department of Wildlife and the Tribe itself.

56 Appendix A to the DEIS contains the Fish Passage Design Technical Memorandum which concludes that a boulder weir-rock lined fish passage structure should be part of the Weber Dam Repair and Modification Project. The District questions the need for such a structure based on the historic flows in the Walker River.

Finally, the District's decision not to comment on a particular matter addressed in the DIES in this letter does not necessarily mean that the District agrees with the position taken in the DEIS. The District specifically reserves the right to challenge any portion of the DEIS or any EIS at some later date should it become necessary.

Sincerely yours,

Dale E. Ferguson

Gordon H. DePaoli
Dale E. Ferguson

GHD:def
cc: Ken Spooner

56. The decision to include a fish passage structure for Weber Dam Repair and Modification was determined necessary to meet ESA obligations for the project. Your comment is noted.

57

JW Howard
Attorneys

JOHN W. HOWARD
THOMAS J. McKINNEY

625 BROADWAY, SUITE 1206
SAN DIEGO, CALIFORNIA 92101

TEL (619) 234-2842
FAX (619) 234-1716
johnh@jwhowardattorneys.com

July 23, 2004

Via Overnight Mail Service

Dean Hagstrom
Bureau of Indian Affairs
Western Regional Office
400 North 5th Street, 13th floor
Phoenix, Arizona

Re: DEIS for proposed Weber Dam Repair and Modification Project

Dear Mr. Hagstrom:

On behalf of our clients including David Haight and the Dynamic Action on Wells Group (DAWG), Inc. we are objecting to the referenced DEIS.

Attached hereto and incorporated by reference is the DAWG Analysis of the DEIS which points out the many deficiencies and errors in the DEIS.

In addition, we believe that the tribe may not have any legal right to the water it wants to store in the repaired reservoir because the tribe already consumes its entire allotment of Walker River water through other uses under the Decree and therefore has no additional water to store. In fact, this makes the dam itself and the reservoir useless, pointless and unneeded.

We have raised this issue in the case of US v. Walker River Irrigation District, now pending in US District Court in Reno. A copy of our brief on that point is attached and incorporated into this objection as if set forth herein.

Sincerely

John W. Howard
JW Howard Attorneys, Ltd.

Enclosures: DAWG report
Brief re OSC

JWH/tjm

57. The attached pleading from the proceedings in *United States v. Walker\River Irrigation Dist.*, No. C-125 (D. Nev.), do not constitute comments on the draft environmental impact statement, and, therefore, no response to those documents is included in the environmental impact statement. The last attachment to the DAWG comments has never been filed in the ongoing litigation. In any event, the substantive questions presented in those attachments are irrelevant to the question whether the repair and modification of Weber Dam, as required by the Indian Dams Safety Act, will have any adverse environmental impacts.

RECEIVED
2004 JUL 26 P 1:50
BIA-WESTERN REGION
LAND AND WATER RESOURCES

A Critical Review of the

May 2004 Draft EIS for repair and modification of

Weber Dam, Walker River Paiute Tribe, Schurz, Nevada

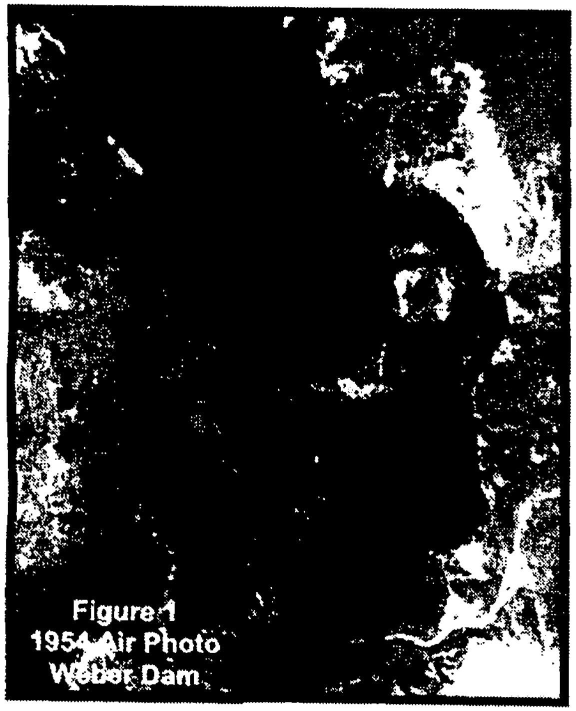

Figure 1
1954 Air Photo
Weber Dam

Dynamic Action on Wells Group (D.A.W.G.)

Donald G. Strachan, Geologist, Gardnerville, Nevada

Executive Summary

The May 2004 Weber Dam Draft Environmental Impact Statement (DEIS) refers to two projects: 1) repair and modification of the existing irrigation dam because of age and a supposed "earthquake fault", and 2) building a new fish ladder for Lahontan Cutthroat Trout (LCT) migrating from Walker Lake. This DEIS is fatally flawed in light of previous federal and state publications on the geology of Weber Dam, the hydrology of Walker River and Walker Lake, and the biology and life requirements of the Lahontan Cutthroat Trout (LCT).

