ENVIRONMENTAL ASSESSMENT

Lower Clear Creek Anadromous Fish Restoration & Management Project

BLM EA RE-2008-16




April 2008

LEAD AGENCIES:

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LIST OF ACRONYMS

ACEC	Area of Critical Environmental Concern
BLM	U.S. Department of the Interior, Bureau of Land Management
BMPs	Best Management Practices
CARB	California Air Resources Board
CBDA	California Bay-Delta Authority
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CFR	Code of Federal Regulation
cfs	Cubic Feet per Second
cm	Centimeter
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
CRMP	Lower Clear Creek Coordinated Resource Management and Planning Group
CVPIA	Central Valley Project Improvement Act
dBA	Decibels
°F	Degrees Fahrenheit
DBH	Diameter at Breast Height
DDT	Dichloro-Diphenyl-Trichloroethane
DFG	California Department of Fish and Game
DPS	Distinct Population Segment
DWR	California Department of Water Resources
EA	Environmental Assessment
EFH	Essential Fish Habitat
EIS	Environmental Impact Study
EPA	U.S. Environmental Protection Agency
ERP	Ecosystem Restoration Program
ESA	Federal Endangered Species Act
ESU	Evolutionarily Significant Unit
FMP	Fishery Management Plan
FONSI	Finding of No Significant Impact
FR	Federal Register
GIS	Geographic Information Systems
GMA	Graham Mathews & Associates, Inc.
HCP	Habitat Conservation Plan
Hg	Mercury
kg	Kilogram
LCCFRP	Lower Clear Creek Floodway Rehabilitation Project
µg	Microgram
µm	Micrometer
mm	Millimeter
MSA	Magnuson-Stevens Fishery Conservation and Management Act
NAAQS	National Ambient Air Quality Standards
NEED	National Environmental Education Development
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NPS	U.S. Department of the Interior, National Park Service
NRCS	U.S. Department of Agriculture, Natural Resources Conservation

	Service
NTU	Nephelometric Turbidity Unit
OHWM	Ordinary High Water Mark
PRBO Conservation Science	Point Reyes Bird Observatory Conservation Science
Reclamation	U.S. Department of the Interior, Bureau of Reclamation
Restoration Team	Lower Clear Creek Restoration Team
RWQCB	Central Valley Regional Water Quality Control Board
SPCCP	Spill Prevention, Control and Countermeasures Plan
U.S.C.	U.S. Code
USFS	U.S. Department of Agriculture, Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Department of Interior, Geological Survey
VELB	Valley Elderberry Longhorn Beetle
WNRA	Department of Interior, National Park Service, Whiskeytown-Shasta-Trinity National Recreation Area
WHR	California Wildlife-Habitat Relationships
WSRCD	Western Shasta Resource Conservation District

1.0 INTRODUCTION

The lower Clear Creek Restoration Team (Restoration Team) is proposing to implement several anadromous fish restoration and management actions on public lands in the lower Clear Creek watershed, located west of Redding, in Shasta County, California (Figure 1). This Environmental Assessment (EA) is being prepared to satisfy the requirements of the National Environmental Policy Act (NEPA). The U.S. Department of the Interior, National Park Service (NPS) and Bureau of Land Management (BLM) are acting as the lead agencies under NEPA, as the project is located on public lands administered by NPS as part of the Whiskeytown Unit of the U.S. Department of Interior, National Park Service Whiskeytown-Shasta-Trinity National Recreation Area (WNRA) and by BLM as part of the Redding Resource Area. If the level of effects on the environment are such that a Finding of No Significant Impact (FONSI) can be supported by the lead agencies, separate FONSI's will be signed by NPS (for 6 proposed project sites) and the BLM (for additional sites outside the boundaries of WNRA). Each such approval would pertain only to the affected agency and would neither constrain nor be constrained by the other agency's decision-making process.

1.1 History of the Lower Clear Creek Restoration Program

Beginning in the early 1990s, multiple federal, state and local agencies and private stakeholder groups concerned about lower Clear Creek began to plan and implement watershed restoration activities to reverse the impacts of Whiskeytown Dam, Saeltzer Dam, placer and dredger gold mining, in-stream aggregate mining, road-related erosion and decades of fire suppression. The Restoration Team, a multi-agency team, was formed to serve as technical advisors for watershed restoration planning, design, implementation and monitoring. The Restoration Team develops projects to improve watershed ecosystem health and anadromous fish production in lower Clear Creek.

The Bureau of Reclamation and the Fish and Wildlife Service began implementation of the Central Valley Project Improvement Act (CVPIA) Fish Restoration Program in 1995 by increasing stream flows. The increased flows resulted in a 5 fold increase in fall Chinook escapement, over the CVPIA baseline escapement period. CVPIA removed Saeltzer Dam in 2000 which has led to the re-establishment of populations of threatened spring Chinook and steelhead. CVPIA has funded numerous successful restoration projects in Clear Creek including almost 100,000 tons of gravel augmentation. It is anticipated that CVPIA would fund most of the actions proposed in this EA.

In 1998, the Western Shasta Resource Conservation District (WSRCD) and the lower Clear Creek Coordinated Resource Management Planning Group (CRMP) developed the lower Clear Creek Watershed Management Plan (WSRCD 1998), which identified numerous restoration and management actions to restore watershed ecosystem function and native anadromous fish populations within lower Clear Creek. Since that time, the Restoration Team and the lower Clear Creek CRMP have implemented multiple resource inventories and restoration projects including dam removal, gravel augmentation, flow augmentation, channel and floodplain restoration, erosion control, fuels reduction and non-native vegetation control.

1.2 Purpose and Need for Federal Action

This EA describes the environmental resources in the project area, analyzes the effects on the environment of the proposed action and a no-action alternative, and proposes mitigation measures to reduce any effects to less than significant levels.

The purpose of the proposed action is to:

- Restore sediment transport processes, including coarse bedload transport continuity and fine sediment deposition on floodplain surfaces;

- Improve habitat conditions for anadromous salmonid species, including Central Valley fall-run and late fall-run Chinook salmon, Central Valley spring-run Chinook salmon and Central Valley steelhead/Sacramento River rainbow trout; and

- Spatially separate adult Central Valley spring-run Chinook salmon from Central Valley fall-run Chinook salmon to prevent hybridization and redd superimposition (disturbance of salmon nests by other nesting salmon).

Major Pierson B. Reading discovered gold near the present-day Clear Creek Road Bridge in 1848. Following this historic discovery, the lower Clear Creek watershed was extensively altered, beginning with placer mining and dredger mining for gold through the 1940s. Floodplains and terraces along the corridor were "turned upside down" by the dredging process, removing all riparian and upland vegetation, and converting finer grained substrates to piles of cobbles unsuitable for revegetation. Commercial in-stream aggregate mining was prevalent in the lower reaches of Clear Creek through the mid-1980s. In-stream mining disrupted the natural channel and floodplain morphology and removed significant gravel deposits from the floodplains.

Additional ecological impacts occurred in the lower Clear Creek watershed when Whiskeytown Dam was completed in 1963 at river mile 18 as part of the Trinity River Division of the Central Valley Project. All coarse and fine sediment from the upper watershed is now trapped by the reservoir. The resulting coarse sediment deficit and reduction in fisheries habitat quality in lower Clear Creek has been well documented by various investigators (Coots 1971 as cited in McBain and Trush 2001, Graham Matthews and Associates [GMA] 2006b). Effects of reduced sediment supply include: riffle coarsening, fossilization of alluvial features, loss of fine sediments available for overbank deposition and riparian re-generation and a reduction in the amount and quality of spawning gravels available for anadromous salmonids. These processes are critical components in creating and maintaining dynamic channel morphology, high quality salmonid habitat and riparian vegetation. Tributary sources of coarse sediment from the reach between Whiskeytown Dam and Paige Boulder Creek are extremely limited and contribute appreciable amounts of sediment only during highly infrequent stochastic events (GMA 2006a, Rasmussen 2006, Steensen 1997). Colluvial sources (canyon walls) contribute virtually nothing within practical management timeframes, and such material is of limited ecological value until it is transported and rounded by fluvial processes over some distance.

In addition to the reduction of course sediment, recruitment of large woody debris (trees) has also been reduced in lower Clear Creek due to the lack of large flood events. Generally, flood events uproot trees and deposit them in, or near, the active channel as the stream subsides. Large woody debris provides habitat by adding to stream complexity that adult and juvenile salmonids use as refugia during migration.

Historically, spring-run Chinook salmon are thought to have over-summered in upper Clear Creek near the town of French Gulch. The higher flow conditions and cooler temperatures in Clear Creek in spring, due to snow melt, allowed spring-run salmon to migrate up Clear Creek before low and warmer summer flows occurred. These warm summer flows would have created a thermal and spatial separation between spring-run and fall-run salmon (occupying two distinct geographical locations within the same system). Since the construction of Saeltzer Dam in 1903, few, if any, spring-run salmon made it past this barrier. The construction of Whiskeytown Dam in 1963 established a permanent anadromous barrier to former spawning grounds. Since then, it is thought that all spring-run salmon were extirpated from Clear Creek.

The decommissioning of Saeltzer Dam in October of 2000, coupled with an increase in minimum instream flows into lower Clear Creek from Whiskeytown Dam, allowed a spring-run population to become established in the upper reaches of lower Clear Creek. Although run timing is different between spring-run and fall-run salmon in lower Clear Creek, the thermal and spatial separation no longer exists due to cooler temperatures from increased flows and Whiskeytown Dam blocking access to historical spring-run spawning reaches. This has created a need to re-establish the spatial separation exhibited historically to preserve the genetic integrity between the two runs of salmon. Hybridization is a potential threat to the continued existence of the Central Valley spring-run salmon, a federally threatened species.

The Restoration Team has identified the need to combine several restoration and management actions into one project that would allow managers the flexibility to make minor modifications or reprioritize restoration actions based on monitoring results and environmental changes over a ten-year period. Anadromous fisheries restoration and management efforts in the post-dam era require the flexibility to adopt alternative approaches, as needed, to ensure the success of the lower Clear Creek restoration efforts. This adaptive management approach will enable the Restoration Team to meet established restoration goals and objectives.

Documentation supporting the need for the proposed action includes the *Lower Clear Creek Watershed Analysis* (WSRCD 1996), DFG memorandum (Coots 1971), the *Lower Clear Creek Fishery Study* (DWR 1986), the *Lower Clear Creek Floodway Restoration Project: Channel Reconstruction, Riparian Vegetation and Wetland Creation Design* (McBain and Trush et al 2000), the *Final Report: Geomorphic Evaluation of Lower Clear Creek Downstream of Whiskeytown Reservoir* (McBain and Trush 2001) and the *2006 Update to the Clear Creek Gravel Management Plan* (GMA 2006b) .

Additionally, numerous sections of NPS Management Policies 2006 support the management actions identified in this environmental assessment. Section 4.15 (Restoration of Natural Systems) directs the NPS to reestablish natural functions and processes in parks unless otherwise directed by congress. Section 4.4.1 (General Principles for Managing Biological Resources) states that the NPS will successfully maintain native plants and animals by preserving and restoring the natural abundances, diversities, dynamics, distributions, habitats, and behaviors of native plant and animal populations and the communities and ecosystems in which they occur. Section 4.4.2.3 (Management of Threatened or Endangered Plants and Animals states that the NPS will survey for, protect, and strive to recover all species native to national park system units that are listed under the Endangered Species Act. To meet these obligations the NPS will:

- undertake active management programs to inventory, monitor, restore, and maintain listed species' habitats; control detrimental nonnative species; manage

detrimental visitor access; and reestablish extirpated populations as necessary to maintain the species and the habitats upon which they depend.

- manage designated critical habitat, essential habitat, and recovery areas to maintain and enhance their value for the recovery of threatened and endangered species.

- cooperate with other agencies to ensure that the delineation of critical habitat, essential habitat, and/or recovery areas on park-managed lands provides needed conservation benefits to the total recovery efforts being conducted by all the participating agencies.

1.3 The Scoping Process

Scoping is an early and open process to determine the scope of environmental issues and alternatives to be addressed in an EA. Scoping was conducted through several meetings of the Restoration Team, which consists of members from WNRA, BLM, U.S. Fish and Wildlife Service (USFWS), Natural Resources Conservation Service (NRCS), Bureau of Reclamation (Reclamation), National Marine Fisheries Service (NMFS), California Department of Fish and Game (DFG), California Department of Water Resources (DWR), Central Valley Regional Water Quality Control Board (RWQCB), WSRCD and the Redding Rancheria. Additional technical expertise is provided to the Restoration Team by private consultants. The Restoration Team conducted five scoping sessions during meetings held on September 9, 2006, November 14, 2006, January 25, 2007, June 21, 2007 and September 20, 2007, and two field meetings on January 8, 2007, and February 6, 2007, to discuss the various projects that might be included in the proposed action and to discuss potential environmental effects of the proposed action.

1.4 Public Participation in the EA Process

This EA will be circulated for a 30 day public comment period. In addition, two copies will be available for public review at the Shasta County Library, Redding, CA.

1.5 Issues Raised During the Scoping Process

WNRA staff expressed concern about potential impacts of a proposed haul route to an existing archaeological site located near the National Environmental Education Development (NEED) Camp. As a result, an alternative haul route was developed for the potential floodplain modification project at Paige Bar. BLM staff expressed concern about potential safety impacts to whitewater recreational users from log habitat structures proposed upstream of Clear Creek Road Bridge. As a result, it has been determined to be infeasible to safely place instream log structures above Clear Creek Bridge. Further, the Restoration Team has committed to ensure that kayak safety issues are incorporated into the specific design process for all in-stream habitat structures.

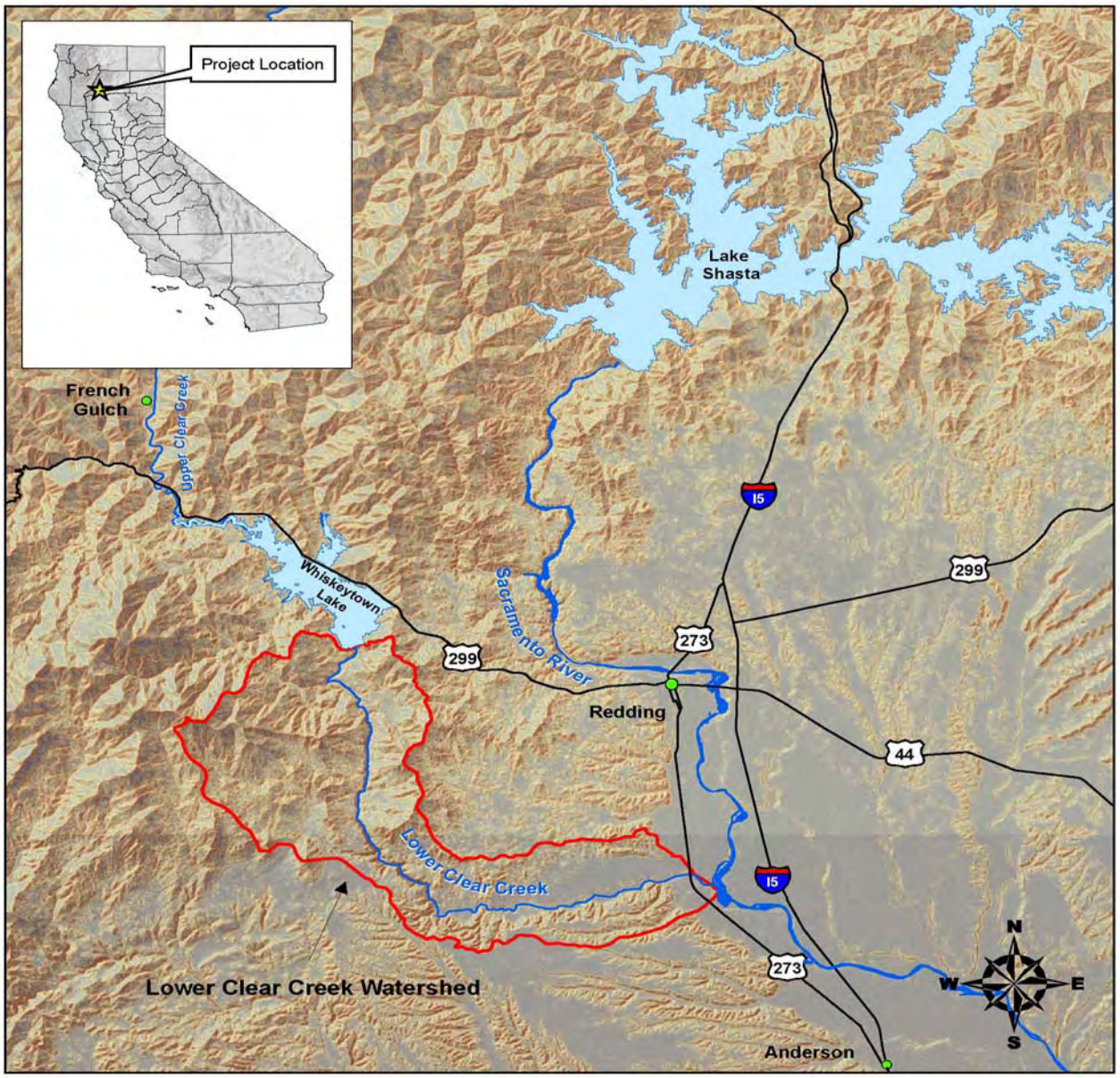
1.6 Land Use Plan Conformance

The General Management Plan for the Management, Use, and Protection of Whiskeytown National Recreation Area (WNRA 1999) included the following statement about restoring natural landscape and land forms and contributing to the recovery of threatened and endangered and sensitive plants and animals under the document heading, Preserve Park Resources:

- Goal 3 - The physical and biological systems of the undeveloped portions of the park approximate early-1800 conditions and processes.
- Action Item - Cooperate with other agencies and landowners in management of the Clear Creek watershed.
- Goal 5, Action Program - Restore unnatural stream channels and take action as needed and prescribed in recovery plans. Wildlife would benefit from improvements to natural vegetation and water bodies from cooperative watershed management. Steps would be taken to restore aquatic habitat for anadromous and native fish species.

The Redding Resource Management Plan and Final Record of Decision (BLM 1993), which guides the management of BLM-administered public lands within the project area, includes the following statements about enhancement of cultural and natural values of lower Clear Creek (page 44):

- Enhance anadromous fisheries habitat. Restore the quality and quantity of riparian vegetation to Class I and Class II. Maintain the scenic quality of the canyon above Clear Creek Road Bridge. Re-establish the native plant communities and associated fauna of the area.



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Environmental Assessment

Lower Clear Creek Anadromous
Fish Restoration & Management Project

Shasta County, California

October, 2007

FIGURE 1

Lower Clear Creek
Watershed Location Map

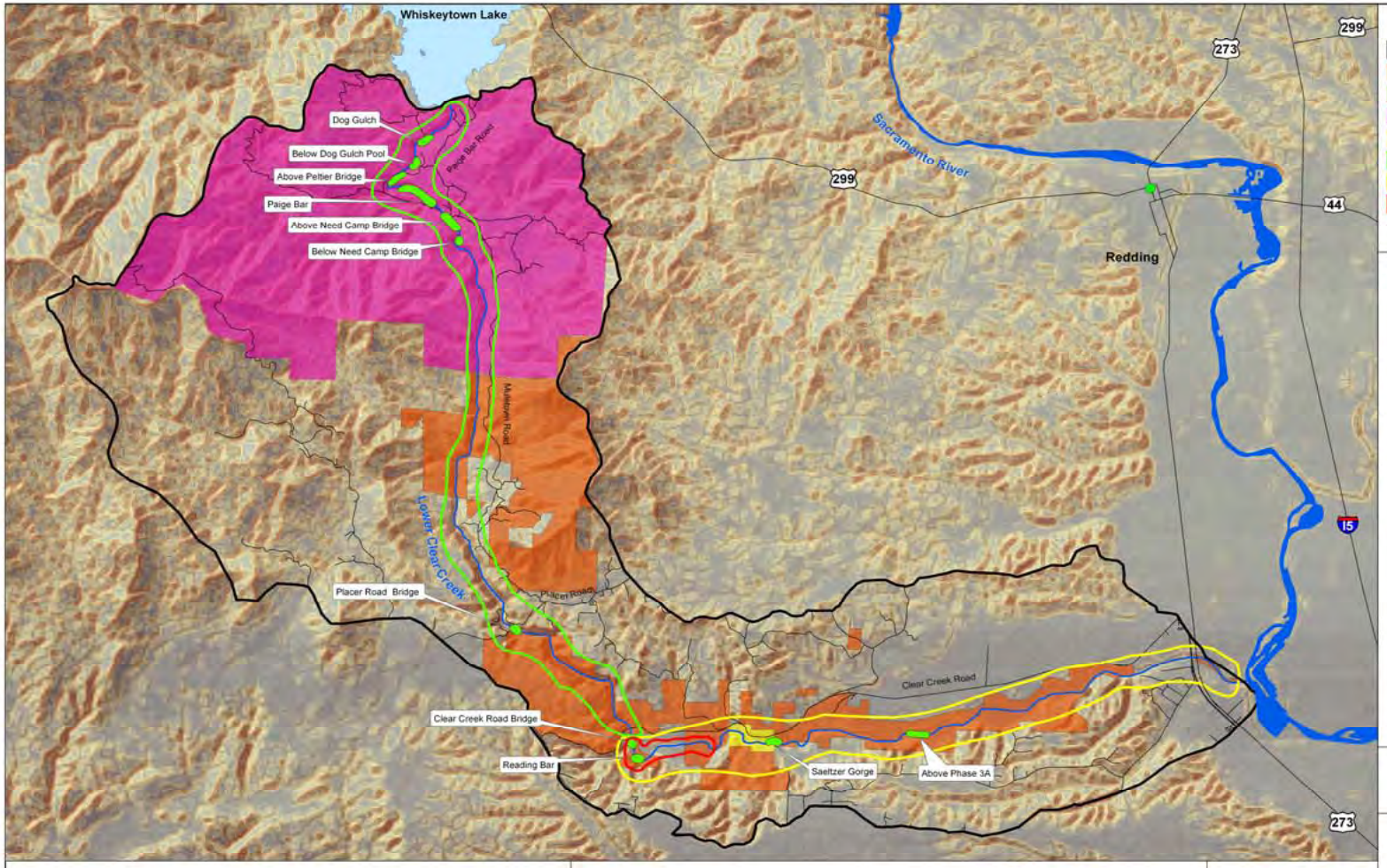
2.0 PROPOSED ACTION AND ALTERNATIVES

2.1 Description of Alternatives

2.1.1 Alternative A-Proposed Action

2.1.1.1 Gravel Augmentation

There are 10 specific gravel augmentation sites included under the proposed action located between Whiskeytown Dam and the lower Clear Creek/Sacramento River confluence (Figure 2). A separate gravel augmentation site exists on non-federal lands near the Placer Road Bridge. Since the Placer Road Bridge site is not located on federal lands, it will be addressed in a separate environmental document. Gravel augmentation projects have occurred at several of these sites in past years (Table 1). Some of the augmentation sites include several design and placement options that may increase the efficiency and/or time in reaching the goal of achieving coarse sediment transport throughout specific reaches of lower Clear Creek, and ultimately recharging the gravel deficit within the entire lower Clear Creek system. Some of the design and placement options may reduce or eliminate the need for other gravel augmentation sites.



