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

January 19, 2012

In response refer to:
2011/06217

Jeremy Ketchum, Chief
California Department of Transportation
Office of Environmental Management S-1
District 3 - Sacramento Area Office
Gateway Oaks, MS 19
2800 Gateway Oaks Dr., STE.100
Sacramento, California, 95833

Dear Mr. Ketchum,

Thank you for your December 23, 2011, request to reinitiate consultation on the Willits ByPass Project. This letter transmits NOAA's National Marine Fisheries Service's (NMFS) biological opinion (Enclosure 1) based on NMFS' review of the U.S. Federal Highway Administration's (FHWA) and California Department of Transportation's (Caltrans) proposed construction of the Hwy. 101 Willits Bypass, in Mendocino County, California. Caltrans is now acting as the action agency for this project as per the agreement with the FHWA in accordance with Section 6005 (a) of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (PL-109-59) to assume the FHWA Secretary's responsibilities under the National Environment Policy Act of 1969 (42 USC 4351, *et seq.*) and all or part of the FHWA Secretary's responsibilities for environmental review, consultation, or other action required under any environmental law with respect to one or more highway projects within the state.

Caltrans has proposed the Willits Bypass Project to reduce delays, improve safety, and improve conditions for interregional traffic. The primary feature of the proposed project is a new segment of Hwy. 101 that would bypass the City of Willits.

The enclosed biological opinion is based on NMFS' review of information provided in Caltrans' October 11, 2011, Mitigation and Monitoring Proposal as well as other documents, meetings, telephone conferences, site visits, and analyses provided during this consultation and the previous consultation in 2010. Caltrans reinitiated consultation on the Willits Bypass for the Willits Bypass mitigation and monitoring proposal actions that may affect listed salmonids in the action area, or critical habitat for these species. This biological opinion addresses potential adverse effects on the following listed species (Evolutionarily Significant Unit or Distinct Population Segment) 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.*):

California Coastal Chinook salmon (*Oncorhynchus tshawytscha*)
threatened (June 28, 2005, 70 FR 37160)
critical habitat (September 2, 2005, 70 FR 52488)
Southern Oregon/Northern California Coasts coho salmon (*O. kisutch*)
threatened (June 28, 2005, 70 FR 37160)
critical habitat (May 5, 1999, 64 FR 24049)
Northern California steelhead (*O. mykiss*)
threatened (January 5, 2006, 71 FR 834)
critical habitat (September 2, 2005, 70 FR 52488)

Based on the best available information, the enclosed biological opinion concludes the proposed Willits Bypass Project is not likely to jeopardize the continued existence of California Coastal Chinook salmon, Southern Oregon/Northern California Coasts coho salmon, or Northern California steelhead, or result in the destruction or adverse modification of designated critical habitat for these species. However, NMFS expects the action is likely to result in take of listed anadromous salmonids. An incidental take statement is included with the enclosed biological opinion. The incidental take statement includes non-discretionary terms and conditions that are expected to minimize the impacts of incidental take of listed salmonids as a result of the Willits Bypass Project road and bridge building activities. In addition, several conservation recommendations have been included in the enclosed biological opinion.

This letter also transmits NMFS' Essential Fish Habitat (EFH) Conservation Recommendations pursuant to section 305(b) of the Magnuson-Stevens Fisheries Conservation and Management Act (MSFCMA) (Enclosure 2). The Willits Bypass project site includes areas identified as EFH for various life stages of species managed under the Pacific Coast Salmon Fishery Management Plan. Based on our review, NMFS concludes that the Willits Bypass Project has the potential to adversely affect EFH. The enclosed Conservation Recommendations are designed to minimize potential adverse effects on EFH.

Please contact Mr. Tom Daugherty at (707) 468-4057 or tom.daugherty@noaa.gov if you have any questions regarding the enclosed biological opinion or require additional information.

Sincerely,

for Chris Yates

Rodney R. McInnis
Regional Administrator

Enclosures

cc: Chris Yates, NMFS, Southwest Region, Long Beach
Chris Collison, Jeremy Ketchum, Caltrans Sacramento
Copy to file 1514122SWR2002SR8262

Enclosure 1

BIOLOGICAL OPINION

ACTION AGENCY:	California Department of Transportation
ACTION:	Funding and Construction of the Hwy. 101 Willits Bypass Project
CONSULTATION CONDUCTED BY:	National Marine Fisheries Service, Southwest Region
PCTS TRACKING NUMBER:	2011/06217
DATE ISSUED:	**January 19, 2012**

I. CONSULTATION HISTORY

In 1994, the U.S. Army Corps of Engineers (ACOE), U.S. Environmental Protection Agency (USEPA), U.S. Department of Transportation Federal Highway Administration (FHWA), U.S. Fish and Wildlife Service (USFWS), NOAA's National Marine Fisheries Service (NMFS), and California Department of Transportation (Caltrans) signed a formal Memorandum of Understanding (MOU) that would integrate the National Environmental Policy Act (NEPA) process and Clean Water Act Section 404 procedures, as well as improve coordination among stakeholder agencies. The NEPA/404 integration process was designed to implement Section 404 more effectively to preserve wetlands and the plants and animals that depend on this type of habitat. Under the guidelines of the MOU, signatory agencies (NEPA/404 Resource Agencies) are to agree to a project's Purpose and Need Statement, which sets forth the criteria for selecting project alternatives. The guidelines also specify that signatory agencies are to agree to the alternatives to be studied, early in the environmental review process.