58 The dam is definitely aged, but a primary or even secondary "earthquake fault" is not documented nor is it inferred beneath Weber Dam. The Bureau of Reclamation's numerous drill holes do not document any tectonic offset in the bedrock. The U.S. Geological Survey does not map a fault in the substrate, nor do they project a mapped fault beneath the embankments. The re-engineering of Weber Dam because of an underlying "earthquake fault", as proposed in the DEIS, has no basis in geologic fact.

Walker Lake's present chemical and physical condition will not allow LCT to live to maturity. Water temperatures and salinities are too high, and oxygen levels are too low. More than 90% of stocked LCT presently die within one week under these lake conditions. Survivors of these stockings suffer permanent organ damage.

Historical salinities at or below 9,000 ppm were beneficial to the LCT and its food sources. Regaining this upper salinity threshold (9,000 ppm) for a viable LCT lake population is only possible by augmenting the normal (101,000 acre-feet) annual flows past Wabuska Gage with an additional 125,000 acre-feet per year through 2037 A.D. No source for this additional water has been identified in the Walker River Basin. At best, perhaps 50,000 acre-feet (past Wabuska Gage) could be found, but this would destroy Walker River's agriculture and only result in lowering salinities to a still-lethal 18,500 ppm. Anything more than 50,000 acre-feet would completely strip Walker River Basin of all water for wildlife and domestic use, and whatever remnant agriculture might remain. LCT could not live in these highly saline conditions, and the effort and water expended to accomplish this unsatisfactory conclusion would be wasted.

59 The DEIS does not address the inability of LCT to live in Walker Lake. A viable lake fishery cannot be recreated given the present drought cycle and lake configuration. Any mention, promotion, planning, or funding of an LCT fish passage in the Weber Dam DEIS is therefore misleading at best and fraudulent at worst. An expensive fish passage would be a useless waste for non-existent or just temporarily planted but still-doomed LCT. The current DEIS will only be valid when all references and assumptions regarding recovery of the non-viable LCT are removed.

58. As summarized in Section 3.2.1.4, and Section 4.2.2.1 of the DEIS there are no known primary active or potentially active faults that project beneath Weber Dam. However, several secondary faults were identified in the footprint of the dam and reservoir (Morrison and Davis, 1984, U.S.B.R., 1990). By definition, secondary fault can only be traced for a short distance (few miles or less), and are not located along the trend of a major fault zone (such as the nearby Wassuk fault). One of these faults, a north trending structure traced for about 0.6 miles, was projected through the left abutment of the dam foundation by Morrison and Davis (1984). The U. S. Bureau of Reclamation (USBR) confirmed the presence of this secondary fault structure based on the results of fault trenching conducted during a seismotectonic study for the dam (USBR, 1990). Although the USBR found no evidence for late Quaternary or Holocene displacement along the fault, their analysis concluded that movement could occur coincident with a large event on the nearby Wassuk fault (USBR, 1995a). Movement of the secondary fault could potentially result in uncontrolled seepage and erosion of the core of the dam. To minimize the potential for damage associated with movement along the secondary fault the USBR proposed to relocate the portion of the embankment such that the crest of the embankment is located downstream of the trace of the fault (USBR 1998). Detailed discussion of the evidence for the existence of the secondary fault, and design to minimize the risk associated with the fault, are provided in the USBR referenced reports.

59. Discussion of conditions for LCT survival or resident populations are outside of the scope of the current EIS. The EIS deals with project-specific impacts and any decisions for management of species or habitat outside of the project area is not included as part of the EIS.

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Introduction

Purpose

The "Weber Dam Repair and Modification" Draft Environmental Impact Statement (DEIS, Miller, May 2004) was prepared on behalf of the Walker River Paiute Tribe of Schurz, Mineral County, Nevada. Dynamic Action on Wells Group (DAWG) has reviewed the DEIS in light of previous federal and state publications on the geology of Weber Dam, the hydrology of Walker River and Walker Lake, and the biology and life requirements of the Lahontan Cutthroat Trout (LCT) in the Walker River Basin. The following comments, discussions, and conclusions have resulted from that review.