LEGEND

- Lower Clear Creek Watershed
- Bureau of Land Management
- Gravel Augmentation Sites
- National Park Service
- California Department of Fish and Game
- Upper Reach
- Lower Reach
- Picket Weir Reach
- Roads

LEAD AGENCIES

Bureau of Land Management
Redding Field Office

National Park Service
Whiskeytown National Recreation Area

Figure 2
Project Location Map

0 6,500 13,000 Feet

October 2007

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Environmental Assessment

Lower Clear Creek Anadromous Fish Restoration & Management Project

Shasta County, California

Ownership Data Source: Bureau of Land Management - Redding Field Office

TABLE 1. PAST GRAVEL AUGMENTATION TOTALS (As of April 2007) Lower Clear Creek Anadromous Fish Restoration and Management Project		
Placement Site	**Total Quantity (Tons)**	**Jurisdiction**
Whiskeytown Dam	23,258	BOR
Below NEED Camp	3,602	NPS
Placer Road Bridge	19,802	Non-Federal
Clear Creek Road	3,003	BLM
Reading Bar	999	BLM
Saeltzer Gorge	36,953	BLM
Above Phase 3A	1,730	BLM
Floodway	11,721	BLM
Phase 2B Exchange	1,404	BLM
TOTAL	**102,470**	
Source: GMA 2007a		

Gravel augmentation would not occur at all sites in a single year, and some sites may not be implemented. Some sites may be used every year through 2018 while others may only be used sporadically. The Restoration Team would utilize the sites as needed, using an adaptive management approach based on the results of ongoing monitoring of gravel routing within the lower Clear Creek system.

In addition to the 10 specific gravel augmentation sites on federal lands, the proposed action includes gravel augmentation at currently unspecified locations within the Lower Reach (between Clear Creek Road Bridge and the Clear Creek/Sacramento River confluence) (Figure 2).

Three different gravel augmentation methods (modified from McBain and Trush 2001) are proposed (Figure 3) including:

1. Lateral Berm: A recruitment-pile of gravel is placed as a steeply sloping bar parallel to the channel to provide long-term supply and short-term confinement.

2. Riffle Supplementation: Gravel is placed across the entire channel and graded to a roughly uniform depth to provide immediate spawning habitat, assuming sufficient depth and velocity parameters are met.

3. End Dump Talus Cone: A large pile of gravel is placed on the bank for recruitment into the stream channel during high flows.

Up to 25,000 tons of gravel would be placed system-wide annually for ten years. The gravel will be sorted, washed river rock that will meet the following specifications:

> Generally accepted gravel sources include deposits outside active stream channels, in high terraces and from the alluvial fan of tributary streams in the upper reaches of the Central Valley Project Reservoirs. Gravel sources shall be limited to the locations specified for the following types of streams.

a. Perennial Steams – all gravel will come from outside the 100-year flood plain.
b. Non-perennial streams that fall under USCE jurisdiction (Section 404 of the Clean Water Act) – all gravel will come from outside of the active stream channel with an excavation depth above the base flow water surface elevation of the stream.
c. Non-perennial streams not under the USCE jurisdiction – gravel may come from any portion of the channel except the flowing stream.
d. CVP reservoir tributary stream deltas – gravel may come from any portion of the channel within the zone of the reservoir influence.

Spawning gravel specifications will include uncrushed "natural river rock". The gravel must be washed at least once and have a cleanliness value allowing basin water quality standards to be maintained during placements. Mixing of existing earth material with stockpiled or delivered gravel will not be allowed. If gravel is to be obtained from federal lands additional environmental compliance will be prepared, permits obtained, and will tier to this assessment.

The gravel size used for augmentation will be between approximately ⅜-inch and 5-inch, according to the approximate gradation in Table 2 below. Gravel size and gradation may be modified based on local geomorphic conditions, the augmentation method, continued studies on gravel use and consultation with USFWS, NMFS and DFG.

TABLE 2. GRAVEL AUGMENTATION SIZE GRADATION
Lower Clear Creek Anadromous Fish Restoration and Management Project

Particle Size	Percent Passing
5-inch	95-100%
2-inch	75-85%
1-inch	40-50%
¾-inch	25-35%
½-inch	10-20%
⅜-inch	0-5%

Lateral Berm Method
(Above Phase 3A Site)

Riffle Supplementation Method
(Reading Bar Site)

End Dump Talus Cone Method
(Placer Bridge Site)

Figure 3. Gravel Augmentation Methods

Descriptions of the 10 sites and the additional augmentation within the Lower Reach are detailed below.

Dog Gulch (NPS)
This site is located at Dog Gulch, the first significant tributary to enter Clear Creek below Whiskeytown Dam on public lands within the WNRA. An existing, steep, native-surfaced road provides access from the paved road across the dam (South Shore Drive) to the right bank (looking downstream) of Clear Creek, just upstream of the Dog Gulch confluence. Three augmentation locations are proposed in the vicinity of the confluence.

Location A: Bedrock Outcrop just Upstream of the Dog Gulch Confluence
This location involves riffle supplementation and/or a lateral berm, using end-dump trucks and loaders or backhoes to smooth gravel across the riverbed and sculpt a berm along the right bank. The augmented gravel would "boost" the leading edge of the previously-implemented Whiskeytown Dam end-dump talus cone, which has mobilized to the pool below Dog Gulch (approximately 3,000 feet below the placement site). Trucks would back up to the creek with very little modification to the streambank, using an existing road-like feature. The gravel placement would be roughly 100 feet long with a volume of up to approximately 390 tons if both the riffle supplementation and lateral berm options are implemented.

Location B: Below Dog Gulch
This location also involves riffle supplementation and/or a lateral berm and is similar to Location B, but requires installing a temporary stream crossing over Dog Gulch, either with a culvert or an underlayment of very coarse rock beneath the crossing, to access a trail along the rather flat surface along the right bank of Clear Creek below the confluence. This bedrock "bench" is interrupted by a few ceanothus shrubs and one small pine tree. Bedrock outcrops would be avoided and voids would be filled with gravel to create a temporary road surface. Gaps in the riparian vegetation provide access to dump the gravel into the channel. Gravel would be graded to a uniform surface level with an approximate depth of two feet. The gravel placement would be approximately 300 feet long with a combined volume of up to approximately 1,650 tons if both the riffle supplementation and lateral berm options are implemented.

Location C: Dog Gulch Pool
This site is farthest downstream, requiring additional road improvements, and would therefore be the most expensive to access. Using the temporary stream crossing over Dog Gulch described above, trucks would end-dump up to approximately 1,590 tons of gravel into the right margin at the head of a deep bedrock pool, just downstream of Locations A and B. Some grading would be required to create the 80-foot long lateral berm along the right bank. In theory, gravel stored in this fashion will be mobilized by powerful helical hydraulics driven by the morphology of this pool during glory hole (a circular spillway allowing uncontrolled releases into Clear Creek of up to 28,892 cfs during large storm events) spills from Whiskeytown Dam.

Below Dog Gulch Pool (NPS)
This site is located just downstream of a large pool (referred to above as Dog Gulch Pool), approximately 1,000 feet downstream of the Dog Gulch/Clear Creek confluence on public lands within the WNRA. This location involves riffle supplementation and a lateral berm using methods similar to the Dog Gulch site. This site would achieve the same benefits as the Dog Gulch site but would provide habitat downstream of Dog Gulch Pool without the need to achieve gravel routing through the pool from upstream sites. Trucks would back up to the creek with very little modification to the stream bank, using an existing road-like feature. The gravel placement would be roughly 800 feet long with a volume of up to approximately 4,500 tons. The site would

be accessed by developing an existing abandoned road that tees off of Peltier Valley Road and terminates at, or near, the active channel. A short, steep section of the road may need to be paved and some streamside vegetation may need to be removed to facilitate gravel placement. A gate would be installed at the upper entrance to the improved road to prevent inappropriate use and provide recreational use.

Above Peltier Bridge (NPS)
This site is located just upstream of Peltier Bridge over Clear Creek on public lands within the WNRA. This location involves riffle supplementation using a gravel sluicing method or helicopter placement to restore habitat to a highly degraded reach, believed to have formerly provided high quality spawning habitat (GMA 2007b). The project would cover the streambed with up to approximately 3,750 tons of gravel, approximately one foot deep, for a distance of 1,600 feet, beginning 250 feet above Peltier Bridge. The long straight reach with moderate gradient would improve short-term habitat attributes until high flows arrange the bed into dynamic alluvial features. With an adequate supply from upstream, this reach would eventually evolve into high gradient (run) spawning habitat, with some limited pool-tail and side channel habitat.

Gravel sluicing would involve pumping a water-gravel slurry through an eight-inch flexible pipe. Two six-inch water pumps feed the eight-inch "Yellomite" line while gravel is fed into a grizzly with a vibrating plate. The pump needs to be within 30 vertical feet of the water source (i.e. water truck). The Peltier injection requires up to a 600-foot runout for the pipe. Staging for gravel sluicing would take place along the Peltier Valley Road from the bridge up the road 1,100 feet. Two turnouts would allow traffic to pass but the road would likely need to be closed periodically during the injection period. The duration of this project would be a minimum of 19 days, (at a rate of 20 tons per hour), and the road may need to be closed during the operation. Sluicing would begin at the bridge and work upstream, re-deploying the pipe through existing gaps in the vegetation as the staging area moves.

Helicopters have been used to place spawning gravels in other streams with success (GMA 2007b). Helicopter placement typically utilizes a radio-controlled hopper that is filled using a loader. The large clearing at the top of the ridge, adjacent to Peltier Valley Road is a potential staging area that would reduce trucking costs. The gravel would be delivered into the creek at a rate of 20 tons per hour. This method does not require road closures.

Paige Bar (NPS)
The upstream end of this site is located approximately 1,000 feet below Peltier Bridge and extends downstream approximately 2,000 feet on public lands within the WNRA. This location involves gravel augmentation and floodplain lowering. Gravel augmentation would be accomplished using riffle supplementation and lateral berming. A riffle supplementation and lateral berm would be placed at the upstream end of the reach using up to approximately 840 tons of gravel to recharge a 100-foot long high quality spawning reach in the first pool and pool tail below the 90- degree bend in Clear Creek. Access to the site would be from the existing road along the left bank side of Peltier Bridge along with moderate amount of roadwork. Trucks would back up to the creek with very little modification to the stream bank, as a road-like feature already is in place and much of the bank is composed of bedrock.

This site also includes a floodplain modification and channel filling site that is located just downstream of the previously-described riffle supplementation and lateral berm. Vegetation would be cleared from the bar top and stream banks. The floodplain would be excavated to a nearly level surface, removing the prominent mound at the upstream end of the bar. This material

would be sorted onsite using a portable screening plant. Compromises to the injected particle size distribution might have to be made depending on the sieving capabilities of the plant. Materials too fine to place in the channel would be sorted along the south side of the bar to facilitate replacement as a floodplain surface. This sandy surface would be planted with native species to prevent subsequent entrainment into lower Clear Creek. Coarser material will be utilized to armor the upstream end of the bar. Grading (1 percent) from hill slope to channel will further reduce the likelihood of recapture. The down-channel bar gradient was chosen to reflect the average bedslope (and water slope) at 0.4 percent.

From the downstream extent of floodplain grading, "feather edging" (removing the streamside vegetation) would continue to the ephemeral stream channel confluence near station 2,300, thus facilitating overbank flow and promoting floodplain function for roughly 1,550 feet of channel. Access to the site would also be from the existing road along the left bank side of Peltier Bridge. This will require a moderate amount of roadwork and opening some gaps in vegetation to allow access to a temporary stream crossing constructed of culverts and spawning gravel.

Approximately 5,250 tons of sorted, stockpiled materials would then be placed back into the channel using riffle supplementation to fill the channel to a roughly uniform depth along the 1,800-foot long reach above the confluence with the right-bank ephemeral stream channel confluence. Within this reach, one-foot tall pool-tail-like riffles punctuate the bed surface at points where the existing longitudinal profile and water surface profile reveal grade breaks that may retain riffles. Further, the scour hole would be left unfilled to provide more complexity. Whether this pool will fill over time or remain scoured, as the local bedrock-induced hydraulics suggests, is unknown. Likewise, the pools near the ephemeral stream confluence and above the Paige Boulder Creek delta will remain unfilled. An additional 1,800 tons of gravel would be required to shape the bar-channel transition. Using gravel instead of sand to "armor" the toe of the bar would serve multiple purposes including:

1. Store gravel for future transport/exchange;
2. Discourage riparian rooting, encroachment and confinement issues; and
3. Prevent entrainment of potentially mercury-laden, easily transported fine sediments.

Completing the floodplain modification and gravel augmentation together would restore process (floodplain function), supply (bed and banks) and provide immediate ecological benefit (roughly sculpted bedforms for spawning), and provide the economic benefit of utilizing gravel from the fossilized bar (sorted onsite) to supplement the gravel augmentation.

Paige Bar is underlain by a highly competent bedrock strata corresponding to approximately 80 feet (arbitrary) in elevation on the topographic maps. This is assumed to be the vertical excavation limit, so 80 feet is projected as a planar surface for the estimate of a net cut of 11,400 tons (Figure 4). Actual bedrock topography may differ and could substantially alter the volume of gravel available and the degree to which the floodplain could be lowered. Gravel injection in the streambed will reduce channel capacity, forcing flows up into the floodplain at roughly 1,000 cubic feet per second (cfs). Both channel roughness and low-flow channel capacity will change (become reduced) following construction due to the removal of vegetation and the addition of gravel.

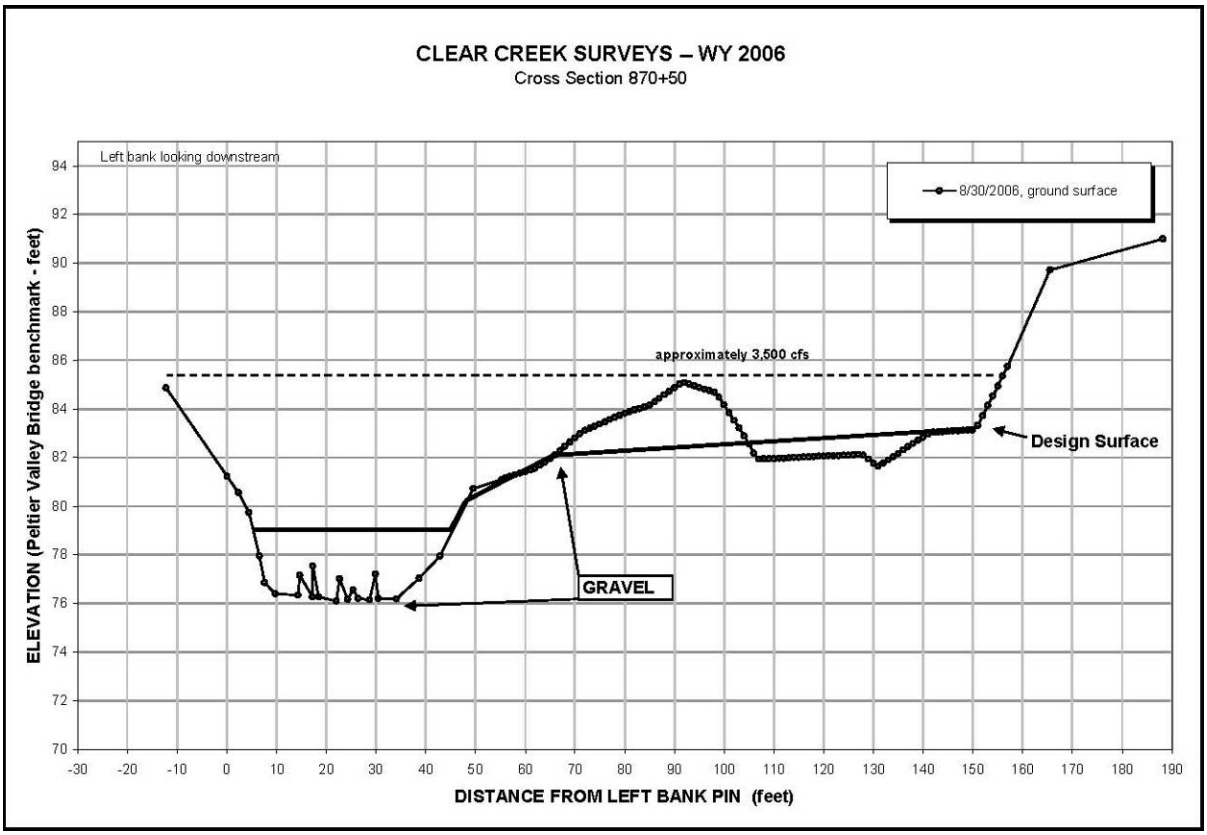

Figure 4. Typical cross section at Paige Bar in the area recommended for floodplain lowering (from GMA 2007a).

A gate would be constructed near the Peltier Bridge to discourage inappropriate use and an interpretive kiosk would be erected near the stream crossing that describes the projects. All fine sediment will be contained onsite to prevent potential mercury contamination.

Above NEED Camp Bridge (NPS)

This site is located just upstream of the bridge over Clear Creek, on the access road to the NEED Camp, on public lands within the WNRA. This location involves using a riffle supplementation at three locations within a 1,300-foot reach from the bridge to the Paige Boulder Creek/Clear Creek confluence to provide immediate spawning habitat. Under the proposed action, up to approximately 2,550 tons of gravel would be placed at the three sites by supplementing pool tails. Access to the placement locations would be via existing roads, when feasible, on either bank of Clear Creek.

Below NEED Camp Bridge (NPS)

This site is located approximately 600 feet downstream of the bridge over Clear Creek, on the access road to the NEED Camp, on public lands within the WNRA. This site has been used for gravel augmentation in past years to recharge the downstream reach. Approximately 3,600 tons

of gravel has been placed at this site using a lateral berm method since 2005. Under the proposed action, up to approximately 4,500 tons would be placed annually at this site.

Clear Creek Road Bridge (BLM)
This site is located just downstream of the Clear Creek Road Bridge over Clear Creek, on public lands administered by BLM. This site has been used for gravel augmentation in past years to recharge the downstream reach. Approximately 3,000 tons of gravel has been placed at this site using an end dump talus cone method since 2003, by placing approximately 1,005 tons annually. Under the proposed action, up to approximately 1,125 tons would be placed annually at this site.

Reading Bar (BLM)
This site is located approximately 2,600 feet downstream of the Clear Creek Road Bridge over Clear Creek, on public lands administered by BLM. This site was used for gravel augmentation in 2003 to provide immediate spawning habitat. A riffle supplementation method was used to place 999 tons of gravel in-channel. Under the proposed action, up to approximately 1,500 tons would be placed annually at this site.

Saeltzer Gorge (BLM)
This site is located downstream of the former location of Saeltzer Dam on public lands currently owned by the State of California and BLM. This site has been used for gravel augmentation in past years to recharge the downstream reach. Approximately 36,900 tons of gravel has been placed at this site using an end dump talus cone method since 1996, ranging between 3,450 tons and 7,500 tons annually. This site includes two locations, one approximately 300 feet below the former location of Saeltzer Dam, located on the right bank, and one approximately 1,000 feet downstream of the former location of Saeltzer Dam, located on the left bank. The upstream site requires a stream crossing to access the augmentation site. Under the proposed action, up to approximately 7,500 would be placed annually between these two locations.

Above Phase 3A (BLM)
This site is located at approximately four miles upstream of the Clear Creek/Sacramento River confluence, upstream of Phase 3A of the Lower Clear Creek Floodway Rehabilitation Project (LCCFRP), on public lands administered by BLM. This site has been used for gravel augmentation in past years to recharge the reach upstream of Phase 3A and replenish gravel that is transported out of the Phase 3A reach. A total 1,730 tons of gravel was placed at two locations using a lateral berm method in 2005. Future use of this site includes at least one additional location upstream of the previously used locations. Under the proposed action, up to approximately 2,250 tons would be placed at three locations annually at this site.

Lower Reach Gravel Augmentation (BLM)
For the purposes of this document, the Lower Reach is defined as the stream channel and banks from Clear Creek Road Bridge to the Clear Creek/Sacramento River confluence (Figure 2). Gravel augmentation would be implemented, as needed, at various, currently unidentified, locations within this reach. These augmentation sites would be in addition to the specific augmentation sites outlined above. Having the flexibility to implement additional gravel augmentation sites within this reach would give managers the ability to respond in a timely manner to address stream reaches identified as having gravel deficits and areas unable to route gravel effectively. The Restoration Team would identify and utilize augmentation sites, as needed, using an adaptive management approach based on the results of ongoing monitoring of gravel routing within the Lower Reach. Access to augmentation sites would utilize existing roads, when feasible, to minimize impact to riparian vegetation or other sensitive biological or cultural resources.

Placement methods could include any, or all, of the three methods previously outlined (riffle supplementation, lateral berm and end dump talus cone). The quantity of gravel at any single site would vary depending on the configuration of the site(s), site hydrology and the ability of the particular reach of stream to route, mobilize and deposit gravel. The annual quantity placed at these unidentified sites would also depend on the amount of gravel placed at other sites within the lower Clear Creek system during that year. Under the proposed action, up to approximately 2,250 tons would be placed annually at these undetermined sites in this reach. Prior to project implementation, when these sites are determined, resources will be inventoried and, if necessary, additional environmental review and compliance conducted to ensure protection of previously undocumented sensitive resources.

