



**UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration**

NATIONAL MARINE FISHERIES SERVICE
Southwest Region
501 West Ocean Boulevard, Suite 4200
Long Beach, California 90802-4213

MAY 14 2008

In response refer to:
2007/07542

Scott Hamelberg
Project Leader
U.S. Fish and Wildlife Service
Coleman National Fish Hatchery Complex
24411 Coleman Fish Hatchery Road
Anderson, California 96007

Dear Mr. Hamelberg:

This document transmits NOAA's National Marine Fisheries Service (NMFS) biological opinion, based upon our analysis of the proposed modification to the instream work window for the U.S. Fish and Wildlife Service's (USFWS) Coleman National Fish Hatchery (Coleman NFH) Fish Barrier Weir and Ladder Modification project (Project), and modified project effects on endangered Sacramento River winter-run Chinook salmon (*Oncorhynchus tshawytscha*), threatened Central Valley spring-run Chinook salmon (*O. tshawytscha*), and threatened Central Valley steelhead (*O. mykiss*); and designated critical habitat, in accordance with section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 *et seq.*; Enclosure 1). The submitted package for reinitiation of consultation, dated November 13, 2007, was received by NMFS on November 15, 2007, and includes the project *Action Specific Implementation Plan* (ASIP), as amended on September 19, 2007. The Coleman NFH is located in lower Battle Creek at RM 5.8, in Shasta County, California. The project area includes the north bank of Battle Creek, and a portion of the south bank where a temporary diversion channel will be excavated.

This biological opinion is based on information provided in the amended ASIP for the proposed project, and discussion between NMFS staff and representatives of the USFWS and the U.S. Bureau of Reclamation. A complete administrative record of this consultation is on file at the NMFS Sacramento Area Office.

Based on the best available scientific and commercial information, the biological opinion concludes that the Coleman NFH Fish Barrier Weir and Ladder Modification project, as modified, is not likely to jeopardize the continued existence of the listed species or adversely modify designated critical habitat. NMFS also has included an incidental take statement with reasonable and prudent measures and non-discretionary terms and conditions that are necessary and appropriate to minimize incidental take associated with the project.



NMFS had previously concluded that the project will temporarily adversely affect essential fish habitat (EFH) for Pacific salmon in the action area, and had issued conservation recommendations for Pacific salmon, as required by the Magnuson-Stevens Fishery Conservation and Management Act as amended (16 U.S.C. 1801 *et seq.*). Based upon the modified instream work window, NMFS has determined that there is no change to the EFH conservation recommendations.

If you have any questions regarding this correspondence or if NMFS can provide further assistance on this project, please contact Shirley Witalis in our Sacramento Area Office, 650 Capitol Mall, Suite 8-300, Sacramento, CA 95814. Ms. Witalis may be reached by telephone at (916) 930-3606, or via e-mail at shirley.witalis@noaa.gov.

Sincerely,



Rodney R. McInnis
Regional Administrator



cc: Copy to file – ARN 151422SWR2005SA00838
NMFS-PRD, Long Beach, CA

Enclosure 1

BIOLOGICAL OPINION

ACTION AGENCY: United States Fish and Wildlife Service, Sacramento District

ACTIVITIES: Coleman National Fish Hatchery Fish Barrier Weir and Ladder Modification Project Addendum

CONSULTATION CONDUCTED BY: National Marine Fisheries Service, Southwest Region

DATE ISSUED: MAY 14 2008

This NOAA's National Marine Fisheries Service (NMFS) biological opinion analyzes a proposed modification to the instream work window for the U.S. Fish and Wildlife Service's (USFWS) Coleman National Fish Hatchery (Coleman NFH) Fish Barrier Weir and Ladder Modification project (Project), and modified project effects on endangered Sacramento River winter-run Chinook salmon (*Oncorhynchus tshawytscha*), threatened Central Valley spring-run Chinook salmon (*O. tshawytscha*), and threatened Central Valley steelhead (*O. mykiss*); and designated critical habitat, in accordance with section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 *et seq.*; Enclosure 1).

I. Consultation History

The consultation history of the project includes a draft biological opinion issued by NMFS to USFWS on May 18, 2006, re-issued as a final biological opinion on June 1, 2006; and an amended biological opinion issued on March 26, 2007. In accordance with biological opinion term and condition 1.a. and 1.b., NMFS has received the following documents:

- A fish rescue report dated June 2007, from USFWS, describing the fish rescue undertaken within the cofferdam installed to accommodate the construction of a new fish ladder.
- A fish rescue report dated August 2007, from USFWS, describing the fish rescue that occurred during the installation of the extension of the cofferdam, to accommodate the construction of a new fish ladder.
- An electronic status report, dated October 31, 2007, on project construction activities and environmental compliance, from Reclamation.

- An electronic status report, dated November 30, 2007, on project construction activities and environmental compliance, from Reclamation.
- An annual report, dated January 16, 2008, and received on January 18, 2008, from Reclamation, which provides a summary of the first season of project implementation.

In accordance with biological opinion term and condition 1.c., NMFS was informed of the following:

- The project proponents have chosen the portable cofferdam alternative, over the spawning gravel cofferdam alternative. The installation of the free-standing portable cofferdam eliminates the need for pile-driving or excavating into the natural streambed and streambank, with less associated noise, dust, and refueling of heavy equipment than with gravel cofferdams.
- The project will ford heavy machinery across Battle Creek, to the south side of the channel, rather than using a stream crossing with culverts for moving the equipment.

On July 30, 2007, a conference call was conducted among representatives of Reclamation and NMFS to discuss alternatives on scheduling what remained of the project construction work, in order to maximize the contractor's ability to complete the hatchery ladder work during the established June 1 to September 30, instream work window.