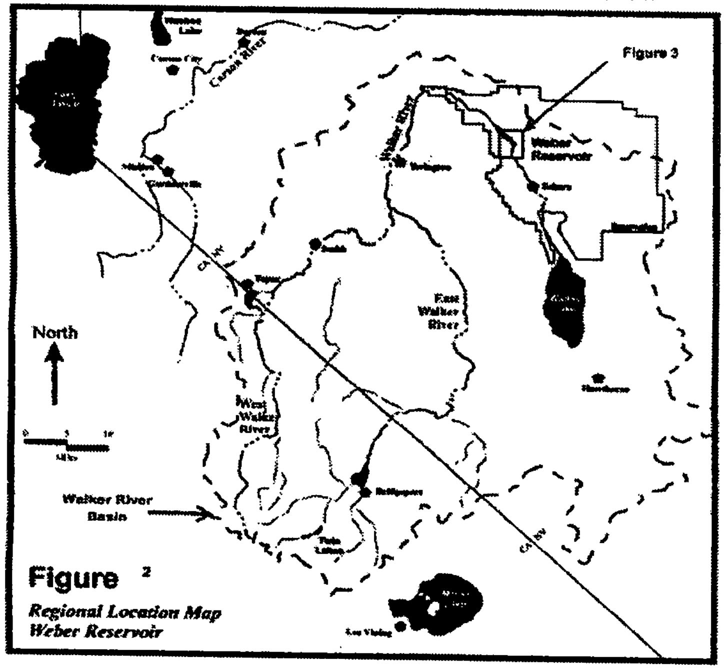


Figure [2]

Regional Location Map
Weber Reservoir

History of Weber Dam

Weber Dam has provided irrigation water to the farmers of Schurz, Nevada since the earthen dam was completed in June 1937. Seventeen years later, the dam needed repair (Figure 1). Sixty-seven years later, the dam still needs repair. In the 1990's, the Bureau of Reclamation (BOR) identified the potential for dam failure, cataclysmic flooding and loss of storage, and initiated design, engineering, permitting, and bidding procedures in collaboration with the BIA. The BOR and BIA intended to complete repairs by 2000, but the U.S. Fish and Wildlife Service (USFW) stopped repair until an LCT fish passage was included. Senator Harry Reid supported this impediment by awarding the USFW funding for a two-year "study" of this environmental issue.

The author's formal research into the Weber Dam controversy began in October 2000, as the Walker River Paiute Tribe were facing two impediments to dam reconstruction: the "fish passage" and an "earthquake fault". Tribal frustrations over these last-minute impediments were clearly stated by Mr. Cassiday Williams in Yerington on October 6th, 2000 at a meeting of the Nevada legislature's Resource Committee.

Newspaper articles in Year 2000 referring to Senator Harry Reid included the existence of an "earthquake fault" at Weber Dam. The articles implied the dam should not be rebuilt because of the danger of collapse (Las Vegas Review-Journal 7/26/00). These same insinuations were made earlier in a presentation during the Walker River Basin Technical Network Meeting in Yerington (McMasters, 2/26/99, paragraph 2).

During the same October 2000 meeting, Mike Savon (see, Savon, Spring 2004) testified that the Nevada Division of Wildlife (NDOW) could not encourage upriver LCT spawning runs until the water level and chemistry of Walker Lake "is secure". Savon also testified the lower Walker River (below Weber) could not support natural LCT spawning, the cyclical Walker River Basin flows were decreasing, and the Walker Lake fishery would not last more than four years. Savon reiterated his predictions of the 2004 fishery "collapse" in a similar meeting a year later, in 2001 (Wegener, 2001).

Four years since the October 2000 meeting have come and gone, and Savon's predictions have come true. Walker Lake's chemistry has deteriorated to a lethal level for LCT. Over 90% of LCT stocked in Walker Lake by NDOW die in their first week because of high salinities, high temperatures, and low oxygen levels (Savon, Spring 2004).

Weber Dam

Engineering, Weber Dam

An aging, earth-fill structure, Weber Dam has been subjected to normal, predictable depradations of the passing years, including "piping" or internal erosion of the dam materials and dam-induced saturation of the naturally porous substrate beneath the dam. The normal aging process promotes seepage both through the dam and along the horizontally-stratified substrate (Figure 1). Seepage through dam materials is especially obvious in the northern embankment, where the pre-dam river channel has been filled.

60 Materials originally used in dam construction may liquify and fail during earthquake-induced acceleration. If a fault existed beneath the dam, and if it was the focus for a 5.8 earthquake, the dam would fail and cataclysmic flooding downstream would result. Acting on an in-house report, the BOR and BIA assumed that such a fault existed in 1999, and reduced water storage by Weber Reservoir by 66% as a preventative measure. The assumed fault does not appear to exist (see below).

Geology, Weber Dam

Since the USFW decision to obstruct dam construction, Senator Reid and the USFW have issued several press releases implying the existence of an "earthquake fault" beneath the present Weber Dam and the proposed site of a rebuilt dam. This author's research of local geology, and discussions with representatives of the BOR and the BIA, have shown the implication of an "earthquake fault" is fallacious.

61 The rocks in the immediate vicinity of Weber Dam and the surrounding Campbell Valley categorized as "valley-fill" deposits by the US Geological Survey (Schaefer, 1980). "Valley fill" consists of Quaternary alluvial, lacustrine, and playa sediments dominated by fine sand, silt, and clay. The alluvial and lacustrine sediments retain much of their original porosity and permeability and are excellent aquifers. These horizontal aquifers are probably responsible for much of the early and on-going seepage beneath Weber Dam (Figure 1). They will continue to pose a seepage problem long after reconstruction is completed. The playa sediments mostly consist of clay-sized particles and tend to be aquitards. Pre-Quaternary sedimentary, volcanic, and basement rocks do not outcrop in the vicinity of Weber Dam, and are presumably hundreds of feet below the present surface.