2.1.1.2 In-stream Habitat Structures

The Restoration Team proposes to place in-stream habitat structures within lower Clear Creek to provide habitat complexity for anadromous fish. Placement of structures in the active channel would create instantly available habitat. Structures that create quiet water or debris accumulation at the stream margins are beneficial for fry survival following emergence. Coupled with gravel augmentation, both log structures and boulder clusters help sort these gravels and scour pools. The enhancement or creation of large, deep pools with abundant cover can improve rearing habitat for salmonid juveniles.

The habitat structures would be placed, as needed, at various, currently unidentified, locations within the lower Clear Creek system. The placement sites would be located on public and/or private lands. The Restoration Team would identify and implement placement sites, as needed, using an adaptive management approach based on the results of ongoing anadromous fisheries monitoring conducted by the USFWS. Access to augmentation sites would utilize existing roads, when feasible, to minimize impact to vegetation or other sensitive biological or cultural resources. Up to 20 boulder clusters and 20 log structures would be placed within the lower Clear Creek system. Placement would occur anywhere within lower Clear Creek, based on access (existing roads), feasibility, need, and willing landowners (private lands). The designs for the in-stream habitat structures will follow the *California Salmonid Stream Habitat Restoration Manual 3rd Edition* (DFG 1998). Several habitat structure designs have been identified and are described below. If additional roads are determined necessary, resources will be inventoried and, if necessary, additional environmental review and compliance conducted to ensure protection of previously undocumented sensitive resources.

Boulder Clusters

Boulder structures are placed in the active channel and along stream banks to break up, or diversify, stream flow in a particular stream reach, to provide in-stream cover for juvenile salmonids and spawning adults, or to recruit spawning gravel. It is desirable to create a variety of stream flow velocities, because juvenile salmonids will select different velocities depending on whether they are feeding or resting. Different water velocities will also sort gravel and create diversity in the substrate. Boulders are well suited for diversifying flows because they are resistant to being displaced by high flows. Because of this, they can be placed mid-channel without constructing a full-channel spanning structure. The interstices (or open spaces) within boulder clusters and between large boulders can provide escape cover for juvenile and adult salmonids.

The range of flows to which a particular structure, or series of structures, may be subjected will dictate size of boulders to be used. Generally, clusters are located in straight, stable, moderately

to well-confined, low gradient riffles (0.5 to 1 percent slope) for spawning gravel enhancement. They are also placed in higher gradient riffles (1 to 4 percent slope) to improve rearing habitat and provide cover. At least three- to five-foot diameter boulders are recommended, except in very small streams. To be effective in creating scour pockets and habitat niches around individual boulders, the correct distance between adjacent boulders and the configuration of the boulder clusters must be determined. In general, adjacent boulders should be 0.5- to 1-foot apart.

The proposed design includes a triangle cluster of three boulders. The boulders would not be cabled together. Several of these clusters may be aggregated to increase scour area and create greater habitat complexity. Heavy equipment is usually required for transporting and positioning boulders including dump trucks, loaders and/or bulldozers. Under some circumstances, it may be most cost-effective to transport and place boulders by helicopter.

Digger Logs

Digger logs are placed with one end anchored securely on the bank and the other end plunging into the bottom of a pool. The primary use of digger logs is to enhance pool habitat by creating diverse cover for rearing juveniles as well as for migrating adults. They are also used to scour the channel, creating or expanding pool habitat. Logs with rootwads intact are positioned with the rootwad end extending down into the pool to create complexity for increasing rearing habitat and maximizing scour.

Digger logs are usually secured to bedrock and held in place using cable and polyester resin adhesive, or secured to live trees or downed wood with threaded rebar. The log is anchored in at least two places, with anchors spaced as far apart on the log as possible to keep it secure during high flows. Digger logs can also be set in a trench dug into the stream bank. At least one-third of the length of the log is placed in the bank. This buried portion of the log is covered with boulders to anchor the structure. Digger logs will usually be positioned to point downstream, although there may be some situations where pointing them upstream would be appropriate (where the intention of the log placement is to create scour). The vertical angle of the log is usually 30 to 45 degrees to the bank.

Spider Logs

Spider logs, also called mini log jams, are several logs placed at angles to mimic a log or debris jam. They provide cover for juvenile rearing and adult spawning and collect woody debris to increase diversity. Their use is restricted to areas where there is no danger of causing bank failure or channel migration. Pools and backwater eddy areas on the stream channel margins are the best locations for these structures.

The structures are composed of several logs placed across each other, in the shape of a triangle, to imitate natural debris or log jam. Each of the logs is secured to bedrock or large boulders in the channel with cable and polyester resin adhesive, or to live trees with threaded rebar. The logs are secured together with threaded rebar. Several other logs with branches and rootwads attached are then fastened to these structure logs with cable or threaded rebar. Before placing spider logs, it is necessary to determine channel capacity and bankfull discharge that could be expected. Log structures should not reduce channel capacity below flood stage needs or a massive log jam and sediment trap could develop.

2.1.1.3 Picket Weir

The USFWS, in cooperation with the DFG, propose to place a temporary A-frame picket weir across lower Clear Creek from approximately late-August to mid-November of each year. The

purpose of the picket weir is to create a spatial separation between Central Valley spring-run Chinook salmon and Central Valley fall-run Chinook salmon in order to prevent potential hybridization and redd superimposition between the runs. An additional benefit includes increasing the Restoration Team's knowledge of run timing for Central Valley fall-run and spring-run Chinook salmon, and Central Valley steelhead. The weir would be located approximately 7.5 miles upstream from the Clear Creek/Sacramento River confluence on public lands administered by BLM.

The weir has been used annually at this site since 2003. Under the proposed action, the weir may be moved to an alternate location within an approximate two-mile reach of lower Clear Creek (Figure 2) if deemed appropriate by the Restoration Team and regulatory agencies.

The weir will be constructed of wooden frames set eight feet apart, connected with aluminum I-beams into which are inserted six-foot long ¾-inch aluminum conduit spaced two inches on center. The conduit will block adult salmonid passage and will extend to the stream bottom, or gaps will be filled with native cobbles or sandbags. The structure will be anchored by cable with adjustable turn buckles to seven-foot long iron rods which are driven vertically into the streambed a sufficient depth to bear the weight of the structure. The installation will include signs warning rafters of the weir's location and alerting fisherman of the regulation prohibiting fishing within 250 feet of a fishway. The weir will be installed and monitored by the USFWS. Installation and removal dates will be determined annually by fisheries biologists from the USFWS, DFG, Reclamation, and NMFS.

In past years, spring- and fall-run Chinook salmon run timing, holding and spawning data have been reviewed to select dates that would maximize the potential to spatially separate spring-run Chinook salmon while minimizing adverse effects to steelhead and fall-run Chinook salmon. The primary objective of selecting the proposed dates is to allow a majority of the spring-run salmon to spawn before allowing fall-run salmon access to the habitat. Installation of the weir late-August would minimize the potential for blocking the upstream migration of spring-run salmon.

The weir was removed on November 3, 2003, and November 1, 2004, but in 2005, weir removal was extended to November 15, due to the large number of fall-run salmon observed downstream of the weir, and the potential impacts to redds upstream of the weir. If less than 20 live salmon are observed within 800 feet below the weir during the late-October USFWS snorkel survey, the removal date of the weir would be approximately November 1. If more than 20 live salmon are observed in this reach, consideration would be given to delaying removal of the weir, as was done in 2005, through consultation with the Restoration Team, including NMFS representatives.

In order to avoid and minimize effects to steelhead, the weir would be removed prior to the anticipated peak of the steelhead migration. Biweekly snorkel surveys would be used to determine the number of steelhead below the weir. If more than ten migrating steelhead are observed below the weir, pickets will be temporarily removed to allow the fish to pass upstream. USFWS would regularly monitor the weir to detect vandalism, remove debris and maintain the integrity of the structure.

2.1.2 Alternative B – No-Action

The no-action alternative is defined as not implementing any aspect of the proposed action. The environmental impacts of the proposed action are compared against the no-action alternative which serves as the environmental baseline. The no-action alternative is not a "static" alternative.

Implicitly, it is the continuation of the environmental conditions and trends that currently exist, or are occurring, within the project area. Under this alternative, the Restoration Team would not implement the Lower Clear Creek Anadromous Fish Restoration and Management Project.

2.1.2.1 Gravel Augmentation

Under the no-action alternative, the 10 specific gravel augmentation sites would not be implemented. Additional gravel augmentation sites would not be developed and implemented in the Lower Reach from Clear Creek Road Bridge to the Clear Creek/Sacramento River confluence. Gravel augmentation and the recharging of the lower Clear Creek system would rely solely on gravel that has been placed as a result of past augmentation projects and the continued implementation of the Whiskeytown Dam gravel augmentation site, located immediately downstream of Whiskeytown Dam. This site is covered under a separate NEPA process. The floodplain modification at Paige Bar would not be implemented.

2.1.2.2 In-stream Habitat Structures

Under the no-action alternative, boulder clusters, digger logs, spider logs, rootwads and other log/rock habitat structures would not be placed in lower Clear Creek.

2.1.2.3 Picket Weir

Under the no-action alternative, the picket weir would not be installed and operated annually in lower Clear Creek.

2.2 The Environmentally-Preferred Alternative

As described in NEPA, the Environmentally-Preferred Alternative is the alternative that would:

1. Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;
2. Ensure for all Americans, safe, healthful, productive and aesthetically and culturally pleasing surroundings;
3. Attain the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences;
4. Preserve important historic, cultural and natural aspects of our natural heritage and maintain, wherever possible, an environment that supports diversity and variety of individual choice;
5. Achieve a balance between population and resource use that will permit high standards of living and a wide sharing of life's amenities; and
6. Enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.

The National Park Service and the Bureau of Land Management has chosen Alternative A (the proposed action) as the Environmentally Preferred Alternative. Based upon the above six criteria, Alternative A achieves the greatest degree of environmentally preferred benefits.

- Criteria 1 is achieved in greater magnitude by Alternative A as the proposed action aids in the restoration of native species and natural environmental processes;
- Criteria 2 is achieved in equal magnitude by both alternatives.

- Criteria 3 is achieved by both Alternatives. However, Alternative A achieves this criteria in greater magnitude as the restoration of native fish populations will provide important recreational opportunities to visitors of public lands.
- Criteria 4 is achieved by both alternatives, however, Alternative A achieves this criteria in greater magnitude as restoration of native anadromous fisheries helps ensure preservation of natural aspects of our natural heritage.
- Criteria 5 is achieved equally by both alternatives.
- Criteria 6 is not applicable to either alternative

3.0 THE AFFECTED ENVIRONMENT

This section contains background information and descriptions of the natural and cultural resources found in the project area that could be affected by the proposed action or other alternatives discussed in this EA.

3.1 Environmental Resources Not Considered in Detail

An initial evaluation of the potential effects of the alternative indicated that there would likely be little to no effect on several resources. These resources will not be discussed further in this document.

3.1.1 Land Use

The proposed action would not result in any changes in land use.

3.1.2 Agriculture, Prime and Unique Farmland

The proposed action would not affect Agriculture, Prime and Unique Farmland.

3.1.3 Areas of Critical Environmental Concern

The BLM-administered land within the lower Clear Creek corridor is not currently designated as an Area of Critical Environmental Concern (ACECs). Therefore, no ACECs will be affected by the proposed action.

3.1.4 Environmental Justice

The proposed action would not result in any disproportionately high adverse impact to low-income or minority populations or communities.

3.1.5 Growth-Inducing Impacts

The proposed action would have no effect on population growth or densities.

3.2 Project Area Setting

Upper Clear Creek originates near 6,000 feet elevation in the Trinity Mountains, and flows south between the Trinity River basin to the west, and the Sacramento River basin to the east. Upper Clear Creek flows into Whiskeytown Lake (elevation 1,210 feet) at Oak Bottom, 11 miles west of Redding. Lower Clear Creek flows south from Whiskeytown Dam for approximately eight miles, then east for approximately eight miles before joining the Sacramento River five miles south of Redding. The drainage area of Clear Creek upstream of the gauging station near Igo is 228 square miles, most of which is regulated by Whiskeytown Dam (McBain and Trush 2001).

The project is located in an area of Mediterranean climate with hot, dry summers, and cool winters with moderate rainfall. At lower elevations, temperatures over 100 degrees Fahrenheit often occur during the months of June through September, while subfreezing temperatures can occur from November through March. The frost-free growing season averages 250 days in the lower elevations, while the mean average temperature is 58° F, as recorded at the weather station located at the WNRA headquarters (WSRCD 1996). The average annual precipitation at the WNRA headquarters is 60 inches, nearly all of it is in the form of rain. Seventy-five to ninety percent of the total annual rainfall occurs between November 1 and April 30.

3.2.1 Air Quality

The Clean Air Act, as amended in 1990, requires the Environmental Protection Agency (EPA) to identify National Ambient Air Quality Standards (NAAQS) to protect public health and welfare. Standards have been set for six pollutants: ozone (O^3), carbon monoxide (CO), nitrogen dioxide (NO^2), sulfur dioxide (SO^2), particulate matter less than 10 microns (PM10), and lead (Pb). In 1997, EPA promulgated a revised NAAQS for ozone and a new NAAQS for particulate matter less than 2.5 microns (PM2.5). In the spring of 1999, a U.S. Court of Appeals panel remanded the standard to EPA for further consideration. However, in early 2001, the Supreme Court upheld the EPA's authority to set these new, more stringent standards. The Shasta County Air Quality Control District regulates air quality issues within the project area. Shasta County, as well as the entire Sacramento Valley, is classified as non-attainment with the state PM10 standard, according to the California Air Resources Board (CARB) Almanac of Emissions and Air Quality (2001). Air quality in the Sacramento Valley Air Basin is affected by pollutants generated locally, transported from metropolitan Sacramento and, at times, a combination of the two sources.

3.2.2 Geology and Soils

The form and function of the lower Clear Creek channel, and the biological communities inhabiting lower Clear Creek, are determined to a large extent by the geologic setting of the watershed (e.g., rock type, rates of erosion, uplift, or subsidence), and the interaction of stream flow and sediment supply to the channel. This fact plays a large role in the channel morphology of lower Clear Creek, and defines unique geomorphic reaches.

Clear Creek flows through two distinct geologic provinces: the Klamath Mountains province and the Great Valley province (WSRCD 1996). Most of the watershed lies within the Klamath Mountains province, which is composed primarily of Paleozoic to Mesozoic igneous, metasedimentary, and metamorphic lithologies. Lower sections of lower Clear Creek (below Whiskeytown Dam) lie primarily within the Great Valley province, which is composed of Mesozoic to recent sedimentary lithologies. Both provinces not only provide different lithologic

characteristics to lower Clear Creek alluvium, but also cause significant differences in channel morphology.

From Whiskeytown Dam to Clear Creek Road Bridge, the lower Clear Creek channel is predominantly bedrock controlled, with tightly confined, steep canyon walls typical of streams within the Klamath Mountains province. The resulting channel morphology is a steep, confined bedrock stream with very little sediment storage. An exception to this general description is the two-mile reach immediately downstream of Whiskeytown Dam, where the reduced bedrock confinement and gentler slope allow substantial gravel storage and alluvial channel features to develop.

The transition from the Klamath Mountains province to the Great Valley province occurs as lower Clear Creek exits the canyon at Clear Creek Road Bridge, with the Klamath Mountain province underlying the Great Valley province but becoming exposed briefly in the gorge below the former location of Saeltzer Dam. The Great Valley province is younger in age and contains less resistant sediments (relative to lithologies of the Klamath Mountain province), which has allowed a wide alluvial valley to form within the canyon walls. Further downstream, the stream corridor continues to widen and eventually transitions into the Sacramento River Valley. This lower section was historically semi-braided, meandering within the lower Clear Creek valley walls, with a floodway up
to 1,000 feet wide. These geomorphic and geologic characteristics allow delineation of distinct reaches along lower Clear Creek, with fairly consistent channel and floodway morphologies.

The soils in the lower Clear Creek watershed have been grouped into five associations. These associations are based primarily on physiography and differences in parent material. In addition to the five soil associations, there are six miscellaneous land types that occur in the watershed.

Mountain Soils
Soils in this association include the following: Chaix, Sierra, Kanaka, Corbett, Holland, Auberry. These soils are located in the upper watershed usually above 1,800 feet in elevation. They are steep, well-drained to very well-drained loams and loamy sands. They are underlain by weathered granite at a depth of 20 to 40 inches. Weathered granites are structurally weak and are easily broken down. However, weathering has not progressed to the point of clay formation. The result is coarse textured, easily eroded soils and a predominance of weak bedrock that is easily broken down into sands with very little silt and clay. The very low clay content, coarse texture and steep slopes combined to create a high erosion hazard. This soil association represents approximately 10,700 acres within the water shed and is found in the upper western and eastern portions of the watershed.

Foothill Soils
Soils in this association include the following: Auburn, Neuns, Goulding, Boomer, and Diamond Springs. The soils in this association are rolling to very steep, well-drained gravelly loams and clay loams. Depth to the volcanic rock and greenstone parent materials is 25 to 50 inches. Many of these soils have a stony or rocky surface. They are located in the middle reach of the watershed usually between 1,000 to 1,800 feet elevation. Because of their steepness and rocky or stony surface, these are not conducive to timber management. This soil association represents approximately 7,800 acres within the watershed and is found primarily in the upper half of lower Clear Creek (Placer Road Bridge to Whiskeytown Dam).

Lower Terrace Soils
Lower terrace soils include Perkins, Churn, Tehama, and Honcut. These soils are generally located in the lower watershed between the high terraces and the alluvial floodplain. They are well-drained and moderately well-drained clay loams and silty clay loams, with a 40- to 60-inch depth to parent alluvial material. This association is suitable for agricultural production as well as for residential development. This soil association represents approximately 920 acres within the watershed and is found primarily in the lower half of lower Clear Creek.

High Terrace Soils
Soils in this association include the following: Red Bluff, Newton, Moda, and Millsholm. These soils are well-drained to moderately well-drained clay and clay loams that are up to 40 to 60 inches deep to old alluvium parent material. They are located in the lower watershed on the higher terraces south and north of Clear Creek, between 600 to 1,000 feet in elevation. The Red Bluff and Moda soils are nearly flat to rolling and are associated with the tops of terraces, while the Newtown soil is moderately steep to steep and is on the sides of the terraces. This soil association represents approximately 5,600 acres within the watershed and is found mostly on the southern lower half of lower Clear Creek.

Bottomland Alluvium
Bottomland alluvium is composed of Reiff and Anderson associations. These soils are well-drained to somewhat excessively drained loamy fine sands and loam. They are located adjacent to the creek and are subject to flooding. An additional component of this association is the tailings and placer diggings map unit that has been reformed to approximate river wash material, typical of historic floodplains in the watershed. This soil association represents approximately 210 acres within the watershed and is found below Clear Creek Road Bridge.

3.2.3 Hydrology and Water Quality

The proposed action is located within the stream channel and floodplains of lower Clear Creek, a perennial tributary to the Sacramento River. Mainstem flows in lower Clear Creek are controlled by Whiskeytown Dam located at river mile 18. Whiskeytown Lake has a storage capacity of 241,000 acre feet (McBain and Trush 2001). The dam, which separates the upper and lower Clear Creek watersheds, has outlet works allowing a total of up to 1,241 cfs to be released at one time. Additionally, the dam has a circular spillway or “glory hole”. The glory hole allows approximately 10,000 cfs to release into lower Clear Creek during large storm events which fill Whiskeytown Reservoir. Several ephemeral, intermittent and perennial tributary streams also contribute flows to lower Clear Creek.

Whiskeytown Dam, constructed in 1963 as part of the Trinity River Division of the Central Valley Project, severely altered the natural hydrology of lower Clear Creek by reducing the frequency, duration and magnitude of high-flow events and diverting a majority of stream flows from the upper watershed to the Sacramento River. Trans-basin diversions of stream flow from the Trinity River to the Sacramento River occur first through the 10.7-mile long lower Clear Creek Tunnel (and Judge Francis Carr Powerplant) into Whiskeytown Lake, and then through the Spring Creek Tunnel and Powerhouse into Keswick Reservoir on the Sacramento River, just north of Redding. Water releases into lower Clear Creek below the dam were reduced by 60 percent of unimpaired conditions (McBain and Trush 1998). The magnitude of common floods (2- to 5-year recurrence) were also reduced by approximately 60 percent (WSRCD 2001)). Flows into lower Clear Creek are controlled to maintain salmonid temperature thresholds which are monitored at the U.S. Department of the Interior, Geological Survey (USGS) Igo gauging station.

Many of the drainages within the WNRA have been sampled for water, sediments, and biota in one or more years (2001 to 2003). Some samples determined that heavy metals have bioaccumulated in fish, amphibians, and benthic macroinvertebrates in the lower Clear Creek watershed. Several taxa of invertebrates and fish collected from these sites contained elevated concentrations of arsenic, chromium, nickel, lead and/or mercury. They also found elevated concentrations of cadmium and selenium in invertebrates. Pathways for metals into aquatic organisms can be through water or sediments, and the amount of bioconcentration or biomagnification is dependent on the metal and ecosystem involved. Certain metals, such as mercury, highly bioconcentrate and have major effects even at relatively low concentrations. Others, such as arsenic do not readily bioconcentrate and must reach higher levels to cause noticeable effects to biota or humans.

The upper portion of lower Clear Creek is considered to have better water quality than the lower reaches as both turbidity and mercury levels increase downstream (Moore and Hughes, 2003). In spite of this, water quality is generally good throughout the system. Non-storm turbidity ranges from 1 to 3 Nephelometric Turbidity Units (NTUs) within the action area. Trace metals do exist within the watershed, both naturally occurring, and residuals left over from historic mining and other historic uses of the watershed. All are within acceptable levels for both public and wildlife health and safety.

3.2.4 Hazardous Materials

The following information is excerpted from a report which synthesized all known information about mercury within the lower Clear Creek watershed (Tetra Tech, Inc. 2005).

Ashley et al. (2002) estimated background concentrations of mercury in the lower Clear Creek watershed at between less than 10 and 30 micrograms per kilogram (µg/kg) by analyzing mercury in pulverized gravel and pebble clasts from representative locations. Moore and Hughes (2003) estimated background mercury concentrations in the lower Clear Creek watershed to be 40 µg/kg in fine (less than 63 micrometers [µm]) sediments by sampling stream sediments from tributaries to lower Clear Creek that are unaffected by historic placer mining.