On November 13, 2007, USFWS requested reinitiation of section 7 consultation on the Coleman NFH fish barrier weir and ladder modification project, and reinitiation of consultation to assess the effects of the project on essential fish habitat (EFH) for Pacific salmon. USFWS has requested a preliminary review of the draft amended biological opinion prior to the completion of the consultation process.

The primary analysis of the effects of the full Coleman National Fish Hatchery Fish Barrier Weir and Ladder Modification project is presented in the previous biological opinions (NMFS 2006; 2007). Those biological opinions are hereby incorporated by reference. This document should be considered as an addendum to those opinions, and will concentrate specifically on the additional and combined effects of the proposed amendment to the established instream work window for the project.

II. Description of the Proposed Action

The Coleman NFH is located in lower Battle Creek at RM 5.8, in Shasta County, California. The project area includes the north bank of Battle Creek, and a portion of the south bank where a temporary diversion channel will be excavated.

As proposed in the amended ASIP, the previously established June 1 to September 30 instream construction window for the project would be extended by the addition of one to two days in May, per instream construction season. Specifically, heavy equipment (estimated as one tracked bulldozer, one pickup truck, one tracked excavator, and one other piece of similar equipment) would be permitted to cross Battle Creek, one or two days in each of May 2008 and May 2009, in order to stage equipment for work to be conducted on the south bank of Battle Creek.

Work activity on the south bank of the creek (Table 1) to be conducted in the month of May will be conducted completely in the dry (wholly outside of the active creek channel) and will include placement of a section of riprap and rock berms, installation of fish barrier frames in the diversion channel, set-up of the dewatering system, and preparations for water diversion (Memorandum from Lauren Carly, July 30, 2007). All of these south bank activities were already described and analyzed in the previous biological opinions. Allowing an early crossing of Battle Creek at the beginning of May would permit the contractor to finish 3.3 weeks of work on the south-side diversion channel before June 1, and provide additional time for completing the hatchery ladder, on or possibly ahead of schedule. Under this scenario, there is a high possibility that all instream work could be completed in the 2008 construction season (Sandy Osborn, Reclamation, pers. comm.), which would greatly reduce the potential impacts to listed species in Battle Creek by foregoing an additional year of instream construction activities. The proposed site of the crossing is at the existing ford of Battle Creek.

Machinery on the south side of the channel will not be left in place over the winter months, but will be forded back across Battle Creek before the previously established seasonal instream construction window closes at the end of September.

As a conservation measure, the project will have oversight of USFWS biologists to monitor for evidence of fish fright responses and any disruption of normal fish behavior such as spawning and feeding. There will be monitoring of the riverine habitat, for presence of sedimentation, and its effects on any fish eggs, larvae, and juveniles in Battle Creek below the project site. There will be a survey for fish redds present on-site, to deter the trampling of eggs and larvae. Actions will be taken to respond to fish in distress, and/or temporarily halt project actions until a fish rescue or a protective protocol can be initiated.

The contractor and construction personnel will be required to participate in and comply with an awareness training regarding government and local environmental laws and permits; penalties for non-compliance with environmental requirements and conditions; endangered, threatened, and special status species, and their habitats; awareness and avoidance of environmentally sensitive areas (exclusion zones); protection of cultural resources; and environmental protection measures, mitigation, compensation, and restoration.

Table 1. Project Activity in May, 2008, on the South Channel of Battle Creek.

Activity Description	Duration (days)	Dates of Activity
Place riprap sections & rock berms	7	May 01 – 09
Install fish barrier frames in diversion channel	5	May 12 – 16
Set up dewatering systems	4	May 19 – 22
Prepare water diversion into channel	1	May 23
Total	17	23 days = 3.3 weeks

Reference: Reclamation Memorandum (2007)

III. Status of the Species and Critical Habitat

No change has occurred, since the issuance of the March 26, 2007, amended biological opinion, on the status of listed fish species under NMFS jurisdiction, or to the status of critical habitat, that may be affected by the proposed project. The threatened Southern Distinct Population Segment of North American green sturgeon (*Acipenser medirostris*) will not be affected by the project, due to its absence in Battle Creek.

IV. Environmental Baseline

The environmental baseline is an analysis of the effects of past and ongoing human and natural factors leading to the current status of the species within the action area. The environmental baseline “includes the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in process” (50 CFR §402.02).

Since the issuance of the March 26, 2007, amended biological opinion on the project, a section 7 consultation was initiated on the Coleman National Fish Hatchery Water Intakes Rehabilitation Project (Intakes Project), and a biological opinion was issued on March 5, 2008.

The Intakes Project is scheduled to begin construction in 2008, with phase 1 of the project to be completed in 2009. Phase 1 includes the modification of Coleman NFH Intake 3, to meet NMFS screening criteria without any change to its intake diversion capacity of 50 cubic feet per second (cfs). Coleman NFH Intake 1 will be expanded to increase its diversion capacity to 122 cfs, by extending a new pipeline having a maximum diameter of 36 inches downstream, to discharge into the existing 48-inch diameter pipeline from Intake 3.

The adverse effects of the Intakes Project are expected to be primarily localized and temporary, related to the instream construction activities. The long term effects are expected to be primarily beneficial to listed salmonids due to reduced entrainment of juvenile salmonids into the hatchery water intake system. Minor long-term adverse impacts of the Intakes Project will include the loss of 0.14 acres (495 linear feet) of vegetated riparian stream corridor, and 0.01 acres (20 linear feet) of non-vegetated stream corridor, due to permanent fill and riprap. The Intakes Project includes compensatory mitigation replacement in-kind to offset for the loss of 0.15 acres of vegetated riparian habitat; however, in the short-term, it will impact critical habitat, and may indirectly affect salmonids by affecting elements of shaded, riverine aquatic habitat, *e.g.*, temperature amelioration, prey base, refuge from high flows, and stream nutrient input in the form of woody debris.