Caltrans is now acting as the action agency for this project as per the agreement with the FHWA in accordance with Section 6005 (a) of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (PL-109-59) to assume the FHWA Secretary's responsibilities under the National Environment Policy Act of 1969 (42 USC 4351, *et seq.*) and all or part of the FHWA Secretary's responsibilities for environmental review, consultation, or other action required under any environmental law with respect to one or more highway projects within the state.

Initial Consultation 1995-2006

Shortly after the MOU was signed, Caltrans and FHWA initiated the NEPA/404 integration process for the Route 101 Willits Bypass project with USEPA, ACOE, USFWS, and NMFS, and invited these agencies to join the Project Development Team (PDT). In 1995, the participating agencies approved the alternatives that would be studied and the Purpose and Need Statement that would guide the project design and operation.

In 1997, Jones and Stokes Associates Inc. prepared a Natural Environmental Study for the Hwy. 101 Willits Bypass Project Area that was submitted to Caltrans, Eureka, California (Jones and Stokes 1997).

On June 1, 1998, NMFS received a letter from Caltrans stating that studies on the Hwy. 101 Willits Bypass would be resuming and six distinct four-lane corridor alignments were to be evaluated. This correspondence also formally invited NMFS to take part in the PDT and to bring forth any concerns regarding the potential effects of the proposed action on Northern California (NC) steelhead (*Oncorhynchus mykiss*), threatened California Coastal (CC) Chinook salmon (*O. tshawytscha*), and threatened Southern Oregon/Northern California Coasts (SONCC) coho salmon (*O. kisutch*) and designated critical habitat for these species.

NMFS participated in ten PDT meetings from June 1998 to October 2003. During this time, a number of major decisions were made with respect to the project. Caltrans determined that two alternatives (Alternatives K and K2) were no longer prudent or feasible, and a third alternative (Alternative TSM) did not meet the project's purpose and need. NMFS brought forth concerns with one of the remaining alternatives (Alternative E3) due to the potential impacts to high-quality stream habitats located in the upper reaches of Baechtel, Broaddus, and Mill Creeks. In addition, NMFS expressed concern with an alternative (Alternative C1) due to potential effects to salmonid spawning and rearing habitat in reaches of Outlet Creek.

Alternatives C1T, J1T, LT, E3, and No Build were considered in the draft Environmental Impact Report/Environmental Impact Statement (EIR/EIS). In addition, the NEPA/404 Resource Agencies agreed that Caltrans would examine the remaining alternatives using a nodal approach, whereby each segment of the remaining alternatives would be evaluated in the draft EIR/EIS. During development of these alternatives, NMFS participated in a number of site visits and meetings regarding the effects of the project and possible mitigation actions to reduce the overall effect to the environment.

On August 22, 2002, NMFS provided Caltrans with comments on the draft EIR/EIS. In that letter, NMFS raised various issues, including potential effects of proposed alternatives on water quality, salmonid habitat, and specific life stages of federally protected salmonids. Caltrans conducted alternatives analysis based on public and agency comments on the draft EIR/EIS, and identified the Modified J1T Alternative as the least environmentally damaging practical alternative (LEDPA). NMFS provided Caltrans with a letter on January 23, 2004, which supported the Modified J1T Alternative as the LEDPA, yet provided Caltrans with concerns related to riparian removal and sediment delivery associated with the Modified J1T Alternative. Once FHWA and Caltrans received concurrence from the NEPA/Section 404 agencies on the LEDPA, they initiated formal section 7 consultation with NMFS on October 17, 2005.

During late May and June 2006, Caltrans and NMFS discussed potential changes to the project's construction techniques including dewatering of bridge construction sites and sound monitoring during pile driving. On June 1, 2006, NMFS provided to Caltrans a preliminary draft of the Incidental Take Statement (ITS) attached to the NMFS internal draft biological opinion. Caltrans provided comments on the draft ITS on June 9, and June 22, 2006. Caltrans suggested that dewatering and relocation of salmonids not occur unless sound levels during pile driving exceeded 187 sound exposure level (SEL) or 208 sound pressure level (SPL) (see section V.C for detailed descriptions of these metrics). The September 2005 biological assessment for the project proposed that NMFS would establish the sound threshold, which would trigger dewatering of the project sites.

NMFS and Caltrans then met in Sacramento, California, on June 26, 2006, to discuss sound monitoring, project site dewatering, and sound levels, which may injure fish. During the meeting, Caltrans continued to propose that dewatering of the stream area near a pile driving work site should not occur unless injurious levels of sound were detected. NMFS expressed concern that waiting until injury occurs does not minimize impacts. NMFS proposed that measures be implemented to protect the fish prior to the onset of injury.