Total mercury concentrations in year-round resident fish species and invertebrates from lower Clear Creek are generally less than 0.14 milligrams per kilogram (mg/kg) (Hothem et al. 2004), which is below the U.S. Environmental Protection Agency (EPA) methylmercury criterion of 0.3 mg/kg for fish tissue. Certain fish (notably the riffle sculpin) and aquatic invertebrates tended to show an increase in total mercury concentrations at downstream sites but remained below EPA criterion. Estimates of mercury loading from lower Clear Creek to the Sacramento River, conducted in the Tetra Tech review, indicated that current releases from Clear Creek are generally low (approximately 0.38 kg per year).

Under current conditions, there does not appear to be a significant potential for adverse impacts to sediment-associated invertebrates, resident fish, or to piscivorous wildlife due to accumulation of mercury in resident fish and invertebrates within lower Clear Creek. Methylation of mercury does not appear to be occurring in either the water column or sediments of lower Clear Creek.

3.2.5 Aesthetics

The Wild and Scenic Rivers Act of 1968 (Public Law 90-542, as amended) provides that all designated Wild and Scenic Rivers are protected for their free-flowing characteristics and

outstandingly remarkable values. Streams determined to be eligible for inclusion in this system have been classified and all public land within ¼-mile of normal high water will be managed to protect the outstanding remarkable values and free-flowing character which led to their determination of eligibility. The public lands administered by BLM within the stream reach from the southern WNRA boundary downstream to Clear Creek Road Bridge has been determined to be eligible as a component of the National Wild and Scenic Rivers System and has been classified as Scenic (BLM 1993) based on the presence of outstandingly remarkable Recreation and Scenic Quality values. The portion of the stream reach within WNRA has not been determined to be eligible as a component of the National Wild and Scenic Rivers System.

The upper portion of lower Clear Creek is characterized by a deep gorge with flowing, cascading water surrounded by a forested upland landscape. The lower portion is characterized by broad alluvial floodplains, meandering gravel bars and lush riparian vegetation. Varying sections of this reach of lower Clear Creek are influenced by visual and noise impacts from residential homes, industrial areas, commercial developments and State Highway 273. In addition, mine tailings are visible in areas from past gold dredger and placer mining operations.

3.2.6 Vegetation, Plant Communities and Habitat Types

Various classification systems have been used to describe the plant communities that make up the vegetation of an area. The system used depends on the scale and level of detail desired, and the classifier's purpose and need. The California Wildlife-Habitat Relationships (WHR) classification system (Mayer & Laudenslayer 1988) used in this assessment is a comprehensive wildlife information system developed to integrate wildlife ecology and management with the plant communities and physical environment upon which they rely. A habitat type is a plant community growing in relatively homogenous environmental conditions. Several habitat types occur within the project area, and they are: Riverine, Fresh Emergent Wetland, Valley Foothill Riparian, Blue Oak-California Foothill Pine, Valley Oak Woodland, Montane Harwood Conifer, Closed-Cone Pine (Knobcone Pine), Mixed Chaparral and Blue Oak Woodland. The following sections describe the habitat types, their distribution, and typical plant species. The Jepson Manual (Hickman, J. 1993) is used for taxonomic nomenclature. Recent (after 1993) taxonomic changes are based on the National Plants Database (NRCS 2007).

Riverine

The stem base of the project area is aquatic Riverine habitat. The Riverine habitat type is classified as having intermittent or perennially running water in the form of rivers and streams. Riverine habitats undergo gradient changes from their origin to the confluence with another system. Near the origin of a riverine system, the gradient is generally steep and fast-flowing. The elevation changes become more gradual and result in slower moving water in the lower reaches. During the gradient changes, different plant and animal associations occur within this habitat classification. In areas of higher gradients, moss and algae are attached to rocks with holdfasts. Emergent vegetation inhabits lower gradient riverine habitats. Riverine habitats can occur in association with many terrestrial habitats. Riverine habitats are also found contiguous to lacustrine and fresh emergent wetland habitats. Common vegetation includes algae, water moss (*Salvinia sp.*), and duckweed (*Lemna sp.*).

Fresh Emergent Wetland

Fresh Emergent Wetlands are characterized by herbaceous hydrophytic plant species. The dominant vegetation is generally perennial monocots. All emergent wetlands are flooded frequently and long enough so that the roots of the vegetation prosper in an anaerobic environment. The vegetation may vary in size from small clumps to vast areas covering several

kilometers. The upper limit of fresh emergent wetland is the boundary between hydric and nonhydric soil, and the lower limit becomes deep water habitats such as lacustrine or riverine. Fresh emergent wetlands occur on the edge of rivers or lakes, but can also occur in depressions with suitable conditions. Fresh emergent wetlands occur throughout the entire reach of lower Clear Creek from Whiskeytown Dam to the Sacramento River. This habitat type is more prominent in the reach below Clear Creek Road Bridge where soils are deeper and the valley becomes wider and is subject to periodic flooding. Typical vegetation includes cattails, bulrush, sedges, spikerush and nutsedge. Plant communities within this association in lower Clear Creek can vary, depending on duration and depth of inundation or whether the habitat type is along the stream margin, backwater or side channel.

Valley Foothill Riparian

Valley-foothill riparian habitats are associated with lower elevation foothills in areas of lower velocity stream segments and floodplains. This community generally has deep alluvial soils with coarse, gravelly or rocky substrate with a high water table. Herbaceous vegetation is limited within these areas, except in openings where tall forbs and shade-tolerant grasses occur. Generally, the understory is impenetrable and includes fallen limbs and other debris. Most trees in this community are deciduous. There is a sub-canopy tree layer and an understory shrub layer. Canopy height is approximately 30 meters (98 feet) in a mature riparian forest, with a canopy cover of 20 to 80 percent. Tree species within this habitat type generally grow quickly.

Valley-foothill riparian can be found primarily in the lower reaches of lower Clear Creek from Clear Creek Road Bridge to the Sacramento River. In addition, smaller linear patches occur scattered throughout the system up to Whiskeytown Dam. Dominant species of valley-foothill riparian habitats in the project area are Fremont cottonwood (*Populus fremontii*) and valley oak (*Quercus lobata*). White alder *(Alnus rhombifolia)* and Oregon ash (*Fraxinus latifolia*) make up the sub-canopy layer. Understory species include wild grape (*Vitus californica*), wildrose (*Rosa californica*), California blackberry (*Rubus ursinus*), poison oak (*Toxicodendron diversilobum*), buttonbush (*Cephalanthus occidentalis*), and several willows *(Salix ssp)*. The herbaceous layer consists of sedges, rushes, grasses, horsetail and nettles.

Blue Oak-California Foothill Pine

This habitat consists of open to dense woodlands dominated by blue oak (*Quercus douglasii*), California foothill pine (*Pinus sabiniana*), and interior live oak (Q. wislizenii). Occasional valley oak and California black oak (*Q. kelloggii*) trees also occur in this habitat. Dominant shrub species include whiteleaf, green and common manzanita (*Arctostaphylos viscida, A. patula, A. manzanita*), buckbrush (*Ceanothus cuneatus*), California buckthorn (*Frangula [Rhamnus] californica), toyon (Heteromeles arbutifolia)*) and poison oak. A dense herbaceous layer dominated by various annual grasses and forbs also occurs in portions of this habitat.

Blue oak-California foothill pine habitat is typically diverse in structure both vertically and horizontally, with a mix of hardwoods, conifers, and shrubs. The shrub component typically includes several species that tend to be clumped, with interspersed patches of annual grasslands. In the upper watershed, above Clear Creek Road Bridge, this habitat type has a pronounced hardwood tree layer, with an infrequent and poorly-developed shrub layer, and a sparse herbaceous layer. On favorable sites, individuals or groups of trees may be only 10 to 13 feet apart and crowns may close, but seldom overlap. On poorer sites, the spacing between trees increases. Steep canyon slopes and rocky ridge tops are areas where pure stands of canyon live oak (*Quercus chrysolepis*) can be found. Knobcone pine (*Pinus attenuata*), blue oak, and California foothill pine are abundant at lower elevations with dispersed populations of Oregon white oak (*Quercus garryana*). Understory vegetation is mostly scattered woody shrubs of

manzanita, mountain-mahogany (*Cercocarpus betuloides*), poison oak and a few forbs. Mature oaks range between 56 to 98 feet tall and up to 59 inches diameter at breast height (DBH). Snags and downed woody material generally are sparse throughout this hardwood-conifer habitat.

In the lower watershed below Clear Creek Road Bridge, the blue oak-California foothill pine habitat has a pronounced hardwood tree layer with a developed shrub layer. Where there is a more open canopy, an herbaceous understory is prevalent. The dominant community above Clear Creek Bridge is blue oak-California foothill pine habitat with a well-developed understory of manzanita and herbaceous plants.

Valley Oak Woodland

This habitat varies from savanna to forest-like stands with partially closed canopies of mostly deciduous, broad-leaved species. Denser stands typically grow in valley soils along natural drainages. Tree density decreases with the transition from lowlands to the less fertile soils of drier uplands. Exceptions to this pattern are known, especially in the central coastal counties. Similarly, the shrub layer is best developed along natural drainages, becoming insignificant in the uplands with more open stands of oaks. Mature valley oaks with well-developed crowns range in height from 15 to 35 meters (49 to 115 feet).

This habitat type is found in a few scattered patches along the floodplains and terraces in the lower reaches of the project area. Valley oak patches along lower Clear Creek range in size from less than one acre to approximately 15 acres. Canopies of these woodlands are dominated almost exclusively by valley oaks. Tree associates in the project area include Northern California black walnut (*Juglans hindsii*), interior live oak, Oregon ash, and blue oak. The shrub understory consists of poison oak, blue elderberry (*Sambucus mexicana*), California wild grape, toyon (*Heteromeles arbutifolia*), California buckthorn, and California blackberry. Various grasses including wild oats, brome, barley, ryegrass, and needlegrass dominate the ground cover. Valley oak stands with little or no grazing tend to develop a partial shrub layer such as poison oak, toyon, and coffeeberry. Ground cover consists of a well-developed carpet of annual grasses and forbs.

Montane Hardwood-Conifer

Montane hardwood-conifer habitat includes both conifers and hardwoods with canopies of 60 to 100 percent cover. To be considered montane hardwood conifer, at least one-third of the trees must be conifer and at least one-third must be broad-leaved. The habitat often occurs in a mosaic-like pattern with small pure stands of conifers interspersed with small stands of broad-leaved trees. This diverse habitat consists of a broad spectrum of mixed, vigorously growing conifer and hardwood species. Typically, conifers to 65 meters (200 feet) in height form the upper canopy and broad-leaved trees 10 to 30 meters (30 to 100 feet) in height comprise the lower canopy. Most of the broad-leaved trees are sclerophyllous evergreen, but winter-deciduous species also occur. Relatively little understory occurs under the dense, bilayered canopy of montane hardwood conifer. However, considerable ground and shrub cover can occur in ecotones or following disturbance such as fire or logging. Steeper slopes are normally devoid of litter; however, gentle slopes often contain considerable accumulations of leaf and branch litter.

This habitat type is located in the Upper Reach of lower Clear Creek where conifer species transition to dominance. Very few conifer species are present in the lower watershed, and where they are present, they do not make up one-third of the species composition. This habitat consists of ponderosa pine (*Pinus ponderosa*), Douglas-fir (*Pseudotsuga menziesii*), incense-cedar (*Calocedrus decurrens*), California black oak, tanoak, Oregon white oak, and other localized species. Species composition varies substantially among different geographic areas. In the Clear

Creek watershed, California black oak, canyon live oak, bigleaf maple (*Acer macrophyllum*), white alder and tanoak (*Lithocarpus densiflorus*) are common, along with ponderosa pine, incense-cedar, Douglas-fir, and sugar pine (*Pinus lambertiana*) forming the overstory.

Closed-Cone Pine (Knobcone Pine)
This habitat includes a number of different evergreen and needle-leaved tree species as dominants. The height and canopy closure of these species are variable and depend upon site characteristics, soil type, the age of the stand and the floristic composition. The closed-cone pine habitats are similar to each other. Pine habitats typically reach heights of 30 meters (66 feet). Most pine communities have a shrub layer of chaparral species with high relative cover (up to 100 percent) and a sparse herbaceous layer. After fire, particularly on good sites, both cypress and pine habitats form dense, even-aged stands. As the stand matures, the stocking density decreases, but single species site dominance is common.

Closed-cone pine habitat is located in the Upper Reach of lower Clear Creek and is in small to large patches throughout the area. This habitat type is well established in patches around Whiskeytown Lake and surrounding areas within WNRA. This habitat type within Clear Creek is dominated by a single species of closed-cone pines; few stands contain both pines and cypress. In general, associated species change as the dominant species changes. The herbaceous layer may support a number of grasses and forbs. Knobcone pine frequently grows in small dense patches with chamise, ceanothus, leather oak and manzanita occurring between patches or in openings in the pine stands. The shrubby understory includes California buckthorn, and poison oak.

Mixed Chaparral
Mixed Chaparral is a structurally homogeneous brushland habitat type dominated by shrubs with thick, stiff, heavily cutinized evergreen leaves. Shrub height and crown cover vary considerably with age, precipitation regime (cismontane vs. transmontane), aspect, and soil type. At maturity, cismontane Mixed Chaparral typically is a dense, nearly impenetrable thicket with greater than 80 percent absolute shrub cover. Canopy height ranges from 1 to 4 meters (3.3 to 13.1 feet), occasionally to 6 meters (19.6 feet). On poor sites, serpentine soils or transmontane slopes, shrub cover may be only 30 to 60 percent and shrubs may be shorter, 0.5 to 3.0 meters (1.6 to 9.8 feet). Considerable leaf litter and standing dead material may accumulate in stands that have not burned for several decades.

Mixed Chaparral is a floristically rich habitat type that supports approximately 240 species of woody plants. Commonly associated shrubs include chamise, birchleaf mountain mahogany, toyon, yerba-santa, California buckeye, and poison oak. Some of these species may be locally dominant. This habitat type is scattered throughout lower Clear Creek. Thicker patches of mixed chaparral occur above the floodplain both in the upper and lower reaches.

3.2.7 Sensitive Plant Species

At present, there are no known state or federally-listed threatened or endangered plants in the WNRA. Plant species of special concern known to occur within the WNRA include: Howell's alkali grass (*Puccinellia howellii*), Shasta County arnica (*Arnica venosa*), clustered lady's slipper (*Cypripedium fasciculatum*), western trillium (*Trillium ovatum ssp. oettingeri*), Sanborn's onion (*Allium sanbornii var. sanbornii*), Sanford's arrowhead (*Sagittaria sanfordii*), and canyon stonecrop (*Sedum paradisum*). None of these species of special concern are known to occur in the project area. However, site-specific surveys have not been conducted for the entire area.

Two additional plant species of concern within the WNRA include blue elderberry (*Sambucus mexicana*) and MacNab cypress (*Cupressus macnabiana*). Although MacNab cypress is not listed as threatened, endangered, or sensitive by the federal or state government, or the California Native Plant Society (CNPS), the WNRA considers McNab cypress to be a species of concern due to its limited range and recent decline within the park. The type specimen for this species was collected near the town of Whiskeytown in the early 20th century from the largest population of Macnab cypress in Northern California. However, this stand was destroyed during the creation of Whiskeytown Lake. Many individuals from this stand were transplanted to adjacent lands and communities, particularly at old homesteads. Although Macnab cypress is not known to occur within the project area, the potential to encounter naturally occurring trees or even transplanted individuals exists. Blue elderberry is a species of concern because it is the host plant for the valley elderberry longhorn beetle (VELB), a species listed as federally threatened. Several elderberry shrubs grow near Trinity Mountain Road along Clear Creek, but no elderberry shrubs are known to occur within the WNRA below Whiskeytown Dam. The park is required to protect the elderberry in accordance with guidelines provided by the USFWS. Blue elderberry is known to occur within the project area downstream of Clear Creek Road Bridge.

Several botanical surveys of portions of the project area below Clear Creek Road Bridge have been conducted (Molter 1998, Bair 1999, Tehama Environmental Solutions, Inc. 2007b). No state or federally-listed threatened or endangered plants were found to occur as a result of these surveys. Fox sedge (*Carex vulpinoidea*), a CNPS List 2.2 species and a state ranked S2.2 threatened species, is known to occur within portions of the project area (Tehama Environmental Solutions, Inc. 2007b).

Fox sedge and several plant species of special concern that may occur within this Lower Reach include: silky cryptantha (*Cryptantha crinita*), Red Bluff dwarf rush (*Juncus leiospermus var. leiospermus*), dimorphic snapdragon (*Antirrhinum subcordatum*), Canyon Creek stonecrop (*Sedum paradisum*), and Brandegee's eriastrum (*Eriastrum brandegeae*).

Fox Sedge

Fox sedge (*Carex vulpinoidea*) is a perennial herb with an extensive range outside of California. It can be found growing from northern California to British Columbia on the west coast. Its distribution continues to the east coast, south to Florida, and grows in Newfoundland as well as Colorado and Arizona. However, there are presently only eight occurrences of fox sedge shown in the California Natural Diversity Database (CNDDB). The growth form of fox sedge is a dense cluster of linear leaves and triangular flowering stems arising from stout rhizomes. Large plants can sometimes grow to one meter in height. More commonly, the plant height is half this size (0.5 meters). The flowering stems extend above the leaf clusters. These flowering stems (culms) are an aggregate of densely clustered flowering spikes positioned on the upper 2 to 15 centimeters (cm) of the culm. These spikes are subtended by long and needle-like bracts. Fox sedge inhabits marshes, freshwater swamps, and riparian woodland. This species was recently found within the project boundaries.

Silky Cryptantha

Silky cryptantha *(Cryptantha crinita*) is an annual herb growing mostly on dry gravel substrate within several plant communities of California, including riparian scrub and woodland, valley and foothill grassland, and lower montane coniferous forest. The species habitat requirements give this species a moderate potential to occur on site.

Red Bluff Dwarf Rush
Red Bluff dwarf rush (*Juncus leiospermus var. leiospermus*) is a small annual herb inhabiting vernal pools and swales and seasonally wet areas of chaparral, cismontane woodland, and valley and foothill grasslands of northern California. This is another species found within the grassland component of the woodland and shrub communities of this area. This species has low potential to occur on site.

Canyon Creek Stonecrop
Canyon Creek stonecrop (*Sedum paradisum*) is a perennial herb with a CNPS List 1B.3 status. It inhabits chaparral and lower montane coniferous forest. This species has a low potential to occur within the project area.

Dimorphic Snapdragon
Dimorphic snapdragon (*Antirrhinum subcordatum*) is a small (less than 80 cm) annual herb with many white flowers closely attached (pedicels 1-3 millimeters [mm]) to flowering stems forming a raceme. The flowers are subtended by leaf-like bracts, and the lowest flowers have long twining and clinging branchlets that act to support the weak stem against other plants or debris. Stem hairs below the inflorescence are non-glandular, whereas those above are glandular. This species is a U.S. Department of Agriculture, Forest Service (USFS) Sensitive species and is in the CNPS List 4 rarity category. There are no occurrences listed in the CNDDB. The habitat is serpentine chaparral openings between 300 to 800 meters in elevation within the inner north coast range. The likelihood of finding this species within the project area is low.

3.2.8 Invasive Plant Species

Numerous exotic (non-native) plant species have become established in some areas of lower Clear Creek. Many exotic plants are highly invasive, able to out-compete native species, and disrupt native plant communities and processes. Within the WNRA, there are 195 known exotic plant species, some of which are considered highly invasive and subject to eradication. High priority nonnative and invasive species of concern within the Clear Creek watershed include: tree of heaven (*Ailanthus altissima*), black locust *(Robinia pseudoacacia)*, catalpa *(Catalpa spp.)*, giant reed (*Arundo donax*), yellow star thistle (*Centaurea solstitialis*), diffuse knapweed (*Centaurea diffusa),* bull thistle (*Cirsium vulgare*), scotch broom (*Cytisus scoparius*), french broom (*Genista monspessulana*), english ivy, (*Hedera helix*), Himalayan blackberry (*Rubus armeniacus*), spanish broom (*Spartium junceum*), salt cedar (*Tamarix chinensis*), common mullein (*Verbascum thapsus*), black mustard (*Brassica nigra*), poison hemlock (*Conium maculatum*), fennel (*Foeniculum vulgare*), Dyer's woad (*Isatis tinctoria*), perennial pepper weed (*Lepidium latifolium*), black locust (*Robinia pseudoacacia*), Bouncing Bet (*Saponaria officinalis*), and wild parsley (*Torilis arvensis*).

Several infestations have been successfully treated within the WRNA, and control efforts for the next several years are expected to achieve a significant reduction in exotic plant populations. Treated areas will require monitoring and retreating indefinitely. Mandates that require direct action to monitor and control the spread of exotics within the WNRA include the 1916 National Park Service Organic Act, the General Management Plan for Whiskeytown National Recreation Area (2001), and National Park Service Management Policies 2006. Specifically, NPS Management Policies 2006 states: "non-native species will not be allowed to displace native species if displacement can be prevented." In addition, the NPS Director's Order 12 states that activities may not be categorically excluded from NEPA if they contribute to the introduction, continued existence, or spread of non-native invasive species or actions that may promote the introduction, growth, or expansion of the range of non-native invasive species (DO-12 Handbook

3.50, Executive Order 13312). Changes in vegetation resources must be observed and documented in order to interpret and analyze such changes as the basis of informed decisions. The goal of the exotic plant program is to reduce exotic pest plant populations and allow re-colonization by native species.

A survey of exotic woody plants within the designated floodway from Clear Creek Road Bridge to the Clear Creek/Sacramento River confluence is currently being conducted by the Restoration Team. No specific invasive plant surveys have been conducted in the stream reach between the WNRA boundary and Clear Creek Road Bridge.

3.2.9 Ecologically Critical Areas

The following area is considered to be ecologically sensitive since it hosts unique and special resource values found in the footprint of the project area and within the WNRA. This area could be affected by the actions described in this EA.

Riparian Habitats
Riparian plant communities provide wildlife corridors and habitat for aquatic species of plants, animals, and invertebrates. Biodiversity, water quality and quantity and recreation values are provided and enhanced by riparian areas. Since this community type spans the length of lower Clear Creek, the composition of species varies along the corridor, adding to the biodiversity.

3.2.10 Fish and Wildlife

Lower Clear Creek supports a relatively diverse assemblage of wildlife species due to the diversity of habitats present within the watershed. More than 200 vertebrate species area known to occur within the WNRA including at least 35 mammal species, 150 bird species and 25 reptile and amphibian species (NPS 2005). Not all of these species are likely to be present within the project area, which only encompasses a portion of the WNRA.