A. Presence of Spring-run Chinook salmon in Battle Creek

Based upon USFWS monitoring data, the spring-run Chinook salmon escapement to Battle Creek is estimated between 50 and 100 adult fish per year, beginning as early as March, and decreasing through June and July. During spring-run peak migration in May, approximately 38 adult fish pass upstream of the barrier weir on average, to hold-over in deep, cool-water pools in upper Battle Creek, and spawn from mid-August through October. Peak juvenile outmigration is between December and February, and continues through August. During the month of May, approximately 4,486 juvenile spring-run Chinook salmon, on average, will outmigrate past the project site. During the June 1 through September 30 instream construction period, it is estimated that approximately 105 adults and 3,000 juveniles will migrate through the action area over the three year construction period. This equals approximately 35 percent of the total number of spring-run Chinook salmon expected to utilize the action area over the full three-year period. An additional 2-5 adult spring-run Chinook salmon and 290-580 juvenile spring-run Chinook salmon are anticipated to pass through the project area during the 1 to 2 days in May of 2008, and May of 2009, when heavy equipment would be permitted to cross Battle Creek under the proposed amendment for the final two years of the project.

B. Presence of steelhead in Battle Creek

Adult steelhead generally begin their migration into Battle Creek in August, with the majority entering the creek between September and January, and spawning between late-December and early May. Juvenile steelhead are present in Battle Creek year-round; outmigration may occur at any time, but is significantly reduced during the June 1 to September 30 primary construction window due to high water temperatures in the lower creek. For purposes of this consultation, NMFS assumes all *O. mykiss* juveniles outmigrating from Battle Creek are expressing anadromous life history and are therefore part of the Central Valley Steelhead Distinct Population Segment. On average, 23 natural-origin adult steelhead pass upstream of the barrier weir in May, and 47 natural-origin adult steelhead pass upstream of the barrier weir in the months of June through August. An average of 32 natural-origin adult steelhead are present in the month of October, and are also assumed to be present in September during the project's instream

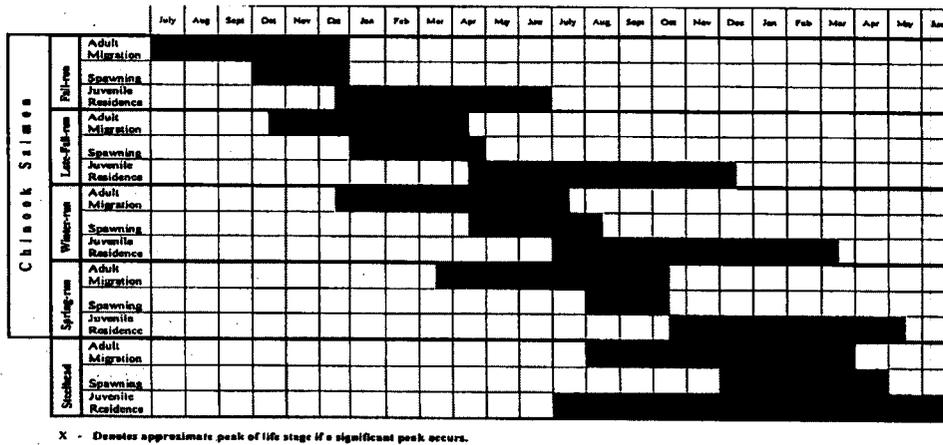
construction window (Reclamation/USFWS 2007). Based on USFWS rotary screw trap data, an estimated average of 6,312 steelhead juveniles outmigrate from Battle Creek in May, an average of 1,410 juveniles outmigrate in June, and an average of 28 juveniles outmigrate in July. During the June 1 through September 30 instream construction window, there is estimated to be approximately 237 steelhead adults and 4,314 juveniles combined over a three-year period. The most recent monitoring data indicates that on average, approximately 79 adult steelhead could be present at the project site during the instream construction window per year. Juvenile abundance estimates are based on direct rotary screw trap monitoring which indicates a three-year average of 1,438 juveniles outmigrating past the project during the four month instream construction window. The month of May is as the tail end of adult and juvenile steelhead migrations, and 1 to 3 adult steelhead and 407 to 814 juvenile steelhead are anticipated to pass through the project area during the 1 to 2 days in May of 2008, and May of 2009, when heavy equipment would be permitted to cross Battle Creek under the proposed amendment. The Coleman NFH run of steelhead is finished by March, and hatchery smolts are released in January; neither are expected to be in Battle Creek.

V. Effects of the Action

The effects of the overall project are described in detail in the previous biological opinions for the project (NMFS 2006; 2007) and that analysis is incorporated here by reference. The following description is of those effects that are expected to occur as a direct result of the proposed changes to the project description (heavy equipment crossing the creek 1 to 2 days in May 2008, and possibly 2009).

The amended action will specifically affect those salmonids expected to be in Battle Creek in the month of May, primarily migrating spring-run adults and rearing steelhead juveniles (Figure 1). Based upon life history, spring-run Chinook salmon juveniles residing in Battle Creek would be in the upper watershed, far removed from the project site. USFWS monitoring indicates that no spawning activities occur near the project site in May or during the instream construction window of June 1 through September 30. Although juvenile steelhead rearing near the project site may be limited due to high water temperatures during the instream construction window, more juveniles are expected to be found at the site in May. The use of project equipment is limited to the construction footprint, the access corridor, and areas specifically designated for machine maintenance and storage. The existing ford in Battle Creek is considered as part of the project access corridor within the action area. Physical effects from fording the project machinery may include: 1) the removal of riparian vegetation on the banks of Battle Creek, 2) impairment of the water quality in Battle Creek, 3) disturbance of spawning and rearing habitat, 4) increased sedimentation into Battle Creek, and, 5) noise and shock disturbance from heavy equipment activities.