62 Pleistocene, Holocene, and Recent fault deformation of Quaternary sediments has been recognized and mapped in the region (Bell, 1984), but not in the immediate vicinity of Weber Dam. Two Pleistocene faults a half-mile southwest and several Holocene faults one mile northwest are the closest to the dam (Figure 3). All of these may properly be termed "secondary". None project beneath Weber Dam. This author has examined the drill data and engineering specs developed by the BOR for dam reconstruction. Adequate structural or stratigraphic evidence for a primary or secondary tectonic fault beneath the dam is not present.

Minor sedimentary growth faults may have formed during deposition of

60. See response to comment 58.

61. Seepage through the embankment and foundation will be taken care of during the final design of the modifications to Weber Dam. The design information contained in the EIS is only preliminary and during final design the seepage issue will be resolved. The final design could include foundation treatment, such as cutoff walls, grouting, etc., to assist in controlling the seepage and directing it to seepage filters and collection drains where the quantity can be measured and monitored.

62. See response to comment 58.

63

Pleistocene-Quaternary water-saturated deltaic, fluvial, and lacustrine sediments in the vicinity of Weber Dam. These sedimentary growth faults are not cause for earthquake concern. Again, primary or secondary tectonic, earthquake-related faults are not documented nor are they geologically inferred beneath Weber Dam.

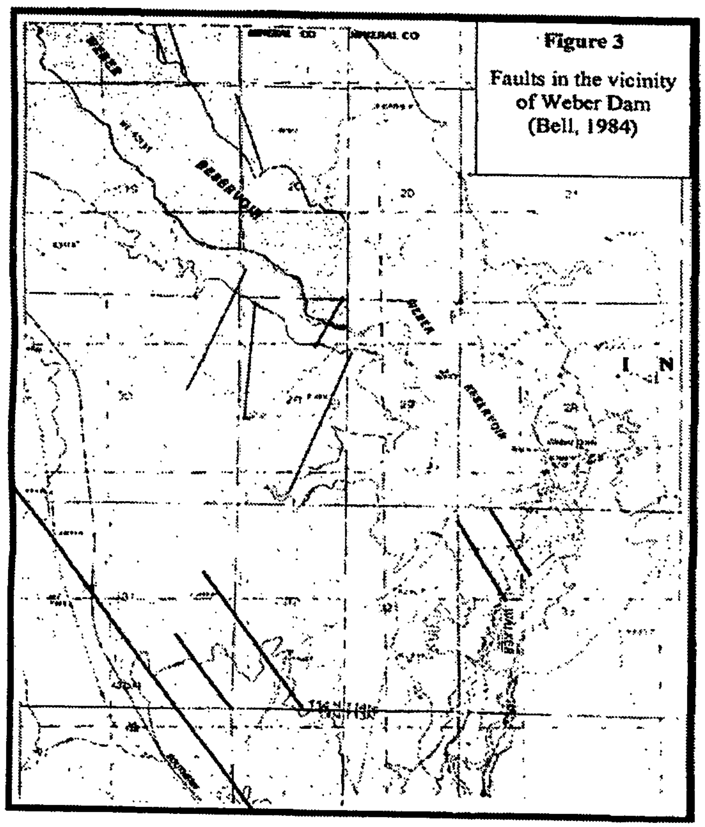


Figure 3

Faults in the vicinity of Weber Dam (Bell, 1984)

63. See response to comment 58.

Walker Lake

Walker Lake has passed through at least three deep-fresh to shallow-saline cycles during the last 5,000 years: specifically 4,700 years B.P., 2,600 years B.P., and 1229 A.D. (Horton, 1996). Decreasing headwater flows, decreasing lake volume, and steadily increasing salinities evident in our relatively short-term historical records suggest Walker Lake is currently on the downward slope of a fourth saline cycle.

Water flowing to Walker Lake since 1925 has been consistently measured at Wabuska Gage, 45 miles upriver from Walker Lake (Pahl, 1997). Annual average (mean) and annual median flows past Wabuska Gage during this 79-year period are 123,000 acre-feet and 79,100 acre-feet, respectively. The average ("normal") of mean and median flows past Wabuska Gage is 101,000 acre-feet. Three predictive scenarios for Walker Lake's next 30 years may be considered using these flow figures (Table 1, Table 2, and Figure 4):

1) Walker Lake's present volume of 1,851,857 acre-feet (3,938 feet ASL) will decrease to 568,656 acre-feet (3,900 feet ASL), and salinities will increase from about 14,500 ppm to 49,230 ppm by Year 2026, if median historic flows (79,000 acre-feet) past Wabuska Gage are used. Under the median scenario, the lake would be a marsh by 2033 A.D. (Table 1).