Herpetological (reptile and amphibian) surveys conducted within the LCCFRP area, located in the lower reaches of the project area, detected 15 species, including 3 amphibian species and 12 reptile species (Bury et al. 2005). Avian monitoring conducted in the lower Clear Creek watershed since 1999 has detected 125 species of birds, 67 of which are confirmed to be breeding within the watershed (Rogner and Burnett 2007). Fisheries surveys conducted in 1981 and 1982 between Clear Creek Road Bridge and the Clear Creek/Sacramento River confluence detected 21 species of fish (Villa 1984).

3.2.11 Special-status Fish

Extensive information exists documenting the presence and abundance of special-status fish species in lower Clear Creek. The following special-status fish species and designated critical habitats are known to, or likely to, occur within the project area:

- Central Valley spring-run Chinook salmon *(Oncorhynchus tshawytscha)*
- Central Valley spring-run Chinook salmon critical habitat
- Central Valley fall-run/late fall-run Chinook salmon *(O. tshawytscha)*
- Central Valley steelhead *(O. mykiss)*
- Central Valley steelhead critical habitat

Central Valley Spring-run Chinook Salmon

The Central Valley spring-run Chinook salmon Evolutionarily Significant Unit (ESU) is listed as Threatened under the federal Endangered Species Act (ESA). The spring-run Chinook salmon is listed as Threatened by the State of California. Critical Habitat was designated by NMFS. Historically, the spring-run Chinook salmon was one of the most abundant and widely-distributed salmon races with Central Valley runs as large as 600,000 fish between the late 1880s and the 1940s (DFG 1998). This race once migrated into headwaters of tributaries to the Sacramento and San Joaquin Rivers but now only exist in the main stem and a few tributaries to the Sacramento River. Gold mining and agricultural diversions caused the first major declines (Moyle et al. 1995) with further extirpations following construction of major water storage and flood control reservoirs on the Sacramento and San Joaquin Rivers and their major tributaries in the 1940s and 1950s (Moyle et al. 1995). Predation on emigrating salmonids at diversion dams, such as Red Bluff Diversion Dam, may also be an important survival factor (Reclamation 1983). Recovery efforts are focused on restoring wild populations by improving stream habitat and outmigration conditions in the rivers and Delta (USFWS 1996).

Spring-run salmon adult migration occurs in the Sacramento River from late March to July. They migrate upstream in the spring and over-summer in cold water habitats and then spawn from August to October, with peak spawning occurring in September. Incubation occurs from mid-August to mid-March, with rearing and emigration occurring from mid-August through April. Chinook salmon require cold, freshwater streams with suitable gravel for reproduction. Females deposit their eggs in nests in gravel-bottom areas of relatively swift water. After emerging, Chinook salmon fry tend to seek shallow, near-shore habitat with slow water velocities and move to progressively deeper, faster water as they grow. Spring-run juveniles frequently reside in freshwater habitat for 12 to 16 months, but many young migrate to the ocean during the spring within five to eight months after hatching. Chinook salmon spend two to four years maturing in the ocean before returning to their natal streams to spawn. All adult salmon die after spawning (Moyle 1976, Allen and Hassler 1986).

Spring-run Chinook are thought to have been present historically in Clear Creek. The spring-run Chinook may have taken advantage of cold water in the upper portions of the watershed prior to being cut off from these areas by Saeltzer Dam in 1903 and Whiskeytown Dam in 1963. The removal of Saeltzer Dam in 2000 allowed re-establishment of Spring-run Chinook by opening up access to cold water below Whiskeytown Dam. The adult spring-run population presently exists in lower Clear Creek at low numbers but appears to be increasing. From 20 to 200 adult spring-run Chinook salmon have been counted in lower Clear Creek annually during the past 8 years (Newton and Brown 2004, M. Brown, pers. comm.). Adult fish migrate through the project area sometime between April and August. The majority of juvenile passage, as measured using rotary screw trap data, occurs in December and January. Lower Clear Creek and the project area are within the designated Critical Habitat for this ESU.

Central Valley Fall-run and Late Fall-run Chinook Salmon

The Central Valley fall-/late fall–run Chinook salmon ESU is a NMFS species of concern. Fall-run Chinook salmon historically inhabited the entire Sacramento-San Joaquin watershed. Current upstream habitat is limited by fish barriers (typically dams) on many streams and rivers. Loss and degradation of spawning and rearing habitat, alteration of stream flows, overharvest, entrainment into water diversions, blockage of migration routes, exposure to toxins, and possibly, loss of genetic viability from interbreeding with hatchery stocks have contributed to population declines. The human-caused factor that perhaps has had the greatest effect on the abundance of all Chinook salmon runs is loss of habitat, primarily in the rivers upstream of the Delta. Major dams block upstream access to most Chinook salmon habitat in Central Valley rivers and streams.

Smaller dams (e.g., the Red Bluff Diversion Dam) in the lower watersheds also delay migration of adults or increase predation on downstream-migrating juvenile salmon (Reclamation 1983). Harvest rates on wild stocks are also a potential cause of population declines. Ocean harvest indices (i.e., percent of population harvested) range from 50 to 79 percent and averaged over 70 percent between 1990 and 1997 (Pacific Fishery Management Council 1998). Recovery efforts are focused primarily on restoring stream habitat, controlling harvest and improving adult and juvenile passage conditions.

Central Valley fall-run Chinook salmon adult migration occurs in the Sacramento River from July through December. The peak of spawning occurs in October and November, incubation occurs from October through March, and rearing and emigration occurs from January through June. A majority of juvenile fish outmigrate within the first few months after emergence, but a small number remain in fresh water and outmigrate the following year. Central Valley late fall-run Chinook salmon overlap the fall-run spawning migration and enter the Sacramento River from mid-October through mid-April. Spawning occurs in the Sacramento River and tributaries from January through mid-April, incubation occurs from January through June, and rearing and emigration occurs from April through mid-December.

Fall-run and late fall-run Chinook are both present in lower Clear Creek. Fall-run adults migrate into Clear Creek from September to December and peak in October. The peak outmigration of juveniles as measured at the USFWS rotary screw trap occurs between mid-January through May. Late fall-run adults migrate from December to March and peak in January. The peak outmigration of juveniles as measured at the USFWS rotary screw trap occurs from mid-April through May. Fall-run spawning escapement has shown a significant increase in the past decade due to restoration activities and increased flows from Whiskeytown Dam

Central Valley Steelhead

The Central Valley steelhead Distinct Population Segment (DPS) is listed as Threatened by NMFS under the federal ESA. Critical Habitat was designated by NMFS, however Essential Fish Habitat (EFH) has not been designated. Steelhead are generally distributed from southern California to the Aleutian Islands. In the Central Valley, naturally producing populations only occur in the Sacramento River and its tributaries. More than 90 percent of the adult steelhead in the Central Valley are produced in hatcheries (Reynolds et al. 1990). Population declines are attributed to blockage from upstream habitats, entrainment from unscreened diversions, hatchery practices, and degraded habitat conditions due to water development and land use practices. Dams at low elevations on all major tributaries block access to an estimated 95 percent of historical spawning habitat in the Central Valley (Reynolds et al. 1993). Recovery efforts are focused on habitat restoration, improving fish passage, and water quality improvements.

Steelhead are generally classified into two races, depending on whether they begin their upstream migration in winter or summer. Winter steelhead typically begin their spawning migration in fall and winter, and spawn within a few weeks to a few months from the time they enter freshwater. Summer steelhead typically enter freshwater in spring and early summer, hold over in deep pools until mature, and spawn in late fall and winter. Steelhead stocks in the Central Valley are considered winter-run steelhead (McEwan and Jackson 1996). Central Valley steelhead adult migration occurs from July through February. Spawning occurs from December through April, and possibly in May in most years in streams with cool, year-round, well-oxygenated water (DFG 1990). Incubation generally occurs from December through April. Juvenile steelhead typically rear for one to two years in streams before emigration, which generally occurs in spring. Steelhead may remain in the ocean from one to four years before returning to natal streams to spawn. Steelhead may spawn more than once and return to the Pacific Ocean between spawning.

Both anadromous (steelhead) and non-anadromous (rainbow trout) forms spawn in Clear Creek. The rainbow trout may reside solely in Clear Creek or may migrate in from the Sacramento River. Rainbow trout may spawn later in the season than steelhead. Spawning occurs in Clear Creek from late December through May with a peak in January. Timing of juvenile emergence in lower Clear Creek ranges from February through July with a peak in April and May. Clear Creek adult steelhead populations have been relatively stable or increasing over from 2001 to 2007 with redd counts ranging from 38 to 163 and averaging 103 per year. Juvenile production from 1999 to 2006 has ranged from 3,700 to 29,500.

Essential Fish Habitat

The Magnuson-Stevens Fishery Conservation and Management Act (MSA) as amended (U.S.Code [U.S.C] 180 et seq.) requires the identification of EFH and the implementation of measures to conserve and enhance habitat with a Fishery Management Plan (FMP), for Federally-managed fishery species that may be adversely affected by a federal action.

EFH is defined as those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. For the purpose of interpreting the definition of essential fish habitat, "waters" includes aquatic areas and their associated physical, chemical, and biological properties that are used by fish, and may include areas historically used by fish where appropriate; "substrate" includes sediment, hard bottom, structures underlying the waters, and associated biological communities; "necessary" means habitat required to support a sustainable fishery and a healthy ecosystem; and "spawning, breeding, feeding, or growth to maturity" covers all habitat types used by a species throughout its life cycle.

The proposed project is within the EFH of "Pacific Salmon". EFH occurs in lower Clear Creek for the Central Valley fall-run and late fall-run Chinook salmon and the Central Valley spring-run Chinook salmon.

3.2.12 Special-status Wildlife

While not as extensive as for special-status fisheries, information is available documenting the presence of special-status wildlife species within significant portions of the watershed. The following special-status wildlife species are known to, or likely to, occur within the project area:

- Bald Eagle (*Haliaeetus leucocephalus*)
- Bank Swallow (*Riparia riparia*)
- Foothill Yellow-legged Frog *(Rana boylii)*
- Little Willow Flycatcher (*Empidonax traillii brewsteri*)
- Northwestern Pond Turtle *(Actinemys marmorata marmorata)*
- Pacific Fisher *(Martes pennanti pacifica*)
- Valley Elderberry Longhorn Beetle *(Desmocerus californicus dimorphus)*
- Western Yellow-billed Cuckoo (*Coccyzus americanus*)

One federally Threatened wildlife species, the northern spotted owl *(Strix occidentalis caurina,)* is known to occur within the WNRA. However, no spotted owl activity centers have been located within the lower Clear Creek watershed (NPS 2001). Potential habitat for one additional federally Threatened wildlife species, the California red-legged frog *(Rana aurora draytonii),* is present within the lower Clear Creek watershed. However, recent protocol-level surveys for California red-legged frog within the LCCFRP area failed to detect this species (Bury et al.

2005). For these reasons, these two species are not likely to be present within the project area, and will not be discussed further in this document.

Bald Eagle

The bald eagle is listed as Endangered under the California Endangered Species Act (CESA), and is designated as Fully Protected by DFG. The species was originally listed as Endangered under the federal ESA, was down listed to Threatened in 1995, and was delisted in 2007. Historically, the bald eagle nested throughout California. However, the current breeding distribution is restricted primarily to the mountainous habitats in the northern quarter of the state, in the northern Sierra Nevada, Cascades, and northern Coast Ranges (DFG 1992). Past declines in bald eagle populations are attributed to the effects of the pesticide Dichloro-Diphenyl-Trichloroethane (DDT), lead shot and habitat disturbance, however in California, the number of territories has increased and the species range has expanded (DFG 2005). Recovery efforts have focused on the protection of nesting areas and restrictions on the use of DDT.

The bald eagle is a large bird of prey that winters throughout California. They nest in the upper canopy of large trees normally in mountain and foothill habitats near rivers, streams and reservoirs. They forage opportunistically on fish and waterfowl but also prey on other small animals and eat carrion (DFG 2005). Bald eagles winter along rivers, lakes, or reservoirs that support adequate fish or water bird prey and have mature trees or large snags available for perch sites. Bald eagles often roost communally during winter, typically in mature trees or snags with open branching structures that are isolated from human disturbance. Bald eagles occasionally occur within the lower Clear Creek corridor, however use of the area consists of foraging and roosting, mainly during the fall and winter. Currently, the nearest known bald eagle nesting location is located in the headwaters of the south fork of Dog Gulch drainage.

Bank Swallow

The bank swallow is listed as Threatened under CESA. The bank swallow historically occurred along the larger lowland rivers throughout California, with the exception of southern California, where the species occurred principally along the coast and at the mouths of large rivers such as the Los Angeles River (Humphrey and Garrison 1987, Laymon et al. 1988). This species has now been extirpated from southern California and its range has been reduced by 50 percent since 1900 (Laymon et al. 1988, DFG 1997). It is currently confined to the Sacramento River above the town of Colusa and is scattered in colonies in northern California. Bank swallow declines have been attributed to the elimination of nesting habitat due to channelization of rivers and flood control projects, particularly rip-rapping of natural stream banks (DFG 2005). Recovery efforts are focused on preserving habitat and restoring naturally meandering riverine ecosystems.

The bank swallow is a neotropical migrant species that winters in South America. It arrives in California in mid-March, with numbers of birds peaking in May (Humphrey and Garrison 1987, Laymon et al. 1988). They are a colonial nesting species that burrows into fine-textured vertical stream banks to construct their nests (Zeiner, et. al. 1990a). The bank swallow breeds and lays a clutch of four to five eggs in April. The young hatch in May, and two to three young are fledged by July each year in a single breeding attempt. The adults and young of the year remain along the riverbanks until they migrate in fall. They forage by hawking insects during flight, feeding primarily over water and riparian areas. Gravel extraction sites, such as those along Cache Creek in Yolo County, are sometimes used for nesting. Bank swallows have been observed foraging within the project area during avian surveys conducted by Point Reyes Bird Observatory Conservation Science (PRBO) (Burnett and Rogner 2006). No bank swallow nesting colonies have been observed within, or near the project area, however the species may breed in the lower Clear Creek watershed (Burnett and Rogner 2006).

Foothill Yellow-legged Frog

The foothill yellow-legged frog is listed as a Sensitive Species by the USFS Pacific Southwest Region and California BLM. The foothill yellow-legged frog historically occurred in most Pacific drainages from the Oregon border to the San Gabriel River drainage in Los Angeles County (Jennings and Hayes 1994). The current distribution of the foothill yellow-legged frog is the Coast Range and the Transverse Mountains in Los Angeles County, the western side of the Sierra Nevada, and in most of northern California west of the Cascade crest (Zeiner et al. 1988). Introduced predatory aquatic species such as fish and bullfrogs, poorly timed water releases from reservoirs, and decreased water flows that force adults to move into permanent pools where they are more susceptible to predation, have contributed to the decline of this species throughout the rest of its range (Jennings and Hayes 1994).

Habitat requirements for the foothill yellow-legged frog include shallow, flowing streams with at least cobble-size substrate. It is believed that this substrate provides necessary refuge for larval and post-metamorph stages (Jennings and Hayes 1994). In the warmer part of this species' range, individuals may remain active year round, while in colder areas, individuals may become inactive or hibernate (Zeiner et al. 1988). Foothill yellow-legged frogs have been observed in the canyon reach of lower Clear Creek, below Whiskeytown Dam, in the vicinity of the NEED Camp. No foothill yellow-legged frogs have been observed within the LCCFRP area during several special-status species surveys (Reclamation et al. 1999, Bury et al. 2005). Incidental foothill yellow-legged frog observations have been made in the Lower Reach of the project area on occasion (M. Brown pers. comm.), however these animals may have been washed downstream during a flood event as they do not appear to persist in this area.

Little Willow Flycatcher

The little willow flycatcher is a subspecies of willow flycatcher (*Empidonax traillii*) which was listed as endangered under the CESA in 1991. This species is also listed as a Sensitive Species by the USFS Pacific Southwest Region. Historically, the little willow flycatcher was a common nesting species in the Sierra Nevada, Central Valley, and the central and northern Coast Ranges. Now, it is found only in isolated populations in the Sierra Nevada and the Cascade Ranges (Harris et al. 1988, DFG 1997). Reported potential threats to the species include riparian habitat loss, livestock grazing and nest parasitism by brown-headed cowbirds (*Molothrus ater*) (DFG 2005). Recovery efforts have primarily concentrated on preserving and restoring riparian nesting habitat.

The little willow flycatcher nests in dense willow thickets in upper elevations in montane meadows and streams with meadows. The species forages in riparian and meadow habitats during the nesting season. It arrives on the breeding grounds in May and June and departs for South America in August (Harris et al. 1988, Zeiner et al. 1990a). Little willow flycatchers have been regularly observed foraging within the project area during spring and fall migration. No nesting has been observed in the lower Clear Creek watershed, and the species is not believed to nest within the project area (Burnett and Rogner 2006).

Northwestern Pond Turtle

The northwestern pond turtle is a subspecies of the western pond turtle *(Actinemys marmorata)* which is listed as a Sensitive Species by the USFS Pacific Southwest Region. The western pond turtle is the only abundant turtle native to California (Zeiner et al. 1988). It was historically found in most Pacific slope drainages between the Oregon and Mexican borders (Jennings and Hayes 1994). The species is still found in most suitable habitats west of the Sierra-Cascade crest in California, but trends show populations to be declining (Jennings and Hayes 1994). Population declines are attributed to impacts to nesting habitat, nest and juvenile predation by non-native

aquatic species, human-induced predator population increases and historic human overexploitation (Jennings and Hayes 1994). Bury et al.; (2004) captured 114 individual northwestern pond turtles at Whiskeytown during June and August of 2004. Overall population structure showed a wide range of sizes and age classes indicative of a turtle population that is stable and not in decline.

This species inhabits quiet waters of ponds, lakes, streams, etc., where there are rocks or logs for basking and safe underwater retreat areas (Stebbins 1972). They are closely tied to water except when females move overland to lay eggs or when either sex may move overland to upland sites to overwinter. They may overwinter on land or in water but are thought to be more likely to overwinter in water when inhabiting pond habitats. Egg-laying typically occurs in May and June but can occur from late April to early August, while overwintering generally begins in October or November. Hatchlings are thought to overwinter in the nest and emerge to migrate to aquatic habitats the following spring (Jennings and Hayes 1994). Northwestern pond turtles are known to occur throughout the lower reaches of lower Clear Creek and have been observed in the canyon reach, in the vicinity of the NEED Camp.

Pacific Fisher

The Pacific fisher is a Candidate for listing under the federal ESA. This species is also listed as a Sensitive Species by the USFS Pacific Southwest Region and California BLM. Fishers may be extirpated from much of their historical range in Washington, Oregon, and California. Threats to this species include fragmentation of forested habitat and loss of structural complexity, riparian habitat and late-seral trees. Trapping at the end of the 19th century severely reduced fisher populations, but the reasons for the lack of recovery in the absence of trapping are unclear.

This medium-sized carnivore inhabits large blocks of dense, late-seral stage coniferous forest with a high number of downed logs. They den in protected cavities and brush piles. Hollow logs, trees, and snags are especially important habitat components. The presence of large deciduous trees, such as oaks, also appears to be important, as well as riparian areas. They range in elevation from near sea level to over 11,000 feet (Williams 1986). Pacific fishers are generally more common in areas of low human density and low human disturbance (Ruggiero et al. 1994). Distribution and populations of fishers are not known within the project area, but the Wildlife Observation Database, dating from the early 1970s to present, reports numerous fisher observations throughout many areas of the WNRA (NPS 2005). It is likely that fishers occur within the upper reaches of the project area.

Valley Elderberry Longhorn Beetle

The VELB is listed as Threatened under the federal ESA. Critical Habitat was designated by USFWS. The VELB is found in scattered populations throughout its historical distribution which includes most of the California Central Valley north to Trinity County, south to San Diego County, and east to San Bernardino County (Barr 1991). Urban and agricultural developments, as well as aggregate mining, have reduced and fragmented the available habitat for the beetle (Barr 1991). Recovery efforts have been focused on protecting three known populations along the American River, Merced River and Putah Creek and protecting remaining habitat within the beetle's suspected historical range.

The beetle's entire life cycle is associated with blue elderberry shrubs in riparian areas connected to California's Central Valley and in the surrounding foothills up to 3,000 feet in elevation in the east and the entire watershed to the west. The adults feed on elderberry foliage and are active from early March through early June. The beetles mate in May and females lay eggs on living elderberry shrubs. Larvae bore through the stems of the shrubs to create an opening in the stem

within which they pupate. After metamorphosing into an adult, the beetle chews a circular exit hole through which it emerges (Barr 1991).

Potential habitat exists within the lower reaches of the project area in the form of elderberry shrubs. Several VELB surveys have been conducted downstream of Clear Creek Road Bridge (Reclamation et al. 1999, WSRCD 2006). Several possible VELB exit holes were observed during one of these surveys. No elderberry shrubs are known to occur within the WNRA below Whiskeytown Dam (NPS 2001). The project area is not located within the designated Critical Habitat for VELB.

Western Yellow-billed Cuckoo

The western yellow-billed cuckoo is a subspecies of yellow-billed cuckoo (*Coccyzus americanus*) which is listed as Endangered under CESA. This subspecies is also listed as a Sensitive Species by the USFS Pacific Southwest Region. The western yellow-billed cuckoo has a smaller range and more restrictive habitat requirements than other subspecies. It breeds in scattered locations where suitable habitat is available throughout California, Idaho, Utah, Arizona, New Mexico, extreme western Texas, and possibly Nevada and western Colorado (Gaines and Laymon 1984). The California breeding range of western yellow-billed cuckoo is restricted to the Sacramento Valley, the South Fork of the Kern River, the Lower Colorado River Valley, and sometimes the Prado Basin in Riverside and San Bernardino Counties. Riparian habitat loss on the breeding grounds is the primary threat to the western yellow-billed cuckoo in California. Riparian habitat loss has resulted from several activities, including agricultural development, flood control projects, reservoir construction, groundwater reduction, urban and suburban development, invasion by non-native vegetation, and long-term intensive year-round cattle grazing. Important temporary losses of riparian habitat also result from wildfires and firewood harvesting. Recovery efforts have primarily concentrated on preserving and restoring riparian nesting habitat.