Figure 1. Seasonal occurrences of salmonid life stages in the Upper Sacramento River.



x - Denotes approximate peak of life stage if a significant peak occurs.

Sources: Vogel and Marine (1991) and Schaffer (1980) as reported in Kier Associates (2000)

a. Removal of Riparian Vegetation

Preparation for the initial crossing of Battle Creek and staging set-up with heavy equipment may include the removal of 360 linear feet of shaded, riverine, aquatic (SRA) habitat. Impacts to stream banks, vegetation and cover, may cause streambank destabilization and an increase in nutrient inputs, a reduction of bank cover canopy and shading, with concurrent reduced amelioration on stream temperature. The removal of riparian trees reduces the amount of large woody debris available as a source of materials for creating instream refugia for rearing salmonids; and for providing substrate for microinvertebrates. However, it has been found that riparian vegetation has less influence on stream temperatures in the lower reaches of Battle Creek where the proposed action will be implemented, where the channel is generally wider and not as easily shaded by streamside trees (KRIS Battle Creek Hydrology).

The amount of SRA habitat and riparian vegetation to be removed will be approximately 0.4 acres (17,424 square feet) on the grounds adjacent to Battle Creek, a small area relative to the total SRA available in the action area, and is not anticipated to be extensive enough to cause water temperature increases. Upon completion of the project, devegetated areas will be reseeded or replanted with native plant species to prevent soil erosion, in coordination with an erosion control specialist. Areas that have not successfully re-established themselves within 3 years will be replanted with native vegetation to re-establish shaded refugia and habitat structure. Post-project monitoring will evaluate the success of the restoration, and assist in identifying areas needing further revegetation to meet the goal of 100 percent replacement of value of habitat impaired by the project. All natural woody riparian or SRA habitat will be avoided or preserved to the maximum extent practicable.

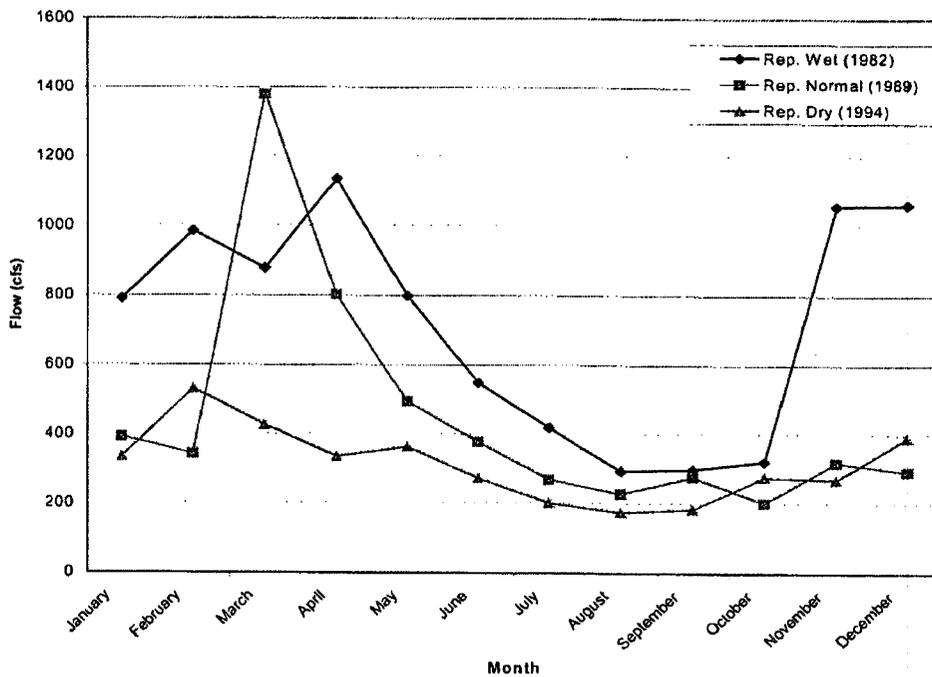
During the period that riparian vegetation is filling back in, returning adult salmonids will have less cover to avoid predation while spawning. Salmonid fry emerging from the

gravels will have degraded edgewater habitat conditions, and potential prey resources will be more susceptible to predation. The project has incorporated measures in the project description to keep the removal of riparian vegetation to a bare minimum. The short-term loss of some riparian habitat is not expected to injure juveniles, as there are available feeding sites and refugia nearby.

b. Impacts to Water Quality of Battle Creek

The proposed action will occur in May, during the descending limb of the annual hydrograph in Battle Creek (Figure 2). The crossing likely would not be attempted if flows in Battle Creek are still high (wet year scenario), due to safety issues. Impacts to the water quality of Battle Creek, are expected to be minimal, and temporary. Any accidental spills in the form of oil, diesel fuel, and machinery lubricant, from the fording of machinery and equipment into Battle Creek, may cause risk of contamination of aquatic habitat and subsequent injury or death to listed salmonids. A Spill Prevention and Countermeasure Plan (SPCP), intended to prevent contamination of soils and waterways from construction and hazardous materials, will avoid or minimize impacts from accidental spills by establishing all staging and storage areas outside of the stream zone. Specifically, equipment and machinery coming in contact with water will be inspected daily to insure that they are completely free of grease, oil, petroleum products or other hazardous materials. Should there be an accidental spill of fuel or oil during the crossing of project machinery to the south side of the channel, Battle Creek may experience a small-scale, temporary impairment to its microinvertebrate community until the contaminants are dispersed or degraded. Any accidental spills will be cleaned up immediately, and NMFS, the California Department of Fish and Game (CDFG), and the Water Quality Control Board (RWQCB), will be notified of the event for further direction. To minimize the effect of a potential hydraulic oil leak, the contractor will utilize biodegradable oils in the hydraulic systems of equipment.