Table 1 - Projected Walker Lake salinity (ppm) as a result of:
Time, MEDIAN historical flow, and additional flows past Wabuska Gage

Year	Median flow 79,100 ac-ft	Added flows 25,000 ac-ft	Added flows 50,000 ac-ft	Added flows 75,000 ac-ft	Added flows 100,000 ac-ft	Added flows 125,000 ac-ft
2004	15,002	14,839	14,677	14,514	14,350	14,187
2012	21,138	18,740	16,792	15,180	13,824	12,670
2016	25,790	21,195	17,932	15,497	13,613	12,111
2020	32,336	24,098	19,127	15,804	13,420	11,646
2024	42,188	27,570	20,377	16,100	13,267	11,254
2026	49,230	29,570	21,002	16,244	13,195	11,082
2033	marsh	38,462	23,384	16,727	12,978	10,575

2) Walker Lake's present volume will decrease to 1,093,198 acre-feet (3,916 feet ASL) and salinities will increase to 25,874 ppm by 2033 A.D. if average (mean) historic flows (123,000 acre-feet) past Wabuska Gage are used (Table 2). Under this average scenario, Walker Lake would be 56 feet deep in 2033 A.D., since the deepest part of Walker Lake is 3,860 feet ASL (Table 2).

3) The most probable future outcome of lake conditions, given the long-term decrease in Walker River headwater flows and no artificial change in lake configuration, will be less than the result of average (mean) flows and greater than the result of median flows. The average of the two end-member flow scenarios (101,000 acre-feet) will be used for a third scenario. Under this most likely of possibilities without additional augmentation, the volume of Walker Lake would decrease to 674,428 acre-feet (3,903 feet ASL), depth would decrease to 43 feet, and salinity would increase to 41,733 ppm by 2033 A.D. (top curve, Figure 4)

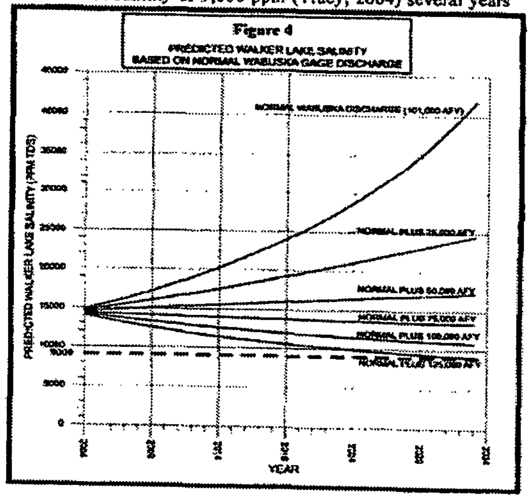
Table 2 - Projected Walker Lake salinity (ppm) as a result of:
Time, AVERAGE historical flow, and additional flows past Wabuska Gage

Year	Average flow 123,000 ac-ft	Added flows 25,000 ac-ft	Added flows 50,000 ac-ft	Added flows 75,000 ac-ft	Added flows 100,000 ac-ft	Added flows 125,000 ac-ft
2004	14,716	14,553	14,390	14,227	14,064	13,901
2012	17,233	15,547	14,135	12,936	11,905	11,011
2016	18,638	16,032	14,032	12,448	11,165	10,104
2020	20,148	16,509	13,943	12,038	10,569	9,402
2024	21,772	16,975	13,866	11,690	10,082	8,846
2033	25,874	17,983	13,733	11,078	9,264	7,946

The effect on Walker Lake chemistry of increased flows past Wabuska Gage may be hypothetically considered and calculated. Hypothetical augmentation of additional flows of 25,000, 50,000, 75,000, 100,000, and 125,000 acre-feet past Wabuska Gage produce several time and augmentation scenarios for achieving salinities of less than 10,000 ppm for Walker Lake (Tables 1 and 2).

Using annual historic median flows (79,000 acre-feet) beginning in 2004, an additional augmentation of 125,000 acre-feet past Wabuska Gage results in Walker Lake salinities falling below the 1964 A.D. salinity of 9,000 ppm (Tracy, 2004) several years after 2050 A.D (Table 1). Walker Lake salinities could fall below 9,000 ppm by 2024 A.D. if the annual historic average (mean) flows past Wabuska Gage (123,000 acre-feet) are augmented with an additional 125,000 acre-feet (Table 2).

The most likely scenario to achieve a salinity of 9,000 ppm is based on augmenting the average of the mean-median flows (101,000 acre-feet) with an additional 125,000 acre-feet per year until at least 2037 A.D (lower curve, Figure 4).