The western yellow-billed cuckoo is a neotropical migrant species that winters in South America. They breed in broad, well-developed, low-elevation riparian woodlands comprised primarily of mature cottonwoods, willows and blackberry. Nesting sites are restricted to river bottoms and other habitats along slow-moving water courses with high humidity (DFG 2005). The breeding season generally begins with pair formation in mid-June and lasts until mid-August. One individual western yellow-billed cuckoo was observed during avian surveys at Reading Bar in 2004, however, the species is not believed to be breeding in lower Clear Creek at this time (Rogner and Burnett 2007).

Other Sensitive Species

Several other sensitive wildlife species are known to occur within the WNRA including tailed frogs (*Asaphus truei*), northern goshawk (*Accipiter gentilis*), olive-sided flycatcher (*Contopus coope*ri), rufous hummingbird (*Selasphorus rufus*), red-breasted sapsucker (*Sphyrapicus ruber)*, California thrasher (*Toxostoma redivivum*), long-eared myotis bat (*Myotis evotis*), fringed myotis bat (*Myotis thysanodes*), Yuma myotis bat (*Myotis yumanensis*) and the pacific western big-eared bat *(Corynorhinus townsendii townsendii*). The extent to which these species occur within the project area is somewhat unknown.

A number of additional migratory songbird species that are covered under the Migratory Bird Treaty Act migrate through, or nest within, the project area including the yellow-breasted chat (*Icteria virens*) and the yellow warbler (*Dendroica petechia brewsteri*).

3.2.13 Wetlands, Other Waters of the U.S., and Floodplains

The great majority of the project area is composed of jurisdictional waters of the U.S. and associated floodplains. Jurisdictional waters of the U.S. include the stream channels of lower Clear Creek and a number of ephemeral, intermittent and perennial tributaries. Floodplains in the Upper Reach are narrow as a result of the steep canyon landform. Floodplains in the Lower Reach are significantly wider to the valley landform. Historic gold and gravel mining, and the operation of Whiskeytown Dam have significantly affected the stream channels and floodplains in the watershed. Significant portions of the floodplains were altered by gold dredging and placer mining operations resulting in numerous tailing piles with coarse cobble and gravel exposed at the surface. Whiskeytown Dam has resulted in more controlled winter flooding, and a stream channel that has eroded down to bedrock in many areas throughout the project area. This has led to changes in the interactions between the stream channel and associated floodplains, including the increased stability of vegetation along the stream banks and floodplain constriction.

Wetlands are present within the project area, more predominantly in the Lower Reach. Delineations of wetlands and other waters of the U.S. according to U.S. Army Corps of Engineers standards have been conducted for several specific restoration projects within the project area, but have not been conducted for the majority of the project area.

3.2.14 Cultural Resources

Cultural resources consist of archaeological sites, historic structures, cultural landscapes, ethnographic resources, and museum objects. Archaeological sites are the location of a significant event, prehistoric or historic occupation or activity, or a building or structure, whether standing, ruined, or vanished, where the location itself possesses historic, cultural, or archaeological value. Historic structures are material assemblies that extend the limits of human capacity, and comprise such diverse objects as buildings, bridges, monuments, fences, and canals. Cultural landscapes are settings we have created in the natural world. They are intertwined patterns of natural and constructed features that represent human manipulation and adaptation of the land. Ethnographic resources are the basic expression of human culture providing the basis for continuity of cultural systems encompassing both the tangible (native languages, subsistence activities) and intangible (oral traditions, religious beliefs). These can include archaeological sites, old ethnographic village sites, travel routes, fishing and hunting camps, locations of ceremonial significance, and areas traditionally used to gather resources. Museum objects consist of those constructions that are primarily artistic in nature or relatively small in scale. Although objects, by nature or design are moveable, they are associated with a specific setting or environment. No potential impact to museum objects is anticipated by this project and they are not discussed below.

Numerous archaeological inventories have been completed within the WNRA (NPS 2005). Several other investigations have occurred in the lower reaches of the watershed for a number of habitat restoration projects (Moehle 1996, Ritter 1998, Orlins, 1998, Nadolski 1999, Bunse and Wee 1999). However, a significant portion of the project area has not previously been surveyed for cultural resources.

Ethnographic and Historic Background

The proposed project is within the ethnographic boundary of the Wintu Indians. The traditional territory of the Wintu encompasses parts of Shasta, Trinity, Tehama, and Siskiyou counties. The Wintu relied on hunting, gathering, and fishing for a wide variety of resources as they became

seasonally available. The main emphasis for the Wintu people was deer hunting, fishing spring and fall Chinook salmon runs, and fall acorn gathering. Other important resources were elk, bear, rabbit and other small mammals, various birds, fish, insects, buckeye, pine nuts, berries and other plants. The expeditions of Jedediah Smith and Peter Ogden across the northern Sacramento Valley in 1826 and 1827 are the earliest encounters between Wintu and Euro-Americans (LaPena 1978). Further expeditions of Euro-American explorers and fur trappers brought disease to the Wintu people and those living in the Central Valley.

Pierson B. Reading received the Rancho Bueneventura land grant from Mexico in 1844 which included lands in the lower Clear Creek watershed (WSRCD 1996). He made the first gold discovery in Shasta County in 1848 at Reading Bar, just downstream of the present Clear Creek Road Bridge. This discovery led to the settlement of Horsetown in 1849 which grew to a population of 1,000 during the height of the gold rush. Duffy's Ditch brought water from the North Fork of Cottonwood Creek to Horsetown in 1853, which was used for hydraulic mining in the 1850s and 1860s (Nadolski 2000). Dredger mining for gold began in the early 1900s and continued through the 1930s until it was supplanted by aggregate mining of the dredge tailings, which continues to occur (Nadolski 2000).

Archaeological Resources

The Lower Clear Creek Archaeological District consists of six known archaeological sites located in the lower Clear Creek watershed below Whiskeytown Dam. The sites consist of prehistoric habitation areas that include house-pit depressions, midden soils, and associated artifact scatters. The primary significance of the district is in the potential for buried and surface deposits to provide comparative data that may contribute to the understanding of regional cultural prehistory, social organization, and the use of available biotic and abiotic resources. At least three undocumented prehistoric midden deposits are known to occur along the north side of the lower Clear Creek drainage. A report of rock art from the Clear Creek Canyon has been received. Upper reaches contain prehistoric sites as well.

Historic Structures

More recent structures and complexes, including the John F. Kennedy Commemorative Panel, Judge Carr Memorial, NEED Camp, and Central Valley Project features, have been recommended to lack National Register eligibility, often for failing to meet the 50-year minimum age requirement. Bevill and Nilsson (2001), however, recommended that some of these features be considered for significance due to the fact that many would soon be 50 years old, and for relation to bygone trends in local and/or national history. For example, the NEED Camp was born out of the cultural and intellectual renaissance of the 1960s. Implementation of the NEED program led to the construction of many such environmental camps across the nation. Very few of these exist today, and only the NEED Camp, now called the Whiskeytown Environmental School, serves in its original capacity. The Clear Creek Ditch, a water conveyance system, 40-plus miles, constructed in the early 1850s, was evaluated in conjunction with a federal land exchange project east of Whiskeytown and determined to be National Register-eligible (Bevill and Nilsson 2001). The ditch originates in Whiskeytown, and portions of it are maintained through use as a recreational trail. The Clear Creek Ditch is significant in both the scope of the construction implemented and its contribution to the local economy. There are numerous other historic resources that have been documented in the past in the lower Clear Creek vicinity including mining landscapes, cabin locations, ditches, dams, quarries, mines, and historic cultivars.

3.2.15 WNRA Park Operations

Park operations that may be affected by the project include maintenance, law enforcement, and fire and emergency services.

Maintenance
Maintenance staff members are responsible for the care and maintenance of park facilities, infrastructure, and physical and cultural resources. The maintenance staff performs a variety of duties ranging from lakeshore cleaning, swim beach preparation, and placement of floating restroom facilities on the lake to erosion control, hazard tree removal, and brushing of trailside vegetation. Besides these responsibilities, maintenance staff performs the daily functions of emptying trash receptacles, cleaning restrooms, inspecting and maintaining picnic areas and campgrounds, and maintaining water and wastewater systems throughout the park.

Law Enforcement and Fire Management
The Law Enforcement and Fire Management units perform law enforcement, fire management, clerical, fuels crew and engine crew functions. The Fire Unit Module is a shared resource that assists in national wildland and prescribed fire management. Responsibilities of these staff members include search and rescue efforts, emergency medical assistance, assistance with traffic accidents, and fire management. Fire management staff also works with maintenance staff in hazard tree removals, cleanup and repair from storm damage, and with the clearing of brush from trails and roads.

3.2.16 Recreation and WNRA Visitor Use and Experience

Visitor experience is a term used to describe what a visitor senses physically, mentally, and emotionally in a park. A visitor's expectations, impressions, and memories of a park contribute to the overall park experience. How a visitor interacts with the resources, park staff, and other visitors are part of the visitor experience. What recreational opportunities are available, and the quality of park programs, facilities, and services round out the park experience. Visitor safety within the park is critical to an agreeable visit. The overall measure of visitor experience is visitor satisfaction.

While the WNRA was originally focused on lake-based recreational opportunities, the public has expanded their interest and use of off-lake areas of the park. In response to the needs of the recreating public, the park seeks to accommodate those needs. Camping, hiking, fishing, limited hunting, kayaking and access to park lands are an appropriate visitor use and experience goal, consistent with the nationwide mission of the NPS. Approximately 700,000 visitors travel to the WNRA each year to enjoy the natural resources, participate in recreational and educational opportunities, and as a social experience. With the population of the City of Redding and surrounding Shasta County on the increase, more visitors, looking to enjoy the park's natural and cultural resources, can be expected.

The NEED camp is operated cooperatively by the WRNA and the Shasta County Office of Education and is used by about 4,000 students per year, or up to 150 elementary-aged children each week from September through June. The camp has operated for over 30 years and is the principal environmental education facility in the Sacramento Valley. Various other civic and youth groups also use the camp on weekends and during the summer.

BLM lands within the lower Clear Creek corridor also receive substantial public recreational use. This use includes swimming, camping, hiking, fishing, limited hunting, kayaking, gold panning and bird watching. A significant portion of the lands between WNRA and the Sacramento River confluence are managed by BLM and offer recreational opportunities. A recreation survey conducted in 1980 concluded that there were 15,000 recreation user days along lower Clear Creek during the summer months (WSRCD 1996). This survey was conducted prior to the increase in BLM-managed lands along lower Clear Creek when most lands were in private holdings.

3.2.17 Noise

Shasta County is characterized as rural with ambient noise conditions less than 50 decibels acoustic (dBA) (Shasta county 2004). Industrial activity and road traffic along lower Clear Creek (Clear Creek Road) produce sources of noise above background levels that affect ambient conditions. The noise levels increase with proximity to source-generating activities. Whiskeytown Dam is the next source of elevated background levels that affect the ambient conditions.

Noise-sensitive land uses within the range of hearing are described as noise-sensitive areas which are facilities such as residence, hospitals, schools, etc., that are within the range of noise-producing activities. There are several noise-sensitive areas within the range of hearing that may be affected during the construction activities associated with gravel augmentation and in-stream habitat structures. These noise-sensitive areas include the NEED camp, Peltier campground and several residences scattered throughout the canyon rims above the stream corridor.

4.0 ENVIRONMENTAL CONSEQUENCES

4.1 Concept of Impact Analysis

The purpose of this section is to present to the reader an analysis of what impacts can be expected under the two alternatives discussed in this document. Through presenting impact analysis, the reader, and decision-makers, are better prepared to weigh advantages and disadvantages of the alternatives. Both alternatives are evaluated in terms of how the actions proposed will impact the affected environment described above. A description of the methods for determining impacts to an affected environment is listed below, followed by an assessment of the environmental impacts for each alternative. Impacts are measured in terms of type, duration, and intensity.

Type of Impact

- **Adverse:** *Likely to result in unnatural or detrimental changes to the resource.*
- **Beneficial:** *Likely to protect, improve, and/or restore the resource.*

Duration of Impact

- **Short-term:** *Immediate changes to the resource where the effects last one year (season).*
- **Intermediate-term:** *Immediate changes to the resource where the effects last two to five years.*
- **Long-term:** *Immediate changes to the resource where the effects last more than five years.*

Intensity of Impact

- **Negligible:** *Imperceptible or undetectable impacts.*
- **Minor:** *Slightly perceptible, and limited in extent. Without further impacts, adverse impacts would reverse and the resources would recover.*
- **Moderate:** *Readily apparent, but limited in extent. Without further impacts, most adverse impacts would eventually reverse and the resource would recover. The impacts are localized in scale.*
- **Major:** *Substantial, highly noticeable, and affecting a large area. Changes would not reverse without active management. The impacts are landscape-level in scale.*

Mitigation of Impacts

Potential impacts to resources may be reduced to less than significant levels by mitigation measures including one or more of the following:

- **Avoid** conducting management activities in an area of the affected environment.
- **Reduce** the type of impact to an affected environment.
- **Minimize** the duration or intensity of the impact to an affected environment.
- **Repair** localized damage to the affected environment immediately after an adverse impact.
- **Rehabilitate** an affected environment with a combination of additional management activities.
- **Compensation** of a major long-term adverse direct impact through additional strategies designed to improve an affected environment as much as is practical.

4.2 Impairment Summary Statement

The NPS must consider the impacts of each alternative to determine if the described action would lead to an impairment of resources as discussed in the National Park Service Organic Act and the General Authorities Act. This determination applies only to NPS lands. Impairment is an impact that would harm the integrity of park resources or values. Not all impacts constitute impairment and proposed management actions that will result in impairment are not approved. Severity, duration, and timing of the impact help determine whether the integrity of a park resource or value would be irreparably compromised. The NPS has determined that no alternative discussed in this document would result in impairment of a park resource. Impairment disclosures are included in the conclusions for each natural and cultural resource topic within the Environmental Consequences section (4.0).

4.3 Impact Analysis

4.3.1 Air Quality

Alternative A – The Proposed Action

Under this alternative, gravel augmentation projects would produce dust from road construction, gravel hauling and gravel dumping, and exhaust fumes from construction equipment and haul trucks. The Paige Bar augmentation site would produce additional dust and exhaust fumes from heavy equipment during construction activities associated with floodplain modification and gravel sorting. Construction of in-stream habitat structures would produce dust from hauling and exhaust fumes from heavy equipment. Impacts to air quality resulting from implementation of this alternative would be adverse, short-term in duration, and minor in intensity.

Air quality impacts from the picket weir installation, operation and de-installation would be negligible.

The following measures would be implemented to reduce impacts to air quality to less than significant levels:

- Dust-suppression techniques, such as periodically watering unpaved roads and construction sites, will be used to minimize the generation of fugitive dust. Construction equipment will be turned off when not in use and equipment will be kept properly maintained to reduce internal combustion engine exhaust.

Additionally, The NPS has determined that the Proposed Action would not result in impairment, as defined by the National Park Service Organic Act and the General Authorities Act, of air quality. This determination applies only to NPS lands.

Alternative B – No Action
Under this alternative, air quality conditions in the vicinity of the project area would remain the same and would continue to be influenced by local vehicle emissions, industrial activities and climatic conditions.

4.3.2 Geology and Soils

The potential adverse impact to geology and soils is limited to increased erosion and compaction of soils in areas where new road construction and road improvement occur and where floodplain modification construction occurs. There would also be additional potential for increased stream bank erosion from heavy equipment use associated with the construction of temporary stream crossings at some gravel augmentation and in-stream habitat structure sites.

Alternative A - The Proposed Action
Under this alternative, impacts to soils would include increased erosion and sediment delivery to the active lower Clear Creek channel from road construction and grading where roads are re-opened or modified, for the implementation of gravel augmentation and in-stream habitat structures. At the Paige Bar augmentation site, additional impacts to soils would include increases in soil erosion from grading, removing and sifting substrate, and compaction from the use of heavy equipment. These impacts to soils are considered to be adverse, long-term in duration, and minor in intensity.

Impacts from the picket weir installation, operation and de-installation would be negligible.

The following measures would be implemented to reduce impacts to geology and soils to less than significant levels:

- Project designs that involve road modification or re-opening will incorporate Best Management Practices (BMPs) for temporary and permanent soil stabilization, such as outsloping, rolling dips, seeding and mulching, etc.

- Construction areas that are not to be maintained as roads (temporary roads, staging areas etc.), will be decompacted, stabilized and revegetated following construction activities.

Additionally, The NPS has determined that the Proposed Action would not result in impairment, as defined by the National Park Service Organic Act and the General Authorities Act, of geology and soils. This determination applies only to NPS lands.

Alternative B – No Action
Under this alternative, no adverse impacts to geology and soil resources would occur. Soil erosion of existing roads and trail would continue at current levels.

4.3.3 Hydrology and Water Quality

Potential adverse impacts to hydrology are limited to increased flooding from the addition of gravel to lower Clear Creek. Potential adverse impact to water quality is limited to increased turbidity and sedimentation resulting from construction activities associated with gravel augmentation and in-stream habitat structures.

Alternative A - The Proposed Action
Under this alternative, impacts to the hydrology of lower Clear Creek would likely include increased flood flow elevations resulting from the addition of spawning gravel in the channel. The lower Clear Creek designated floodway within the project area is currently undeveloped. While the addition of gravel to the channel will likely slightly increase flood flow elevations, impacts to homes, structures, roads etc., are not likely to occur. The recharging of a gravel substrate and resulting increased inundation of floodplains represents restoration of a stream channel condition and alluvial function that was present prior to the construction of Whiskeytown Dam. These impacts to hydrology are considered to be beneficial, long-term in duration, and minor in intensity.

Potential impacts to water quality would include increased turbidity and sedimentation. Road construction and temporary stream crossings for gravel augmentation and in-stream habitat structures have potential adverse effect to water quality from erosion of road surfaces or the direct placement of soil into flowing waters. Gravel augmentation would result in increased turbidity as gravel is placed into flowing waters. Additional water quality impacts from the Paige Bar floodplain modification site include increased turbidity and sediment delivery into the active channel from adjustments of the disturbed floodplain surface during winter high-flows following construction. These impacts to water quality are considered to be adverse, short-term, and minor in intensity.

Impacts from the picket weir installation, operation and de-installation would be negligible.

The following measures would be implemented to reduce impacts to water quality to less than significant levels minimize impacts to water quality:

- Construction activities shall be implemented in full compliance with the Water Quality Control Plan (Basin Plan) and in consultation with the Central Valley Regional Water Quality Control Board.

- Equipment shall not be operated in flowing stream channels except as may be necessary to construct stream crossings and place in-stream habitat structures and spawning gravel. When work in flowing stream channels is unavoidable, clean spawning gravel will be used to create a pad for the equipment in the channel. Temporary stream crossings shall be constructed of clean spawning gravel. Construction of the footing shall proceed in a manner that minimizes sediment discharge. After placement, the spawning gravel will be

removed from the stream channel or spread evenly to blend in with existing placed gravels.

- Spawning gravel shall be clean, washed gravel with a cleanness value allowing basin water quality standards to be maintained during placements (Caltrans Test # 227).

Additionally, The NPS has determined that the Proposed Action would not result in impairment, as defined by the National Park Service Organic Act and the General Authorities Act, of hydrology and water quality. This determination applies only to NPS lands.

Alternative B – No Action
Under alternative B, no impacts to water quality would occur. Water quality would continue to be influenced by existing factors in the watershed.

4.3.4 Hazardous Materials

Placer and hydraulic mining for gold was conducted in lower Clear Creek in the late 1800's. As a result of these activities potentially large amounts of elemental mercury may have been released in to the watershed. Over time, this elemental mercury may have formed inorganic salts or methylmercury, or may have migrated either downward through the gravels, or downstream via natural sediment transport mechanisms. The impacts associated with the potential introduction and mobilization of mercury from the implementation of gravel augmentation and in-stream habitat structures, and potential subsequent hazard to the biological and human environment, are considered to be negligible. Studies in Clear Creek have shown that most mercury is associated with very small particles which would be removed by washing. All spawning gravel will be dry sorted to remove particles less than 3/8-inch in diameter and be washed at least once to remove residual fine particles. Floodplain work at the Paige Bar augmentation site will occur in an area where no dredge tailings are present.

The operation of motorized construction equipment and trucks use to haul gravel would increase the risk of discharging hazardous materials such as fuel, oil, and hydraulic fluids into the environment, including aquatic systems. This potential impact would be adverse. The duration and intensity would depend on the type of material, and the location and amount of the discharge.

Impacts from the picket weir installation, operation and de-installation would be negligible.

In addition to the measures identified to reduce impacts to water quality to less than significant levels the following measures would be implemented to reduce the risk of exposing humans the physical, biological and human environment to hazardous materials:

- Prior to site-specific construction activities, a Spill Prevention, Control and Countermeasures Plan (SPCCP) will be prepared. The SPCCP will include on-site handling rules to keep construction and hazardous materials out of waterways and drainages.

- All equipment refueling and maintenance will be restricted to designated equipment staging areas, located away from streams and other sensitive habitats.

4.3.5 Aesthetics

Alternative A – The Proposed Action
Under this alternative, in-stream habitat structures and gravel augmentation may be placed within the stream reach determined to be eligible as a component of the National Wild and Scenic Rivers System. Habitat structures and riffle supplementation gravel augmentations are difficult to assess, whether they are natural or man-made, due to the fact that they are constructed of natural materials (rock and logs). No talus cone gravel augmentation methods will be implemented within this stream reach. One talus cone project would be implemented at the Placer Bridge site. However, this site is located on private land, and is therefore not included in the National Wild and Scenic Rivers System. Temporary impacts to the aesthetic character of the Upper Reach of the project area would occur as a result of noise and visual impacts during construction activities. Impacts to aesthetics within this Upper Reach are considered to be adverse, short-term, and moderate in intensity.

Temporary impacts to the aesthetic character of the Lower Reach of the project area would also occur as a result of noise and visual impacts during construction activities associated with gravel augmentation and in-stream habitat actions. Visual impacts would also occur from the operation of the picket weir. Because of the moderate aesthetic quality of the Lower Reach of the project area, impacts to aesthetics are considered to be adverse, short-term, and minor in intensity.

The following measures would be implemented to reduce impacts to aesthetics to less than significant levels:

- All in-stream habitat structures implemented within the stream reach determined to be eligible as a component of the National Wild and Scenic Rivers System will be designed to ensure that the structures, and any utilized access routes, do not compromise the aesthetic quality of this area.

Alternative B – No Action
Under alternative B, no impacts to the aesthetic character of the project area would occur.