Figure 2. Representative Wet, Normal, and Dry flows (CFS) in Battle Creek.



Reference: U.S. Bureau of Reclamation (2003)

c. Disturbance of Spawning and Rearing Habitat

Salmonid spawning habitat may be affected by the crushing and compaction of gravels and cobbles in Battle Creek, due to heavy equipment traversing the channel during one to two summer construction periods. It is unknown how adult salmonids returning after the construction season and before winter rains will respond to the habitat conditions. Spring-run Chinook salmon and steelhead spawning occurs far upstream of the project area, and therefore would not be affected by disturbance of spawning habitat in this area. Subsequent to project completion, high flows later in the winter likely will redistribute creek bed materials and eliminate any residual effects from gravel compaction, and restore the natural bed form with subsurface gravel flows similar to pre-project conditions.

d. Increased Sedimentation into Battle Creek

Increases in suspended inorganic sediment concentrations can be deleterious to filter-feeding invertebrates and to fish, which exhibit avoidance behavior and negative physiological responses (Owens *et al.* 2005). Sedimentation may impair spawning substrate and rearing habitat, and cause mortality of fish eggs, fish larvae, and rearing juveniles. Juvenile salmonids may avoid or leave preferred habitats if areas are injected with high concentrations of suspended sediment; adult and juvenile migration may be delayed by high turbidity. NMFS expects small temporary increases in turbidity from the

stream crossing of project machinery, that will be likely to result in some limited behavioral effects, such as temporarily reduced feeding efficiency.

In-channel physical disturbances due to excavation and heavy equipment operation, and associated increases in turbidity and suspended sediment, are expected to be localized and short-lived. Proposed conservation measures of installing erosion control devices adjacent to work areas are expected to avoid or minimize construction impacts to habitat. USFWS has proposed conservation measures and developed a Storm Water Pollution Prevention Plan (SWPPP), in anticipation of the need to reduce mobilization of potential fine sediment from project actions. A SWPPP developed for the project is intended to avoid or minimize the potential for sediment input into aquatic systems, and is part of the National Pollution Discharge Elimination System (NPDES) General Construction Activity Stormwater Permit for the project.

The implementation of the SWPPP is expected to avoid or minimize effects of sedimentation from the construction of the access corridor. Temporary sediment control measures will be located at disturbed areas to prevent sediment from entering Battle Creek, and kept in place until they are stabilized. Interim measures to control erosion and sedimentation over-winter will include best management practices, including the use of mulch, straw wattles, and silt fences. Water quality will be monitored for turbidity and settleable materials according to the RWQCB Section 401 Water Quality Certification standard conditions.

e. Noise from Heavy Equipment Activities

Noise will be generated in and around the project area by the tracked bulldozer, pickup truck, tracked excavator, and possibly other, similar equipment, entering and crossing Battle Creek. Salmon and steelhead are affected by sounds within their environment, and may be affected by the proposed action.

A salmonid's auditory system monitors ambient sound, which provides environmental cues on the presence of predators, prey, and mates. The directional response of hair cells of the inner ear of a fish provides the ability to detect a sound source in the presence of high levels of ambient noise. Anthropomorphic noise, such as that emanating from machines, may mask environmental sounds and alter the auditory thresholds of fish (Scholik and Yan 2001). A maximal hearing loss may be experienced some time after noise onset, with an even longer recovery time, dependent upon the duration of noise exposure and auditory frequency (Popper *et al.* 2004; Smith *et al.* 2004; Scholik and Yan 2001).

Fish may pick up on the sounds from the advancing machinery and move, or otherwise, may be impacted in the ability to distinguish environmental cues necessary for their survival from damage to hair cells resulting in temporary deafness (Hastings and Popper 2005). There is evidence that fish can replace chemically-damaged sensory cells (Lombarte *et al.* 1993 *in* Hastings and Popper 2005) but it is unknown if this is true for sensory cells that have been killed from exposure to sound.