Lahontan Cutthroat Trout

64 A subspecies of cutthroat trout, the Lahontan cutthroat trout (LCT) or black spotted trout (Miller, 2004, page 3-37), presently occurs in some streams and lakes within the former basin of ancient Lake Lahontan. Until this year, a non-reproductive LCT "fishery" was maintained in Walker Lake by annual stocking from the NDOW hatchery in Mason Valley (Anderson, 15 September 2000). California Fish and Game intermittently stocks LCT in Walker River headwaters. The tribal hatchery at Sutcliff on Pyramid Lake periodically provides stock for Walker Lake (Lowry, 31 October 2000). The USFW hatchery in Gardnerville occasionally supplies LCT stock (Marchant, 11 September 2000).

LCT populated the entire basin of Ancient Lake Lahontan through the lake's latest high stand 12,500 years ago. Reduced precipitation since that time caused the disappearance of Lake Lahontan, isolating the various basins around the Lahontan Basin, including the Truckee, Carson, and Walker drainages. Walker Lake was dry or saline and nearly dry at least three times during this latest Lahontan dessication: 4,700 years B.P., 2,600 years B.P., and 775 years B.P. (Horton, 1996). Walker Lake has again reached a lethal salinity in the first years of the 21st century AD. Each time Walker Lake became uninhabitable for the LCT, they survived in the headwaters of the Walker River. Each time wetter conditions have prevailed, the adaptable LCT has repopulated a refreshed and refilled, nutrient-rich Walker Lake, spawning every few years in the headwaters.

Walker Lake alkalinity and salinity are important chemical markers for discerning LCT health. LCTs are one of the few freshwater fish species able to tolerate the alkalinities of Walker Lake, which fluctuated around a pH of 9.4 during most of the 20th century. The relative resistance of LCT to fish pathogens seems to be enhanced by slight fluctuations in pH and accompanying stress levels (Weber, UNR, 13 September, 2000). LCT seem to thrive in lake salinities between 5,000 mg/l and 12,000 mg/l, although long-term kidney problems seem to ensue above 5,000 mg/l (Taylor, 1972, and Dickerson,
65 1997). Fresher, cooler, more oxygenated streams are still necessary for LCT reproduction, hence their periodic headwater spawning migrations.

66 Water temperatures and salinities are presently too high, and oxygen levels too low, for LCT to live to maturity in Walker Lake. More than 90% of stocked LCT die within one week under present lake conditions. Survivors of these stockings suffer permanent organ damage (Savon, Spring 2004).

64. See response to comment 61.

65. See response to comment 58.

66. See response to comment 59.

67

Discussion and comments on DEIS

Weber Dam discussion

The Weber Dam DEIS calls for relocation of the northern embankment to stop excessive leakage and potential failure from fault-related liquefaction (Miller, 2004, page 2-5). Weber Dam leaked "excessively" as early as 1954 (Figure 1). This leakage occurs through the horizontally extensive, water-saturated, porous lacustrine and fluvial substrate. Leakage also occurs because of erosional "piping" of dam materials above the substrate in the pre-dam river channel area. The DEIS addresses the "piping" problem in the old river channel area, but does not recognize or address the substrate leakage beneath the dam at several locations (Figure 1). Because BOR has not recognized or discussed the substrate leakage problem, suitable modifications to correct this problem are not proposed in the DEIS.

The northern embankment is being relocated about 200 feet downstream (Miller, 2004, figure 2.2-1) to "eliminate the effects of foundation movement along the embankment" (Miller, 2004, page 2-5, line 10). Unfortunately, the semi-consolidated, porous substrate responsible for much of the present leakage also extends beneath the the site of the new northern embankment. Once the new embankment is built, the underlying substrate will again become water-saturated, negating any advantages gained from the relocation. Any seismic acceleration from nearby earthquakes will be accentuated by this newly-saturated substrate.

One item in Weber Dam's favor is the purported "fault zone" (Miller, 2004, page 2-5, lines 11 and 12), or probable lack thereof, beneath the present embankment. Many in their public pronouncements have earlier assumed the existence of an "earthquake fault" beneath Weber Dam (ex: McMasters, 1999; Review-Journal, 1999). However, there is no evidence of the purported fault. Significant bedrock offsets are not demonstrated by subsurface drill data. There are no faults on outcrop or in air photos (Bell, 1984). There is no evidence of an "earthquake fault" beneath Weber Dam. Accordingly, re-engineering Weber Dam because of an underlying "earthquake fault" has no basis in geologic fact.

Walker Lake discussion

The present volume of Walker Lake is 1,959,729 acre-feet at a surface elevation of 3,941 feet ASL and a depth of 81 feet. Salinity is presently at 14,187 ppm. These conditions will deteriorate rapidly in the next 30 years. Volume of Walker Lake will probably decrease to 674,428 acre-feet (3,903 feet ASL) during this period, decreasing depth to 43 feet. Salinities would increase to 41,733 ppm.