4.3.6 Vegetation, Plant Communities and Habitat Types

Potential impacts to the vegetation and habitat types within the proposed project may result from: re-opening access roads to the stream and floodplain, removal of vegetation, non-native species introduction and spread, and erosion.

Alternative A – The Proposed Action
Under this alternative, impacts to vegetation and plant communities would occur as a result of re-opening or widening roads to gain access to the creek to implement gravel augmentation and in-stream habitat structures. These impacts would occur primarily to upland plant communities, however some impacts to aquatic vegetation communities would occur at stream crossings and at gravel and in-stream habitat placement locations. These impacts to vegetation and plant community resources are considered to be adverse, short-term in duration, and minor in intensity.

At the Paige Bar gravel augmentation/floodplain lowering site, all vegetation and plant communities that are within the construction footprint will be removed. These impacts will occur primarily to riparian vegetation. The purpose of this action is to restore floodplain function to a site that has been impacted by riparian encroachment due to the construction of Whiskeytown

Dam. Impacts to vegetation and plant communities under this alternative are considered to be adverse and of moderate intensity in the short-term. However, in the long-term impacts will be beneficial and moderate in scale since floodplains will be replanted with native riparian vegetation.

Therefore, the overall impacts are considered to be beneficial, long-term in duration and moderate in intensity.

Impacts from the picket weir installation, operation and de-installation would be negligible.

The following measures would be implemented to reduce impacts to vegetation, plant communities and habitat types to less than significant levels:

- Impacts to existing vegetation will be avoided to the extent practical.

- Disturbed areas, not intended for future road access or gravel placement, will be revegetated with native plant species and/or mulched with certified weed-free hay following the completion of construction activities.

Additionally, The NPS has determined that the Proposed Action would not result in impairment, as defined by the National Park Service Organic Act and the General Authorities Act, of vegetation, plant communities and habitat types. This determination applies only to NPS lands.

Alternative B – No Action
Under this alternative, impacts to vegetation and plant communities would not occur.

4.3.7 Sensitive Plant Species

Alternative A – The Proposed Action
Under this alternative, impacts to sensitive plant species may occur from ground disturbing activities if sensitive plants were present within the project boundaries. The project area is a dynamic system and plant species occurrences may change over time. If sensitive plant species are discovered within or near the project area, but avoidance measures are successfully implemented, impacts would be negligible. If sensitive plant populations can not be avoided, other mitigation measures such as transplanting may occur. If mitigation is necessary, impacts would be considered adverse, short-term in duration, and moderate in intensity.

Some beneficial impacts may occur for Shasta County Arnica as a result of road construction as it is known to colonize areas that have been disturbed, particularly on north facing aspects. These beneficial impacts will likely be negligible and long-term in duration.

Impacts from the picket weir installation, operation and de-installation would be negligible.

The following measures would be implemented to reduce impacts to sensitive plant species to less than significant levels:

- Prior to commencing site-specific activities associated with any of the gravel augmentation or in-stream habitat sites, a WNRA or BLM botanist will survey the site for sensitive plant species. The survey will include all areas that will be directly and indirectly impacted. Any sensitive plant species discovered will be clearly flagged and

avoided when possible. If avoidance is impossible, the responsible agency will be consulted and measures to avoid or minimize impacts, such as transplantation, will be examined. Mitigation measures will need to be approved by the responsible agency before the project can proceed.

Additionally, The NPS has determined that the Proposed Action would not result in impairment, as defined by the National Park Service Organic Act and the General Authorities Act, of sensitive plant species. This determination applies only to NPS lands.

Alternative B – No Action
Under this alternative, impacts to sensitive plant species would not occur.

4.3.8 Invasive Plant Species

Alternative A – The Proposed Action
Under this alternative, nonnative and invasive plant species could potentially be introduced to the project area. Invasives could also be spread by movement from one location to another within the project area, as construction activities would provide disturbed areas that invasive plant species may colonize. Invasive plant seeds and plant tissues could be transported by equipment, and it is unlikely that this impact can be completely avoided. Impacts would likely be adverse, intermediate-term in duration and moderate in intensity.

The following measures would be implemented to reduce impacts from invasive plant species to less than significant levels:

- All equipment used for the project will be thoroughly washed off-site to remove invasive plant seed, stems, etc. prior to arriving at the construction area. If construction involves work at two or more separate locations along the creek and project area, when possible, equipment will be thoroughly cleaned after completing work at one location, before proceeding to the next location. This will minimize the dissemination of noxious or invasive plant species within the project area.

- All areas disturbed by project implementation should be monitored for recruitment and regeneration of invasive weeds for a minimum of one year. If recruits or stimulated regeneration is discovered, control measures will be implemented as soon as possible.

- Nonnative and invasive plant species will be surveyed and mapped before work commences. Significant infestation will be treated prior to beginning work in order to prevent the transport of nonnative and invasive plant species throughout the project area.

- All areas with significant soil disturbance will be mulched with certified weed-free mulch.

Additionally, The NPS has determined that the Proposed Action would not result in impairment, as defined by the National Park Service Organic Act and the General Authorities Act, of park natural or cultural resources due to introduction of invasive plant species. This determination applies only to NPS lands.

Alternative B – No Action
Under this alternative, the level of introduction, spread, and density patterns of invasive plant species will occur consistent with current levels.

4.3.9 Ecologically Critical Areas

The following Ecologically Critical Area could be affected by the actions described in this EA.

Riparian Habitats

Alternative A – The Proposed Action
Under this alternative, re-opening of roads would require some removal and trimming of riparian vegetation where proposed roads are located near streams. Gravel augmentation sites and access for placement of habitat structures may require some riparian habitat removal. This impact would be minimized by locating areas along the stream margin where riparian vegetation is sparse or natural gaps occur. Impacts to riparian habitats would be adverse, intermediate-term in duration, and minor in intensity.

The floodplain lowering at the Paige Bar site would require removal of riparian vegetation within the construction area in order to restore a functional floodplain. Disturbed areas of existing vegetation outside the modified floodplain will be re-planted with native vegetation. Impacts to riparian habitat associated with this activity are considered adverse, intermediate in duration and moderate in intensity. However, in the long-term impacts will be beneficial and moderate in scale since floodplains will be replanted with native riparian vegetation. Therefore, the overall impacts are considered to be beneficial, long-term in duration and moderate in intensity.

On March 30, 2007, the U.S. District Court in Pacific Coast Fed. Of Fishermen's Assn. et al. v. Natl. Marine Fisheries Service, et al., Civ. o. 04-1299RSM (W.D. Wash) (PCFFA IV) found deficiencies in the biological opinions and the supplemental environmental impact statement regarding the amendment to clarify the Aquatic Conservation Strategy (ACS) of the Northwest Forest Plan. This requires management to conform with the 1994 ROD. As such, the following provides analysis of conformance with the ACS as required with B-10 of the Record of Decision (ROD).

The riparian and wetland assessment determination concluded that the project area will encompass riparian and wetland areas. Although impacts to the riparian have been identified as adverse, intermediate-term in duration and minor in intensity, the long term results of the action will be beneficial, and moderate in scale. Overall it has been determined that the overall impacts are considered to be beneficial, long-term in duration and moderate in intensity. The implementation of the project specifications will ensure that impacts within the riparian reserve boundary will be a short term impact it will not prevent or retard the attainment of ACS objectives. The project measures ensure that the proposed action maintains and improves the existing conditions in the long term and 'meets' the intention of the ACS.

Impacts from the picket weir installation, operation and de-installation would be negligible.

The measures identified to reduce impacts to vegetation, plant communities and habitat types to less than significant levels would also be expected to minimize impacts to riparian habitat.

Alternative B – No Action
Under this alternative, no impacts to riparian habitats would occur. In this dynamic system, riparian habitats would continue to establish and be removed by scouring stream flows consistent with current environmental conditions.

4.3.10 Special-status Fish

Central Valley Spring-run Chinook salmon

Alternative A – The Proposed Action
The primary purpose of the proposed action is to restore and manage habitat for anadromous fish, including spring-run salmon. Under this alternative, spring-run Chinook salmon spawning and rearing habitat could be impacted if significant amounts of turbidity and sediment from construction and grading were delivered to Clear Creek. Sediment and turbidity impacts, depending on the time frame, would likely be adverse, short-term in duration and minor in intensity.

Adult and juvenile fish could be harmed or killed by in-stream construction activities. Spring-run salmon redds could be destroyed if buried by placed spawning gravel. Impacts could also occur if stream crossings blocked or restricted upstream or downstream fish passage. These potentially adverse impacts would be avoided and/or minimized by restricting construction activities to times of the year when fish and/or redds are not present. Spring-run salmon redds could also be negatively impacted by fine sediments present in placed gravel. To avoided this impact, all gravel must be washed at least once and have a cleanliness value allowing basin water quality standards to be maintained. The overall impacts to spring-run Chinook salmon as a result of implementing gravel augmentation and in-stream habitat structures are considered to be beneficial, long-term and major in intensity. Beneficial impacts would result from an increase in quantity and quality of spawning habitat consisting of a gravel size composition preferred by salmonids with low amounts of fine sediments. The CVPIA anticipates placing up to about 25,000 tons of spawning gravel annually over the next ten years. It's expected that residence time of injected gravel will be 10-20 years allowing use by spawning salmonids over a long period of time.

The operation of the picket weir is likely to block upstream passage of some adult spring-run salmon. Although the intent of the picket weir is to separate the greatest percentage of spring-run salmon from fall-run salmon in order to prevent superimposition and hybridization, some spring-run do not make it upstream past the weir location before it is constructed. In 2006, the weir was moved approximately 0.7 miles downstream from the Reading Bar location to increase the proportion of the spring-run population above the weir. The weir had been installed at the Reading Bar location for the previous three years. Snorkel observations immediately prior to the closing of the weir revealed that 14 percent in 2004, and 20 percent in 2005, of the spring-run population were holding in a large pool located between the former and currently-used weir sites. Snorkel surveys in June 2006 indicated that 13 percent of the spring-run population was holding in the pool. Impacts to spring-run salmon that remain downstream of the weir, after weir installation, are considered to be adverse, long-term in duration and moderate in intensity due to potential hybridization and redd superimposition impacts. The overall impacts to spring-run Chinook salmon are considered to be beneficial, long-term in duration and major in intensity.

In addition to the measures identified to reduce impacts to water quality to less than significant levels, the following measures would be implemented to reduce impacts to Central Valley spring-run salmon to less than significant levels:

- All stream crossings will be designed to ensure that conditions are maintained for effective upstream and downstream fish passage, at all times and all flow conditions.

- To avoid and minimize impacts to spawning and rearing anadromous fish, gravel augmentation and in-stream habitat structures will be implemented according to the following timing restrictions:

  - Zone 1 (Whiskeytown Dam to approximately ¾-mile downstream of Whiskeytown Dam): Work may be conducted at any time of year.

  - Zone 2 (approximately ¾-mile downstream of Whiskeytown Dam to the USFWS picket weir location): Work may be conducted from November 1 to November 30, or from May 1 to August 31. Pre-project redd surveys will be conducted if work is to be implemented from November 1 to November 30 to ensure that redds are not impacted.

  - Zone 3 (USFWS picket weir location to the Sacramento River): work may be conducted from June 1 to September 30.

Additionally, The NPS has determined that the Proposed Action would not result in impairment, as defined by the National Park Service Organic Act and the General Authorities Act, of Central Valley spring-run Chinook salmon. This determination applies only to NPS lands.

Alternative B – No Action

Under this alternative, potential impacts to spring-run Chinook salmon would not occur from potential sediment delivery to the stream, in-stream construction activities and gravel placement. In addition, spawning and rearing habitat would not be restored and enhanced by gravel augmentation and in-stream habitat structures. Spawning opportunities would rely on current, and continually depleting, gravel supplies. Impacts to spring-run Chinook salmon under this alternative would be adverse, long-term and major in intensity.

Under this alternative, the potential deterrent to upstream migration would not occur, however the risk of hybridization and/or superimposition between spring-run and fall-run salmon would increase. Impacts to spring-run Chinook salmon under this alternative would be adverse, long-term and major in intensity.

Central Valley Steelhead

Alternative A – The Proposed Action

Under this alternative, the adverse and beneficial impacts to Central Valley steelhead from the implementation of gravel augmentation and in-stream habitat structures would be similar to the impacts to Central Valley spring-run salmon. The overall impacts to steelhead are considered to be beneficial, long-term in duration and major in intensity.

The USFWS has been conducting surveys to determine if there are any adverse effects on steelhead migration from the installation of the picket weir. In 2003 and 2004, snorkel surveys were carried out three to four times per week in the downstream vicinity of the weir. The maximum number of steelhead observed holding below the weir was two in 2003, and three in 2004. Based upon these results, in 2005 monitoring efforts were reduced to biweekly snorkel

surveys. The maximum number of large steelhead trout observed in the downstream vicinity of the weir during a survey after closure of the weir in 2005 was one. In all years, steelhead were not observed aggregating below the weir and few were in the creek during the time of the weir operation.

Adult steelhead that encounter the weir could potentially experience temporary migration delays. These delays are not expected to interfere or prevent steelhead from successfully spawning because the weir will be removed 1.5 months prior to the onset of steelhead spawning and there is adequate spawning habitat in the vicinity of the weir. Steelhead that are temporarily delayed are not expected to experience any adverse effects below the weir because mean daily water temperatures at the time will range between 50° and 61° F, a level that is within the suitable range for steelhead migration. Based on this information, the impacts from the picket weir installation, operation and de-installation on Central Valley steelhead would be negligible.

The measures identified to reduce impacts to Central Valley spring-run salmon and water quality to less than significant levels would also be expected to reduce impacts on Central Valley steelhead to less than significant levels.

Additionally, The NPS has determined that the Proposed Action would not result in impairment, as defined by the National Park Service Organic Act and the General Authorities Act, of Central Valley steelhead. This determination applies only to NPS lands.

Alternative B – No Action
Under this alternative, the adverse and beneficial impacts to Central Valley steelhead from the implementation of gravel augmentation and in-stream habitat structures would be similar to the impacts to Central Valley spring-run salmon. The impacts of not operating the picket weir would be negligible.

Central Valley Fall-run and Late Fall-run Chinook Salmon

Alternative A – The Proposed Action
Under this alternative, the adverse and beneficial impacts to Central Valley fall-run and late fall-run Chinook salmon from the implementation of gravel augmentation and in-stream habitat structures would be similar to the impacts to Central Valley spring-run salmon. The overall impacts to fall-run and late fall-run salmon are considered to be beneficial, long-term in duration and major in intensity.

The operation of the picket weir interrupts and effectively blocks upstream passage of some adult fall-run salmon. This represents a loss of spawning habitat for some fall-run salmon. USFWS estimates that less than two percent of the total fall-run population migrates upstream of the natural partial barrier, located approximately one river mile downstream of the current weir location. There is sufficient spawning habitat in the area downstream of the weir for the small number of fall-run that migrate into this reach. Placement of the weir would also prevent the negative impacts of hybridization on fall-run. Late fall-run salmon are generally not present in the lower Clear Creek system during the period when the weir is in place. Based on this information, the impacts from the picket weir installation, operation and de-installation on Central Valley fall-run salmon are considered to be adverse, long-term in duration and minor in intensity.

The measures identified to reduce impacts Central Valley spring-run salmon and water quality to less than significant levels would also be expected to reduce impacts on Central Valley fall-run and late fall-run Chinook salmon to less than significant levels.

Additionally, The NPS has determined that the Proposed Action would not result in impairment, as defined by the National Park Service Organic Act and the General Authorities Act, of Central Valley fall-run and late fall-run Chinook salmon. This determination applies only to NPS lands.

Alternative B – No Action
Under this alternative, the adverse and beneficial impacts to Central Valley fall-run and late fall-run Chinook salmon from the implementation of gravel augmentation and in-stream habitat structures would be similar to the impacts to Central Valley spring-run Chinook salmon.

Under this alternative, approximately two percent of the fall-run salmon population would be able to access additional spawning habitat above the current picket weir location which would result in a potential increase in fall-run salmon population numbers. These impacts are considered to be beneficial, long-term in duration and moderate in intensity for fall-run Chinook salmon.

4.3.11 Special-status Wildlife

Much of the project area has not been surveyed for special-status wildlife species. Because the project area is a dynamic system, wildlife and fisheries populations and occurrences may change over time. In addition to the species-specific measures outlined below, the following measures would be implemented to reduce impacts to less than significant to special-status species:

- Prior to commencing with site-specific gravel augmentation and in-stream habitat structure work, project sites will be surveyed and cleared by WNRA or BLM Biologists, regarding special-status wildlife species issues.

Additionally, The NPS has determined that the Proposed Action would not result in impairment, as defined by the National Park Service Organic Act and the General Authorities Act, of special-status wildlife species. This determination applies only to NPS lands.

Bald Eagle

Alternative A – The Proposed Action
The Clear Creek riparian corridor provides both foraging and perching habitat for bald eagles. Under this alternative, construction activities associated with gravel augmentation and in-stream habitat structures could temporarily alter foraging activities throughout the project area; however, this impact would be considered less than significant based on the abundance of suitable foraging habitat in the vicinity of the project area. No long-term impediments to foraging habitat associated with the proposed action are anticipated. The loss of potential perch trees would not affect the species use of the Clear Creek riparian corridor for foraging habitat. Impacts to nesting activities are not anticipated due to the fact that the project area is greater than ½-mile from any known, historic bald eagle nest sites. These impacts to bald eagles from gravel augmentation and in-stream habitat structures are considered to be negligible.

The implementation of spawning gravel augmentation and in-stream habitat structures is expected to restore aquatic habitat, thereby increasing fish populations, which would result in increased foraging opportunities for bald eagles. These impacts to bald eagles from gravel augmentation and in-stream habitat structures are considered to be beneficial, long-term in duration, and moderate in intensity.

Impacts from the picket weir installation, operation and de-installation on bald eagles would be negligible.

Alternative B – No Action
Under this alternative, there would be no impacts to bald eagles.

Bank Swallow

Alternative A – The Proposed Action
Under this alternative, construction activities associated with gravel augmentation and in-stream habitat structures could alter bank swallow foraging activities throughout the project area; however, this impact would be considered less than significant based on the abundance of suitable foraging habitat in the vicinity of individual proposed actions or the project area. No long-term impediments to foraging habitat associated with the proposed action are anticipated. Impacts to nesting activities are not anticipated due to the fact that bank swallows are not known to nest in lower Clear Creek. These impacts to bank swallows from gravel augmentation and in-stream habitat structures are considered to be negligible.

The implementation of spawning gravel augmentation is expected to restore aquatic habitat, thereby increasing aquatic invertebrate populations, which would result in increased foraging opportunities for bank swallows. These impacts to bank swallows from gravel augmentation are considered to be beneficial, long-term in duration, and moderate in intensity.

Impacts from the picket weir installation, operation and de-installation on bank swallows would be negligible.

Alternative B – No Action
Under this alternative, there would be no impacts to bank swallows.

Foothill Yellow-legged Frog

Alternative A – The Proposed Action
Under this alternative, in-stream construction activities associated with gravel augmentation and in-stream habitat structures in the Upper Reach could harm or kill foothill yellow-legged frogs. These impacts to foothill yellow-legged frogs from gravel augmentation and in-stream habitat structures are considered to be adverse, short-term in duration, and minor in intensity.

The implementation of spawning gravel augmentation is expected to restore a gravel and cobble substrate which would result in an increase in habitat for foothill yellow-legged frogs. These impacts to foothill yellow-legged frogs from gravel augmentation are considered to be beneficial, long-term in duration, and minor in intensity.

Impacts from the picket weir installation, operation and de-installation on foothill yellow-legged frogs would be negligible.

Alternative B – No Action
Under this alternative, there would be no impacts to foothill yellow-legged frogs.

Little Willow Flycatcher

Alternative A – The Proposed Action
Under this alternative, construction activities associated with gravel augmentation and in-stream habitat structures could alter little willow flycatcher foraging activities during spring and fall migration; however, this impact would be considered less than significant based on the abundance of suitable foraging habitat in the vicinity of individual proposed actions or the project area. Impacts to nesting activities are not anticipated due to the fact that the little willow flycatcher are not known to nest in lower Clear Creek. These impacts to the little willow flycatcher from gravel augmentation and in-stream habitat structures are considered to be negligible.

The implementation of spawning gravel augmentation is expected to restore aquatic habitat, thereby increasing aquatic invertebrate populations, which would result in increased foraging opportunities for little willow flycatchers. These impacts to little willow flycatchers from gravel augmentation are considered to be beneficial, long-term in duration, and minor in intensity.

Impacts from the picket weir installation, operation and de-installation on little willow flycatchers would be negligible.

Alternative B – No Action
Under this alternative, there would be no impacts to little willow flycatchers.

Northwestern Pond Turtle

Alternative A – The Proposed Action
Under this alternative, in-stream construction activities associated with gravel augmentation and in-stream habitat structures in the Upper Reach could harm or kill northwestern pond turtles. These impacts to northwestern pond turtles from gravel augmentation and in-stream habitat structures are considered to be adverse, short-term in duration, and moderate in intensity. The nearby robust population at Whiskeytown Reservoir will also ensure recruitment.

Impacts from the picket weir installation, operation and de-installation on northwestern pond turtles would be negligible.

Alternative B – No Action
Under this alternative, there would be no impacts to northwestern pond turtles.

Pacific Fisher

Alternative A – The Proposed Action
For the Pacific fisher, the Fish and Wildlife Service authors of the twelve month status review for the pacific fisher noted that "the Northwest Forest Plan (NWFP) embodies ecosystem objectives which are expected to contribute substantially to the restoration and protection of suitable habitat for fishers on Federal lands in the plan area" (FWS, 2004). Impacts to fishers under this alternative would primarily be limited to disturbance during construction associated with gravel augmentation and in-stream habitat structures. Habitat modification due to construction would be extremely minimal and small in scale, as the components important to fisher habitat such as large trees, snags, denning sites, and riparian habitat would be retained. Fisher habitat would be retained except for some riparian vegetation along the stream margin in the footprint of the floodplain modification. No habitat structures are present that are large enough within the construction area that would otherwise be used for denning or as rest sites. Although, impacts to

fishers from gravel augmentation and in-stream habitat structures are considered to be adverse, short-term in duration, and minor in intensity, the system of existing late-successional reserves, riparian reserves and other guidelines as specified under the Northwest Forest Plan, in combination with site and project specific conservation measures as specified in this document significantly reduce the probability that any given action would so significantly affect the fisher population in the area that it would require the FWS to alter the current priority for the listing of the Pacific Fisher.