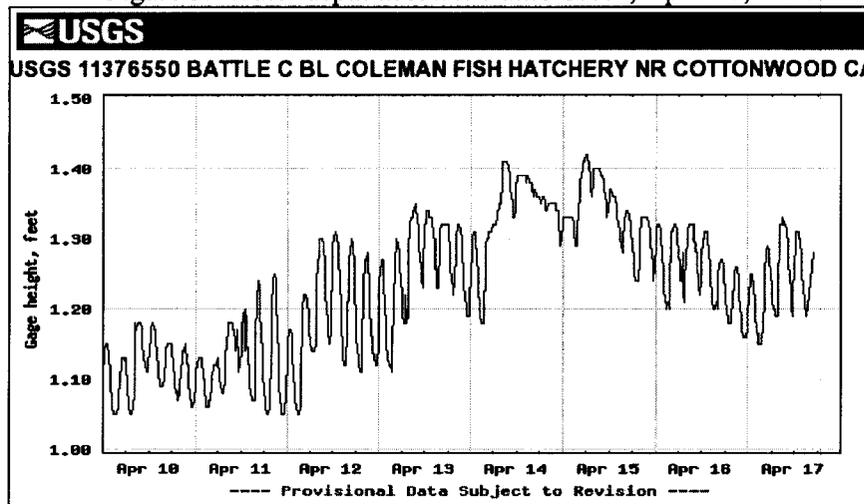
Table 2. Some Effects of Sound on Fish

Initial Sound Thresholds	Response	Behavioral/Physical Response
Low-frequency oscillatory water motion	Behavioral Response	Awareness response (lateral line receptors sensitive to low-frequency oscillatory water motion in immediate vicinity of fish)
5 - 10 Hz Infrasound	Behavioral Response	Awareness response (swimbladder does not play role in sound perception)
10 Hz Infrasound	Behavioral Response	Spontaneous avoidance and flight response (Enger <i>et al.</i> 1993; Knudsen <i>et al.</i> 1997)
150 Hz - Within optimal salmonid hearing range	No Behavioral Response	Acclimated/habituated to sound (Knudsen <i>et al.</i> 1997)
150 dB re 1 μ Pa RMS High acoustic frequency	Behavioral Response	startle; fright; disorientation; swim into deeper water; swim into project equipment (Popper <i>et al.</i> 2004)
180 dB 1 μ Pa Peak High acoustic frequency	Physical Injury	Injury to soft tissue organs; hair cell damage; temporary/permanent hearing loss; mortality (Popper <i>et al.</i> 2004)
204 dB re 1 μ Pa Peak High acoustic frequency	Mortality	Severe internal injuries. (Popper <i>et al.</i> 2004)

The degree of hair cell damage is not related directly to the distance of fish from the sound source, but to the received level and duration of sound exposure. Hawkins and Johnstone (1978) showed that Atlantic salmon (*Salmo*) detected sounds well below 20 Hz and above 600 Hz, but only responded to infrasound (10 Hz), when they were physically close to a source. Based upon measured sound scales, the decibel (dB) level of sounds emanating from a moving piece of machinery would be between 80 and 100 dBs, within the normal hearing (lower) range of salmonids (Engineers Without Borders Cal Poly, 2008). It is expected that in May, Battle Creek will be at or lower than a depth of 1.28 feet, as recorded (Figure 3) on April 17, 2008, by the U.S. Geological Survey water gauge located in Battle Creek below Coleman NFH (latitude 40°23'54", and longitude 122°08'43). As sound does not propagate quickly over distances greater than water depth (due to repeated interaction with the surface and bottom) the sound pressure from noise transferred to the water column may only be detected by the fish at close range (Rogers and Cox 1988). Based on Battle Creek water depth in May, and sound levels expected to be produced by the proposed action, salmon and steelhead are unlikely to be adversely affected by the noise generated by the proposed action unless they are very close to the machinery (within a few feet). NMFS expects that fish in the immediate vicinity of the proposed crossing will detect the large equipment (visually or auditorily) as it approaches and enters the creek, and will move away from the vehicles to a safe distance where adverse noise impacts would not occur.

There is a possibility of noise from the proposed action occurring as transference of the vibration from the engine to the machine casing and into the creek. Pressure gradients created from discharge velocities of moving vehicles through Battle Creek could have the potential to impact incubating eggs (Sutherland and Ogle 1975). However, it is unlikely that listed species would be spawning in the action area during the month of May (several years of extensive monitoring of the action area has not detected salmonid spawning in the action area in May).

Figure 3. Water depth in lower Battle Creek, April 17, 2008.



VI. Cumulative Effects

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this draft biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA. Non-Federal actions that may affect the action area include voluntary State or privately sponsored habitat restoration activities, agricultural practices, livestock grazing and water withdrawals/diversions. Farming activities within or adjacent to the action area may have negative effects on water quality due to runoff laden with agricultural chemicals. Water withdrawals/diversions may result in entrainment of individuals into unscreened or improperly screened diversions, and may result in depleted river flows that are necessary for migration, spawning, rearing, flushing of sediment from spawning gravels, gravel recruitment and transport of large, woody debris.

VII. Integration and Synthesis

This section integrates the current conditions described in the environmental baseline with the effects of the proposed action and the cumulative effects of future actions. The purpose of this synthesis is to develop an understanding of the likely short term and long term response of listed species and critical habitat to the proposed project.

Modifications to the Coleman NFH fish barrier weir and ladder, and rehabilitation of the Coleman NFH intakes, will be occurring simultaneously in construction season 2008, and possibly in 2009. Compounded and synergistic effects may be experienced by salmonids from both projects occurring simultaneously within the action area, as the work windows of the two projects will overlap from June 1 to September 1. Both projects together may

elicit fish behavior avoidance in those areas and limit habitat availability in the action area. Effects from seasonal warm water temperatures, fish crowding, disorientation and noise, experienced between short amounts of recovery time, may compound stress levels and affect behavioral and physiological responses in emigrating juveniles and migrating adults.

NMFS believes that the minor, short-term risks to salmonids and habitat resulting from the one-time crossing of Battle Creek in May by approximately 4 heavy machines, for set-up on the south bank of the creek, will be outweighed by the expected benefit of completing the project on time (Sandy Osborn, Reclamation, pers. comm.). This scenario would also reduce the compounded effects of the two instream work projects (Barrier Weir Modification project and Hatchery Intakes Modification project) by allowing the 2008 construction season to be the only year that both projects' construction activities would be occurring simultaneously.

Conservation measures, best management practices (BMPs), designated work zones and exclusion zones, an instream construction window, and biological monitoring have been incorporated into the project description. A *Spill Prevention and Countermeasure Plan* will prevent contamination of soils and waterways from construction and hazardous materials; and a *Storm Water Pollution Prevention Plan* will avoid or minimize the potential for sediment input into aquatic systems, and will be part of the National Pollution Discharge Elimination System General Construction Activity Storm Water Permit for the project. Following the established conservation measures for the project, the machinery will be clean, free of oil leaks, and proceed at cautious speed into the creek to minimize the possibility of injury or mortality to juvenile salmonids in the immediate area, and to keep within the designated work and staging areas established for the project. Designated monitors will be present to observe for fish presence and alert the construction crew as project equipment is forded across the creek channel. Appropriate implementation of BMPs and conservation measures are expected to reduce the potential impacts to water quality to a level that would not be likely to adversely affect listed salmonids. Impacts to a relatively small amount of riparian vegetation will diminish as new plantings become established, and are expected to be fully compensated over a few years as SRA habitat is recovered, and the riparian area adjacent to the project site is restored.