The LCT and its food sources were thriving in Walker Lake in 1964 when historical salinities were between 3,000 ppm and 9,000 ppm (Tracy, 2004, page 16). At present, the most likely future scenario to achieve even this upper salinity threshold (9,000 ppm) for a viable LCT lake population is based on augmenting the average of the mean-median flows (101,000 acre-feet) with an additional 125,000 acre-feet per year through 2037 A.D. No source for this amount of additional water has been found or identified in the Walker River Basin. At best, perhaps 50,000 acre-feet past Wabuska

67. See response to comment 59.

68 Gage could be found, but this would destroy Walker River's agriculture and only result in lowering salinities to a still-lethal 18,500 ppm. Anything more than 50,000 acre-feet would completely strip Walker River Basin of all water for wildlife and domestic use, as well as whatever remnant of agriculture might remain. This conclusion is based on the most likely scenario of averaging the mean-median flows presented in Tables 1 and 2.
69 LCT could not live in these highly saline conditions, and the effort and water expended to accomplish this unsatisfactory conclusion would be wasted. The Weber Dam DEIS does not address this potential devastation.

LCT discussion

70 LCT are presently unable to live to maturity in Walker Lake. Water temperatures and salinities are too high and are increasing. Oxygen levels are too low, and are decreasing. Mike Savon's four-year-old predictions (see "History" above) have come true. The Walker Lake fishery is dead, and there are no naturally reproductive LCT in the middle and lower reaches of the Walker River. LCT survivors are again restricted to the headwaters of the Walker River Basin until the next cyclical wet period.

The Weber Dam DEIS does not recognize the inability of LCT to live in Walker Lake under present or conceivable conditions in the short-term future. As a result, no suggestions are offered to provide for a viable lake fishery. Instead, the Weber Dam DEIS contemplates the building of an expensive fish ladder tailored to annual or periodic spawning runs for a non-existent fish population.

71

68. See response to comment 64.

69. See response to comment 58.

70. See response to comment 59.

71. See response to comment 59.

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Excerpts from oral presentation in Yerington, Nevada, June 30, 2004.

And that concludes my presentation. And we'll take comments at this time. I have one speaker, Mr. David Haight. If you would like to make a comment, you're welcome to.

MR. HAIGHT: Should I stand up there? I'll come up to the table, because I need to open this thing.

MR. MILLER: If you could state your name and organization.

MR. HAIGHT: David Haight. H-a-i-g-h-t. And it's the Dynamic Action on Wells Group, or DAWG.

And my first question is on page 5 of Weber Dam Action Alternative Potential Impact Analysis. And if you go to potential impact zones, you are referring to wetlands. And I assume this might be your thing. But you -- you refer to two reaches, Reach One and Reach Two.

Reach One and Reach Two, if you add them together, come up to a ten-mile length of the river starting from -- Weber Dam upstream ten miles. And I believe this thing is -- is designating those wetlands; is that correct?

72 I need to know -- my question is, are these -- is that ten-mile stretch from Weber Dam

72. Actions outside of the current proposed project and proposed action are not included in the EIS. Any actions on reservation lands outside of the project area are not covered by this Environmental Impact Statement.

upstream, is that going to be officially designated wetlands? And I guess wetlands, you can answer that, does that fall under The Clean Water Act?

I guess it's my question, is it to designate that ten-mile stretch as defined under The Clean Water Act? And it would appear that that may be the case. Because if you look at the people who have reviewed this document, and I guess who has approved

73 it -- does this mean they have approved it, this list of reviewers here?

MR. MILLER: It's just the reviewers.

MR. HAIGHT: My question is, is that the official position of the Tribe?

Okay. You made it very plain that the fish ladder is for the recovery of the LCT, primarily.

74 And you say here -- this is on page 4-19. It says, "The long-term impact would include the fishway, which would allow passage at Weber Dam for migrating LCT. The fish passage who assist in the recovery of LCT in the Walker River Basin. However, the structures upstream of Weber Reservoir would continue to block migration to spawning areas. The fish passage would provide a beneficial impact to LCT by removing the migration barrier at Weber Dam. But until the passage blocks upstream of Weber Reservoir are removed, it would likely not result in any natural reproduction of

73. The reviewers listed for the document provided comment for substantive and issues related to NEPA requirements for EIS. It is not a decision document.

74. The identification of upstream barriers is listed in the Walker River Recovery Implementation Team (WRIT) document with no specific actions stated in that document as far as removal of upstream barriers. It is beyond the scope of the DEIS to determine what upstream barriers exist and also any actions that may result from that identification.

74 LCT."

Would you define those barriers upstream of Weber? Does that mean you want to take out Bridgeport and Topaz Reservoir, the dam? That's my question. I want that defined. What upstream barriers must be removed in order to result in the natural reproduction of the fish?

75 And you also say that this is -- this is on page 4-22. "The Tribe is interested in actively pursuing LCT recovery and fishery, which includes taking steps to provide that opportunity in Walker Lake and the lower Walker River as the recovery program progresses. Weber Reservoir can be managed in such a way to promote LCT passage, and the LCT fishery that could develop in the entire Walker River as the recovery program progresses."