Alternative B – No Action
Under this alternative, impacts to fishers will remain at current levels, which are likely limited to minimal disturbance due encounters with recreational users of the project area.

Valley Elderberry Longhorn Beetle

Alternative A – The Proposed Action
Under this alternative, construction activities associated with gravel augmentation and in-stream habitat structures could harm or kill VELB or impact potential VELB habitat. Surveys will be conducted as necessary, and elderberry plants will be completely avoided in accordance with the USFWS conservation guidelines (USFWS 1999), to ensure a "no affect" determination.

The following measures would be implemented to ensure no affects to VELB will occur:

- Prior to commencing with site-specific activities associated with any of the gravel augmentation or in-stream habitat sites, a BLM biologist will survey the site for elderberry shrubs and ensure that any identified potential VELB habitat is completely avoided.

Impacts from the picket weir installation, operation and de-installation on VELB would be negligible.

Alternative B – No Action
Under this alternative, there would be no impacts to VELB or potential VELB habitat.

Western Yellow-billed Cuckoo

Alternative A – The Proposed Action
Under this alternative, construction activities associated with gravel augmentation and in-stream habitat structures could alter western yellow-billed cuckoo foraging activities in the Lower Reach of the project area; however, this impact would be considered less than significant based on the abundance of suitable foraging habitat in the vicinity of individual proposed actions or the project area. Impacts to nesting activities are not anticipated due to the fact that western yellow-billed cuckoos are not known to nest in lower Clear Creek. These impacts to the western yellow-billed cuckoo from gravel augmentation and in-stream habitat structures are considered to be negligible, and will not contribute to the need to list the species

Impacts from the picket weir installation, operation and de-installation on western yellow-billed cuckoos would be negligible.

Alternative B – No Action
Under this alternative, there would be no impacts to western yellow-billed cuckoos.

Other Species of Concern

Alternative A – The Proposed Action
Under this alternative, some impacts to other species of concern such as migratory songbirds would occur during construction activities related to gravel augmentation and in-stream habitat structures. Impacts would primarily involve altering foraging activities away from construction activities; however, this impact would be considered less than significant based on the abundance of suitable foraging habitat in the vicinity of individual proposed actions or the project area, accordingly these impacts are considered negligible. Construction activities associated with gravel augmentation and in-stream habitat structures, particularly the vegetation removal at the Paige Bar gravel augmentation site, could destroy active songbird nests. These impacts are considered to be adverse, intermediate-term in duration, and moderate in intensity.

The following measures would be implemented to reduce impacts to migratory songbirds to less than significant levels:

- To avoid impacts to nesting songbirds, vegetation removal activities will occur outside of the nesting season (March 1 –August 1).

Impacts from the picket weir installation, operation and de-installation on other species of concern would be negligible.

Alternative B – No Action
Under this alternative, impacts to other species of concern would not occur.

4.3.12 Wetlands and Other Waters of the U.S., and Floodplains

Alternative A – The Proposed Action
Under this alternative, an unknown acreage of wetlands and other waters of the U.S. will be affected by restoration actions. At gravel augmentation sites, spawning gravel would be placed within narrow bands of streamside wetlands, within other waters of the U.S., and on active floodplains. This material would be expected to be removed annually by high flow events and distributed into the stream channel. At in-stream habitat structure sites, boulders and logs would be placed within other waters of the U.S. Clean gravel fill material would be temporarily placed within lower Clear Creek and several tributaries for stream crossings and would be spread into the channel when the crossing is removed. Natural gaps in vegetation along the stream margin would be utilized whenever possible. At the Paige Bar gravel augmentation/floodplain lowering site, additional impacts include removing floodplain vegetation, and disturbing and lowering the elevation of the existing floodplain surface. Completing the floodplain modification and gravel augmentation together will restore process (floodplain function), supply (bed and banks) and provide immediate ecological benefit. The purpose of gravel augmentation and in-stream habitat structures is to restore and enhance aquatic habitats impacted by the construction of Whiskeytown Dam. Impacts to wetlands, other waters of the U.S., and floodplains from gravel augmentation and in-stream habitat structures are considered to be beneficial, long-term in duration, and moderate in intensity. A Statement of Findings, in accordance with NPS Procedural Manual 77-2: Floodplain Management, is not triggered as floodplain impacts associated with the project are beneficial and part of a project designed to restore natural conditions.

The picket weir would be temporarily placed within the OHWM of lower Clear Creek annually. Impacts from the picket weir installation, operation and de-installation would be negligible.

The following measures would be implemented to reduce impacts to wetlands, other waters of the U.S. and floodplains to less than significant levels:

- Construction activities shall be implemented in full compliance with Section 404 of the Clean Water Act, and in consultation with the U.S. Army Corps of Engineers.

- Project activities will avoid impacts to wetlands to the extent possible. Wetlands located near construction areas will be protected with high-visibility fencing to ensure that inadvertent damage does not occur.

Additionally, The NPS has determined that the Proposed Action would not result in impairment, as defined by the National Park Service Organic Act and the General Authorities Act, of wetlands and other waters of the U.S., and floodplains. This determination applies only to NPS lands.

Alternative B – No Action
Under Alternative B, no gravel augmentation or in-stream habitat structures would be implemented. Existing coarse sediment within the stream system would continue to be transported downstream and out of the Clear Creek system, resulting in further degradation of aquatic habitats. Impacts under this alternative are considered adverse, long-term and major in intensity. Under the no-action alternative, the picket weir would not be operated. Impacts to wetlands, other waters and floodplains as a result of the lack of operation of the weir would be negligible.

4.3.13 Cultural Resources

Alternative A – The Proposed Action
Much of the project area has not been surveyed for archaeological resources. The proposed access road for the Paige Bar gravel augmentation site was designed to avoid known archaeological sites. Both the National Park Service and the BLM has a Protocol agreement with the Advisory Council on Historic Preservation (ACHP) and the National Conference of State Historic Preservation Officers (SHPO). However, this project does not meet the requirements of exclusion under the 1995 Servicewide Programmatic agreement among the National Park Service, ACHP and the National Conference of State Historic Preservation Officers. Operation in the WNRA will be scheduled to avoid impacts on the NEED camp.

The following measures would be implemented to reduce impacts to cultural resources to less than significant levels:

- As applicable, standard consultation under Section 106 of the National Historic Preservation Act (36 CFR 800) or use and implementation of existing Protocols will be completed prior to any construction activities with the potential to affect cultural resources.

- In the event that archaeological resources not identified during previous surveys are discovered during construction activities, all work will stop in the site vicinity, archeologists will be brought onto the site, and consultation with the State Historic Preservation Officer may be necessary.

- Consultation with local tribes will be completed to identify any Traditional Cultural Properties that may exist in the project area.

Additionally, The NPS has determined that the Proposed Action would not result in impairment, as defined by the National Park Service Organic Act and the General Authorities Act, of cultural resources. This determination applies only to NPS lands.

Alternative B – No Action
Under this alternative, cultural resources would not be affected. Disturbance from construction activities, including road installation and improvement, would not occur.

4.3.14 WNRA Park Operations

Alternative A – The Proposed Action
Under this alternative, Park operations could experience a need for an increase or reallocation of personnel in the areas of construction activities to direct traffic in the event that road closures are needed, and/or to keep visitors away from restoration construction sites. These impacts are considered to be adverse, short-term in duration, and minor in intensity.

No impacts from the picket weir installation, operation and de-installation on Park operations would occur due to the fact that the weir site is not located within the WNRA.

The following measures would be implemented to reduce impacts to Park operations to less than significant levels:

- Interpretive signs would be placed at the entrance of newly constructed roads or stream crossings warning of heavy equipment use in the area. The interpretive signs would also include a summary of the stream restoration activities. Newly constructed roads would be gated or closed to vehicle traffic when not in use by placing boulders, logs or dirt piles or a combination of these at the entrance of the newly constructed road.

Alternative B – No Action
Under this alternative, no impacts would occur to Park operation. Park operations would continue to be influenced by current conditions.

4.3.15 Recreation and WNRA Visitor Use and Experience

Alternative A – The Proposed Action
Under this alternative, visitors to WNRA could experience road closures or delays to Peltier campground or NEED Camp due to construction activities, such as hauling equipment or materials, gravel sluicing operations from Peltier Valley Road, or construction of the temporary stream crossing near Paige bar. Visitors to the WNRA could also experience elevated noise levels caused by heavy machinery during construction of the floodplain modification and stream crossing, that may affect a positive recreational or visitor use experience. Visitors using lands administered by the BLM could experience elevated noise levels due to gravel augmentation and delivery of habitat structures to the active channel by heavy equipment, that may affect a positive recreational or visitor use experience. In addition to construction related activities, visitors may experience temporary stream closures and need to port kayaks, inner-tubes or rafts around the

picket weir during operation. These impacts are considered to be adverse, short-term in duration, and minor in intensity.

Under this alternative, the implementation of in-stream log habitat structures would not occur above Clear Creek Road Bridge. This restriction was implemented to avoid safety risks to whitewater recreational users in the Upper Reach.

The following measures would be implemented to reduce impacts to recreation and visitor use to less than significant levels:

- In order to reduce the impact to visitor use and experience within WNRA and BLM lands, the construction window including re-opening roads, gravel injections, floodplain modification and placement of in-stream habitat structures, should be limited to off-peak visitor use periods prior to the last weekend in May and after the first weekend in September.

- Kayak safety issues will be incorporated into the specific design process for all in-stream habitat structures constructed.

Alternative B – No Action
Under Alternative B, visitor use and experience would not be affected. The safety risk to whitewater recreational users of the Upper Reach would continue to be influenced by current and future factors.

4.3.16 Noise

Alternative A – The Proposed Action
Under this alternative, the NEED Camp, Peltier campground and residences located along the canyon rims near site-specific activities, or along haul routes (noise-sensitive area), would be affected by construction-related noise generated during the implementation of gravel augmentation and in-stream habitat structures. Noise-producing activities would include the use of heavy equipment to conduct floodplain modification, construct temporary stream crossings and roads, placing spawning gravels and hauling materials and equipment. Heavy equipment needed for project implementation would include bulldozers, excavators, dump trucks, front-end loaders and gravel sifters. Noise levels would exceed ambient conditions during site-specific work but would be temporary in nature, and would not result in a permanent increase in noise levels. Temporary construction activities are exempt from the noise requirements of Shasta County. These impacts are considered to be adverse, short-term in duration, and minor in intensity.

Impacts from the picket weir installation, operation and de-installation would be negligible.

Additionally, The NPS has determined that the Proposed Action would not result in impairment, as defined by the National Park Service Organic Act and the General Authorities Act, of park natural or cultural resources due to noise from the project-related activities. This determination applies only to NPS lands.

Alternative B – No Action
Under this alternative, no noise impacts would occur. Noise-sensitive areas would continue to be effected by existing noise-generating activities.

4.4 Cumulative Effects

NEPA requires a discussion of project effects which, when combined with the effects of other projects, could result in significant cumulative effects. Cumulative effects are defined as the impact on the environment which results from the incremental impact of the action when added to other past, present, or reasonably foreseeable future actions regardless of what agency or person undertakes such other actions.

The proposed action is part of a larger comprehensive watershed restoration program that includes spawning gravel augmentation, flow management, dam removal, erosion control, fuels reduction, and invasive weed management projects. A number of environmental restoration and enhancement projects have recently been, and are currently being, implemented within the lower Clear Creek watershed through a series of actions directed by the multi-agency Restoration Team.

Beginning in 1996, gravel augmentation has been occurring at a number of locations in lower Clear Creek to reverse the loss of spawning and rearing habitat for anadromous salmonid species caused by the construction of Whiskeytown Dam. To date, over 102,000 tons of spawning gravel have been added at multiple locations. Saeltzer Dam was removed in 2000, allowing anadromous fish, primarily spring-run Chinook salmon and steelhead, to utilize 12 miles of previously inaccessible spawning and rearing habitat.

Beginning in 1999, the multi-phased Lower Clear Creek Floodway Rehabilitation Project (LCCFRP) was initiated. The LCCFRP was designed primarily to improve anadromous salmonid habitat by restoring natural stream channel and floodplain processes in areas that were severely impacted by gold mining, aggregate mining and the effects of Whiskeytown Dam. The project involves two sites located at river mile three, and river mile eight. Phases 1, 2A, 2B, and 3A were implemented between 1999 and 2003 with funding from the California Bay-Delta Authority (CBDA) Ecosystem Restoration Program (ERP), administered by USFWS and DFG; the Central Valley Project Improvement Act (CVPIA), administered by Reclamation and the USFWS; and the Jobs in the Woods, administered by the BLM, and Clean Water and Watershed Restoration programs, administered by BLM. As of the completion of Phase 3A, over 97 acres of floodplain have been re-created, and 47 acres of riparian habitat have been planted. Phase 3B is currently being implemented. Phase 3C, the final phase, is currently unfunded and may, or may not, be implemented.

Reclamation plans to continue to place spawning gravel, as needed, immediately below Whiskeytown Dam. The Whiskeytown Dam gravel augmentation site is covered under separate NEPA documentation and is not part of the proposed action. Other past and current actions on NPS and BLM lands within the watershed include the construction of shaded fuel breaks and controlled burning projects to minimize the potential for catastrophic wildfires in the watershed, numerous erosion control projects to decrease fine sediment inputs to lower Clear Creek, and exotic plant control projects to reverse negative impacts on native plant and animal species. These projects include the Paige Bar Demonstration Watershed Project (NPS), the Pope-Ericson Road Removal Project (NPS), the Mule Town Road Shaded Fuel Break Project (BLM), the Shasta Divide Shaded Fuel Break Project (NPS), the Buck Shaded Fuel Break Project (NPS), and the Shasta Divide, Mule, and Salt Creek Prescribed Fire Projects (NPS). Future potential projects include additional road removal within the Paige Boulder Creek watershed on NPS lands, invasive exotic plant removal throughout the lower Clear Creek watershed, and the Buck Prescribed Fire Project (NPS).

The proposed action, evaluated individually and cumulatively, will have no significant negative impact on the surroundings or other resources in the watershed, and is expected to have cumulatively beneficial effects on anadromous fish populations in lower Clear Creek.

4.5 Summary of Mitigation Measures

The following presents a summary list of the measures outlined in this EA to mitigate for environmental impacts that may result from the proposed action:

Air Quality

- Dust-suppression techniques, such as periodically watering unpaved roads and construction sites, will be used to minimize the generation of fugitive dust. Construction equipment will be turned off when not in use and equipment will be kept properly maintained to reduce internal combustion engine exhaust.

Geology and Soils

- Project designs that involve road modification or re-opening will incorporate BMPs for temporary and permanent soil stabilization such as outsloping, rolling dips, seeding and mulching, etc.

- Construction areas that are not to be maintained as roads (temporary roads, staging areas etc.), will be decompacted, stabilized and revegetated following construction activities.

Hydrology and Water Quality

- Construction activities shall be implemented in full compliance with the Water Quality Control Plan (Basin Plan) and in consultation with the RWQCB

- Equipment shall not be operated in flowing stream channels except as may be necessary to construct stream crossings and place in-stream habitat structures and spawning gravel. When work in flowing stream channels is unavoidable, clean spawning gravel will be used to create a pad for the equipment in the channel. Temporary stream crossings shall be constructed of clean spawning gravel. Construction of the footing shall proceed in a manner that minimizes sediment discharge. After placement, the spawning gravel will be removed from the stream channel or spread evenly to blend in with existing placed gravels.

- Spawning gravel shall be clean, washed gravel with a cleanness value allowing basin water quality standards to be maintained during placements (Caltrans Test # 227).

Hazardous Materials

- Prior to site-specific construction activities, a Spill Prevention, Control and Countermeasures Plan (SPCCP) will be prepared. The SPCCP will include on-site handling rules to keep construction and hazardous materials out of waterways and drainages.

- All equipment refueling and maintenance will be restricted to designated equipment staging areas, located away from streams and other sensitive habitats.

Aesthetics

- All in-stream habitat structures implemented within the stream reach determined to be eligible as a component of the National Wild and Scenic Rivers System (from southern WNRA boundary downstream to Clear Creek Road Bridge) will be designed to ensure that the structures, and any utilized access routes, do not compromise the aesthetic quality of this area.

Vegetation, Plant Communities and Habitat Types

- Impacts to existing vegetation will be avoided to the extent practical.

- Disturbed areas not intended for future road access or gravel placement will be revegetated with native plant species following the completion of construction activities.

Sensitive Plant Species

- Prior to commencing site-specific activities associated with any of the gravel augmentation or in-stream habitat sites, a WNRA or BLM botanist will survey the site for sensitive plant species. The survey will include all areas that will be directly and indirectly impacted. Any sensitive plant species discovered will be clearly flagged and avoided when possible. If avoidance is impossible, the responsible agency will be consulted and measures to avoid or minimize impacts, such as transplantation, will be examined. Mitigation measures will need to be approved by the responsible agency before the project can proceed.

Invasive Plant Species

- All equipment used for the project will be thoroughly washed off-site to remove invasive plant seed, stems, etc., prior to arriving at the construction area. If construction involves work at two or more separate locations along the creek and project area, when possible, equipment should be thoroughly cleaned after completing work at one location, before proceeding to the next location. This will minimize the dissemination of noxious or invasive plant species within the project area.

- All areas disturbed by project implementation should be monitored for recruitment and regeneration of invasive weeds for a minimum of one year. If recruits or stimulated regeneration is discovered, control measures will be implemented as soon as possible.

Special-status Fish

- All stream crossings will be designed to ensure that conditions are maintained for effective upstream and downstream fish passage, at all times and all flow conditions.

- To avoid and minimize impacts to spawning and rearing anadromous fish, gravel augmentation and in-stream habitat structures will be implemented according to the following timing restrictions:

  - Zone 1 (Whiskeytown Dam to approximately ¾-mile downstream of Whiskeytown Dam): Work may be conducted at any time of year.

  - Zone 2 (approximately ¾-mile downstream of Whiskeytown Dam to the USFWS picket weir location): Work may be conducted from November 1 to November 30, or from May 1 to August 31. Pre-project redd surveys will be conducted if

work is to be implemented from November 1 to November 30, to ensure that redds are not impacted.

- ► Zone 3 (USFWS picket weir location to the Sacramento River): Work may be conducted from June 1 to September 30.

Special-status Wildlife

- Prior to commencing with site-specific gravel augmentation and in-stream habitat structure work, project sites will be surveyed and cleared by WNRA or BLM Biologists, regarding special-status wildlife species issues.

- Prior to commencing with site-specific activities associated with any of the gravel augmentation or in-stream habitat sites, a BLM biologist will survey the site for elderberry shrubs and ensure that any identified potential VELB habitat is completely avoided.

- To avoid impacts to nesting songbirds, vegetation removal activities will occur outside of the nesting season (March 1 –August 1).

Wetlands & Other Waters/Floodplains

- Construction activities shall be implemented in full compliance with Section 404 of the Clean Water Act, and in consultation with the U.S. Army Corps of Engineers.

- Project activities will avoid impacts to wetlands to the extent possible. High-visibility protective fencing will be installed to wetlands located near construction areas to ensure that inadvertent damage does not occur.

Cultural Resources

- As applicable, standard consultation under Section 106 of the National Historic Preservation Act (36 CFR 800) or use and implementation of existing Protocols will be completed prior to any construction activities with the potential to affect cultural resources.

- In the event that archaeological resources not identified during previous surveys are discovered during construction activities, all work will stop in the site vicinity, archeologists will be brought onto the site, and consultation with the State Historic Preservation Officer may be necessary.

- Consultation with local tribes will be completed to identify any Traditional Cultural Properties that may occur in the project area.

WNRA Park Operations

- Interpretive signs would be placed at the entrance of newly constructed roads or stream crossings warning of heavy equipment use in the area. The interpretive signs would also include a summary of the stream restoration activities. Newly constructed roads would be gated or closed to vehicle traffic when not in use by placing boulders, logs or dirt piles or a combination of these at the entrance of the newly constructed road.

Recreation and WNRA Visitor Use and Experience

- In order to reduce the impact to visitor use and experience within WNRA and BLM lands, the construction window including re-opening roads, gravel injections, floodplain modification and placement of in-stream habitat structures, should be limited to off peak visitor use periods prior to the last weekend in May and after the first weekend in September.

- Kayak safety issues will be incorporated into the specific design process for all in-stream habitat structures.

4.6 Conclusions

Based on this EA, the BLM and the NPS have determined that the proposed project would not result in significant adverse effects on the environmental resources in the project area. Additionally, the NPS has determined that the proposed project will not result in impairment, as defined by the National Park Service Organic Act and the General Authorities Act, of park natural or cultural resources. Following the review period, a determination will be made whether a FONSI is warranted, or whether the preparation of an EIS will be necessary.

5.0 COMPLIANCE WITH ENVIRONMENTAL LAWS AND REGULATIONS

The following environmental laws and regulations will be complied with, as applicable, for gravel augmentation, in-stream habitat structures and picket weir operation. Some of the following may not apply, depending on whether a state or local agency implements the proposed action:

Environmental Law/Regulation	Agency
American Indian Religious Freedom Act of 1978	Bureau of Land Management National Park Service
California Fish and Game Code Section 1602	California Department of Fish and Game
California Endangered Species Act	California Department of Fish and Game
California Environmental Quality Act	State or Local Lead Agency
Clean Air Act	Shasta County Air Quality Control District
Clean Water Act Section 401	California Regional Water Quality Control Board
Clean Water Act Section 404	U.S. Army Corps of Engineers
California Water Code Sections 8710-8723	California Reclamation Board
Endangered Species Act	National Marine Fisheries Service U.S. Fish and Wildlife Service

Magnuson-Stevens Fishery Conservation and Management Act	National Marine Fisheries Service
Migratory Bird Treaty Act	U.S. Fish and Wildlife Service
National Historic Preservation Act Section 106	State Historic Preservation Officer
Wild and Scenic Rivers Act	Bureau of Land Management
Executive Order 11990 Protection of Wetlands	Bureau of Land Management National Park Service
Executive Order 11988 Floodplain Management	Bureau of Land Management National Park Service
Executive Order 13007 Indian Sacred Sites	Bureau of Land Management National Park Service
Executive Order 11593 Protection and Enhance-ment of the Cultural Environment	Bureau of Land Management National Park Service
Executive Order 13287 Preserve America	Bureau of Land Management National Park Service

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