Due to these comprehensive conservation measures, the minor impacts that are expected to befall a small number of listed salmonids that may be present during the proposed 1 to 2 day equipment crossing activities would not appreciably diminish the likelihood of survival and recovery of Sacramento River winter-run Chinook salmon, Central Valley spring-run Chinook salmon, or Central Valley steelhead.

The passage of heavy equipment through the Battle Creek is expected to temporarily impact salmonid rearing and migration habitat, through loss of SRA and riparian habitat, physical disturbance of the channel banks and substrate, and associated increases in turbidity and suspended sediment. There is also some risk of fuel or oil leakage from machinery impacting water quality during the crossing of Battle Creek. The BMPs and conservation measures are expected to avoid or minimize these impacts; the loss of SRA

and riparian habitat is expected to be small relative to overall availability, and will be avoided to the maximum extent practical; disturbed areas will be replanted to provide 100 percent replacement of native woody species after three years. Any potential impacts to habitat in Battle Creek will be short term, and full habitat function is expected to return once the project is completed. It is NMFS' opinion that possible, adverse effects to habitat are not likely to diminish its value for the conservation of Central Valley salmonids.

VIII. Conclusion

After reviewing the best available scientific and commercial information, the current status of Central Valley spring-run Chinook salmon and Central Valley steelhead, and critical habitat, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is NMFS' biological opinion that the Coleman NFH Fish Barrier Weir and Ladder Modification project, as amended, is not likely to jeopardize the continued existence of Sacramento River winter-run Chinook salmon, Central Valley spring-run Chinook salmon, and Central Valley steelhead, and is not likely to destroy or adversely modify designated critical habitat of Central Valley spring-run Chinook salmon and Central Valley steelhead.

IX. INCIDENTAL TAKE STATEMENT

Section 9 of the Endangered Species Act (ESA) and Federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by NMFS as an act which kills or injures fish or wildlife. Such an act may include significant habitat modification or degradation where it actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including breeding, spawning, rearing, migrating, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by USFWS so that they become binding conditions of any grant or permit issued to the Contracted Party (Contractor) providing the construction services, for the exemption in section 7(o)(2) to apply. USFWS has a continuing duty to regulate the activity covered by this incidental take statement. If USFWS 1) fails to assume and implement the terms and conditions or 2) fails to require the Contractor to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, USFWS and the Contractor must report on the progress of the

action and its impact on the species and proposed critical habitat to NMFS as specified in the incidental take statement (50 CFR §402.14[i][3]).

A. Amount or Extent of Take

No take of Sacramento River winter-run Chinook salmon is anticipated because they have rarely been observed in the action area in recent years, presumably due to changes in hatchery practices. In addition to the amount and extent of take analyzed in the previous BOs (NMFS 2006; 2007), NMFS anticipates an additional take of 2-5 adult spring-run Chinook salmon and 290-580 juvenile spring-run Chinook salmon at the Battle Creek project site during the a maximum of 2 days in May of 2008 and 2009, when heavy equipment is crossed over from the north side to the south side of Battle Creek.

Likewise, NMFS anticipates an additional take of 1 to 3 natural-origin adult steelhead and 407 to 814 natural-origin juvenile steelhead at the Battle Creek project site during a maximum of 2 days in May of 2008 and 2009, when heavy equipment is crossed over from the north side to the south side of Battle Creek.

This is the maximum level of potential incidental take based on the estimated total number of individuals of these listed species that may be present in the action area, and is expected to be in the form of increased stress levels, migration delays, displacement from preferred habitat, associated monitoring, and injury/mortality from moving machinery.

Anticipated incidental take may be exceeded if project activities exceed the criteria described above or if the project is not implemented as described in the ASIP, as amended September 19, 2007, for the project, including the full implementation of the proposed conservation measures listed in the *Description of the Proposed Action* section.

B. Effect of the Take

In the accompanying biological opinion, NMFS determined that the previously described level of anticipated take is not likely to result in jeopardy to the species or the destruction or adverse modification of critical habitat.

C. Reasonable and Prudent Measures.

Pursuant to section 7(b)(4) of the ESA, the following reasonable and prudent measures are necessary and appropriate to minimize take of Central Valley spring-run and Central Valley steelhead:

1. USFWS shall minimize the harm to salmonids in the action area during the implementation of the proposed action.
2. USFWS, in cooperation with Reclamation, shall closely monitor all construction activities, and report any incidences of take of listing salmonids that results from construction of the project.

D. Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, the USFWS, in cooperation with Reclamation, must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

RPM 1. USFWS shall minimize the harm to salmonids in the action area during the implementation of the proposed action.

a. To minimize the risk to fish and habitat from the fording across Battle Creek by heavy machinery and equipment, the fording should proceed slowly and carefully to allow wildlife (*e.g.*, adult and juvenile salmonids) sufficient time to escape in advance of machinery, assisted by field staff monitoring for the presence of salmonids.

b. If salmonids are in the project area, USFWS should monitor the sound level in Battle Creek as machinery is crossing. If sound level approaches 120 dB, the crossing of machinery should be staggered, to allow for a recovery period between each crossing.

c. USFWS, in cooperation with Reclamation, for the purposes of agency review and approval, shall provide the finalized project plans to NMFS at least 14 days prior to implementation:

- the final Spill Prevention and Countermeasure Plan (SPCP) intended to prevent contamination of soils and waterways from construction and hazardous materials;
- any chemically-treated substances that will be used during the instream construction window;
- the final stream crossing design;
- all water pumps screened to NMFS criteria;
- if gravel cofferdams are used during project implementation, the source location of gravel and extraction methodology;
- the design specifications and installation process for the crest cap and overshot gate to the existing barrier weir;
- any pile-driving or dredging activities; and,
- final area of deposition of project spoils.

d. USFWS, in cooperation with Reclamation, for the purposes of agency review and approval shall provide to NMFS at least 60 days prior to implementation the finalized project plans for any blasting activities.