This fits in with the previous statement. Is it the intent, then, to take away all barriers, any obstruction from Walker Lake all the way up to the Sierras? Is that part of the plan?

76 Now, let's go to -- okay. Okay. This is on page -- it's in Appendix C, which is Weber Dam Alternatives Screening Memorandum. And it's Table 1.

And it's entitled, Estimated Average Annual Water Budget for the Walker Indian Reservation area (all values in acre-feet).

75. See response to comment 74.

76. Mr. Haight disagrees with the use of an annual average flow in Table 1 of the Groundwater Alternative Screening Level Assessment memorandum (Appendix C, DEIS). That memorandum provided the results of a screening level assessment of the adequacy of the groundwater aquifers to meet the irrigation demands of the reservoir. As explained in the memorandum, one of the methods used to evaluate potential changes to the hydrologic system that could occur as a result of groundwater development was to review the estimated average annual water balance for surface water and groundwater resources. The estimated average annual water balance was based on the information provided in an earlier U.S.G.S. report that also addressed groundwater availability for the Walker Indian Reservation (Schaefer, 1980). The surface water inflow to the reservation was estimated using the average annual streamflow measured at the Wabuska gauge. Groundwater resource assessments conducted by the U.S.G.S. and groundwater consultants in Nevada are typically

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What you have here is a long-term average of -- of water, available water. You have the long-term, you have the Walker River, you have 113,800 acre-feet. That's very close to what you get past Wabuska gage as an average, okay?

But the problem here is an average number. And you are calling this a water budget. You can't do that. A water budget means that's -- that's -- the amount of water you have available to do your -- whatever you want to do. You cannot use an average to do that, because you have different amounts of water on different years. So I have a question on that, and that's that.

And that's supported -- it is on page 3-19. And it's Table 3.3-2. And it's annual Walker River discharge data near Wabuska gage. And you're using USGS numbers. And Wabuska water that went through there is a huge variable.

And I'm saying you can't use that to average chart to address the problem that you need to

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getting so much water to your fish passage, because it varies from year to year. You have to address -- I don't know how -- you have worst case and best case. You go to -- where you're talking now about your fish passage, and the fish passage is based on the assumption that you have an annual operational flow.

based on estimates of average annual values for inflow and outflow components (see Berger, 2000 as an example). The use of average annual values was appropriate for the screening level assessment. The variation in discharge measured at the Wabuska gage was described in Section 3.3.2.2.

Berger, David L. 2000. Water Budget Estimates for the 14 Hydrographic Areas in the Middle Humboldt River Basin, North Central Nevada. U. S. Geological Survey Water-Resources Investigations Report 00-4168.

77. The operation of the fish passage is discussed in detail in the Biological Assessment included as an appendix to the final EIS and also provided in the section under threatened and endangered species.

78 That goes back to your operational chart that you have there.

You have a flow rate of 25 cfs to greater than 200 cfs. But where are you measuring that flow rate?

This flow rate, the way you have this written, you require that flow rate in order to get four feet through your fish bypass. Okay? Your 25 cfs is almost what you get right now at Wabuska gage under C-125. You get 26.125 per second cubic feet for 180 days. So you need to define that. You need to say this operational flows of 25 to 200 cfs is measured where? Is it measured at Wabuska gage, or is it measured down at your dam where you have the bypass?

I think they're saying down at the dam. If they are, that's not good. That won't work. Okay.

79 One more, and I'm done. And this is what I think you might be able to answer, Doctor. Uhm, this is on page 3-37. It says, "Typical of cutthroat trout subspecies, LCT is an obligatory stream spawner. Spawning occurs from April through July," right?

You're the fisherman. If you go to -- this is on page 3-28. It says, "The combination of lack of river flow and climatic conditions result in summer water temperatures throughout the mainstream Walker River are lethal to trout species, including

78. The flow rates listed are design criteria to meet the velocities in which the fish are able to swim. There is no connection between those specified cubic feet per second numbers and any water right. It is not intended to mean that there would be flow outside of what is normally passed by Weber Reservoir for use in the fish passage.

79. See response to comments 56 and 59.

79

the LCT."

So if the entire Walker River system is lethal to LCT, why are you building the fish ladder? If you get the fish up on the mainstream of the Walker River, according to your own EIS, the fish will die. So I would like that answered.

This is on the same page, down at the bottom. You say the best habitat diversity is downstream from Weber Dam. So you're saying in this, after you say that you're going to build a fish ladder to get the fish up the stream, once you get them up the stream they'll die in the stream because the stream won't support them. So why don't you keep your fish between Walker Lake and the dam? That's what you say here. So I would like that answered. That's it.

MR. MILLER: Okay. Thank you for your comments and questions.

MR. HAIGHT: And that will be -- there will be answers to those, I guess?

MR. MILLER: We will have a combination of answers to all questions in the Final EIS.

MR. HAIGHT: And I will have an analysis done on this and submit it, a written one, also.

MR. MILLER: Okay. Thank you.