RPM 2. USFWS, in cooperation with Reclamation, shall closely monitor all construction activities, and report any incidences of take of listing salmonids that results from construction of the project.

a. USFWS, in cooperation with Reclamation, shall provide annual reports to NMFS' Sacramento Area Office (see contact information below) within six months of the close of each instream construction season (*i.e.*, approximately March 1, following an October 1 close of construction).

- These reports shall include: a summary of total numbers of listed salmonids encountered, captured, or killed during construction and rescue operations; progress on construction elements and updated timelines for project completion; and efficacy of the conservation measures and descriptions of any unforeseen problems or incidents that may have affected listed salmonids.

Updates and reports required by these terms and conditions shall be submitted to:

Office Supervisor
NMFS
Sacramento Area Office
650 Capitol Mall, Suite 8-300
Sacramento, CA 95814

X. CONSERVATION RECOMMENDATIONS

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

NMFS believes the following conservation recommendation is consistent with these obligations, and therefore should be implemented by USFWS and Reclamation.

a. USFWS and Reclamation should continue to work cooperatively to implement the screening of the Coleman NFH water supply intake 2. In order to minimize take occurring at Intake 2, the USFWS, in cooperation with Reclamation, should expeditiously pursue funding and implementation of Phase 2 of the Coleman NFH Water Intakes Rehabilitation Project. Implementation of Phase 2 should begin no later than 3 years and completed within 5 years, from the 2008 issuance of the biological opinion for that project. This screening project further integrates Coleman NFH operations/management with salmonid restoration activities in Battle Creek, and is necessary for protecting restored runs of Sacramento River winter-run

Chinook salmon, Central Valley spring-run Chinook salmon, and Central Valley steelhead in the Battle Creek watershed.

In order for NMFS to be kept informed of actions avoiding or minimizing adverse effects or benefiting listed species or their habitats, NMFS requests notification of implementation of the conservation recommendation.

XI. REINITIATION OF CONSULTATION

This concludes formal consultation on the action(s) outlined in the November 13, 2007, request for consultation received from the USFWS. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: 1) the amount or extent of incidental take is exceeded, 2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion, 3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion, or, 4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, formal consultation shall be reinitiated immediately.

XII. REFERENCES

Enger, P.S., H.E. Karlsen, F.R. Knudsen, and O. Sand. 1993. Detection and reaction of fish to infrasound. ICES of Marine Science Symposium 196: 108-112.

Engineers Without Borders Cal Poly.

<http://ceenve3.civeng.calpoly.edu/cota/ENVE309/Measurement%20OF%20Sound.htm>

Hastings, M.C. and A.N. Popper. 2005. Effects of Sound on Fish. Prepared for Jones and Stokes under California Department of Transportation Contract No. 43A0139, Task Order 1. 82 pp.

Hawkins, A.D. and A.D.F. Johnstone. 1978. The hearing of the Atlantic salmon, *Salmo salar*. Journal of Fisheries Biology 13: 655-673.

Kier and Associates. 2000. Draft Battle Creek salmon and steelhead restoration project adaptive management plan. Prepared for U.S. Bureau of Reclamation, Pacific Gas and Electric, National Marine Fisheries Service, U.S. Fish and Wildlife Service and California Department of Fish and Game. 78 p.

Knudsen, F.R., C.B. Schreck, S.M. Knapp, P.S. Enger and O. Sand. 1997. Infrasound Produces flight and avoidance responses in Pacific juvenile salmonids. Journal of Fish Biology 51: 824-829.

Owens, P.N., Batalla, R.J., Collins, A.J., Gomez, B., Hicks, D.M., Horowitz, A.J., Kondolf, G.M., Marden, M., Page, M.J., Peacock, D.H., Petticrew, E.L., Salomons, W., and N.A. Trustrum. 2005. Fine-grained sediment in river systems: environmental significance and management issues. River Research and Applications 21: 693-717.

Popper, A.N., J. Fewtrell, M.E. Smith, and R.D. McCauley. 2004. Anthropogenic Sound: Effects on the behavior and physiology of fishes. Marine Technology Society Journal 37(4): 35-40.

Rogers, P.H. and M. Cox. 1988. Underwater sound as a biological stimulus. Pp. 131-149 in Sensory Biology of Aquatic Animals, J. Atema *et al.*, eds. Springer-Verlag, New York.

Scholik, A.R. and H.Y. Yan. 2002. Effects of boat engine noise on the auditory sensitivity of the fathead minnow, *Pimephales promelas*. Environmental Biology of Fishes 63:203-209.

Smith, M.E., A.S. Kane and A.N. Popper. 2004. Noise-induced stress response and hearing loss in goldfish (*Carassius auratus*). Journal of Experimental Biology 207: 427-435.

U.S. Bureau of Reclamation (Reclamation). 2003. Draft Battle Creek salmon and steelhead restoration project environmental impact statement/environmental impact report. Mid Pacific Region. Sacramento, CA.

Reclamation. 2007. Memorandum to NMFS regarding the early crossing Battle Creek by contractor before the established instream work window in order to complete the hatchery ladder modification on time. 4 p.

Reclamation and U.S. Fish and Wildlife Service (USFWS). 2007. Action Specific Implementation Plan, as amended on September 19, 2007. 78 p.