To resolve this issue, Caltrans proposed to dewater stream reaches in advance of pile driving to ensure listed salmonids would not be exposed to unsafe levels of sound. An electronic mail message from Sarah Allred (Caltrans) to Thomas Daugherty (NMFS) on June 30, 2006, confirmed that Caltrans would remove fish and de-water stream areas in the vicinity of pile driving and would not rely on sound monitoring thresholds to determine if dewatering is needed. Above and below each dewatered reach, Caltrans proposed to conduct hydroacoustic monitoring during pile driving to assess sound levels.

By letter dated July 13, 2006, to NMFS, Caltrans expressed concern with the delay in issuance of the NMFS biological opinion for the Willits Bypass Project. Caltrans' letter suggested the sound threshold issues associated with pile driving be set aside for this project, because they agreed to dewater all wetted stream crossings prior to pile driving.

On July 19, 2006, Caltrans and NMFS exchanged additional information by electronic mail regarding the hydroacoustic monitoring above and below dewatered areas of the stream.

Having addressed the project effects on listed salmonids and issues related to hydroacoustic monitoring, NMFS finalized and issued the first Biological Opinion for the Willits Bypass Project on September 11, 2006.

Reinitiated Consultation 2009-2010

Following issuance of the September 11, 2006 biological opinion, Caltrans decided to construct the proposed project in two phases rather than one phase. Under the new proposal, two highway lanes would be constructed in each phase for a total of four lanes, and ultimately becoming two for southbound and two for northbound traffic. A two-lane, northbound and southbound, bypass would be completed in Phase 1, during which time Caltrans would continue to acquire future rights-of-way to further the development of the four-lane highway prism. The completed four-lane by-pass would be completed in Phase 2 as funding becomes available. As a result, it was necessary for Caltrans to reinitiate consultation with NMFS to address this two phase approach and related changes. That additional consultation resulted in a second biological opinion that assessed impacts for the four-lane bypass and all construction work for Phases 1 and 2, whichincluded a new action area. NMFS indicated to Caltrans that because the time between the end of Phase 1 and the start of Phase 2 may take up to ten years, there could be a need to reassess the status of the listed species and critical habitat in the project's action area. Therefore, the project activities analyzed in the second biological opinion were clearly defined as occurring in phase 1 or phase 2 with the caveat that those activities occurring in Phase 2 may be subject to reinitiation of section 7 consultation.

Other changes to the project description (originally described in the September 11, 2006 biological opinion) included a new alignment for the viaduct placement and a new footprint for the Quail Meadows interchange at the northern end of the bypass. The viaduct will now reroute around the existing Willits Wastewater Treatment Plant (WWTP), using a triple compound curve alignment that will shift slightly to the northeast and return to alignment near the Northwestern Pacific Railroad crossing. The new viaduct design will have a lower profile over the railroad tracks, resulting in a significant reduction of the embankment footprint between the end of the viaduct structure and the railroad crossing. This new alignment will preclude the need to decommission the wastewater treatment ponds at the WWTP. The proposed interchange at Quail Meadows has expanded to include additional crossings over Upp Creek and incorporation of a roundabout.

Multiple agencies, including NMFS staff, met in Willits, California on February 3 and 4, 2010, to view the new project locations and discuss the new project details.

Another site visit was conducted on February 11, 2010, between NMFS, Caltrans, and the California Department of Fish and Game (CDFG) to review key fish passage areas along upper and middle Haehl Creek and Upp Creek. CDFG has concerns stemming from the highly eroded conditions along the banks of upper Haehl Creek and the amount of work proposed to align the middle Haehl Creek, and the channel reconfiguration plans proposed by Caltrans. Additional meetings between NMFS, Caltrans, and CDFG followed to address the fish passage plans and their possible modification.

On March 1, 2010, Caltrans reinitiated formal section 7 consultation with NMFS by transmitting a biological assessment that analyzed the potential impacts of the proposed changes to the Willits Bypass project.

One additional site visit occurred on April 15, 2010, between Caltrans, CDFG, CH2MHill, and NMFS to finalize the fish passage requirements and mitigation components for upper Haehl and Upp Creeks.

Having addressed the effects of the redefined two-phase project on listed salmonids, NMFS finalized and issued the second Biological Opinion for the Willits Bypass Project on June 22, 2010.

Second Reinitiated Consultation 2011

Since the transmittal of NMFS' June 22, 2010, biological opinion, Caltrans has worked to develop the final mitigation and monitoring plan for the bypass project. Additional mitigation actions were required for wetland impacts associated with the issuance of the Department of the Army Corps of Engineers (USACE) 404 permit, and for sediment reduction needed to acquire the State Water Resources Control Board 401 water quality permit. By letter on October 6, 2011, Caltrans notified NMFS that the USACE had issued a 404 permit Public Notice for the Caltrans' October 11, 2011, Mitigation and Monitoring Proposal (Caltrans 2011b). NMFS transmitted a comment letter regarding the October 11, 2011, Mitigation and Monitoring Proposal to the USACE on November 17, 2011.

Caltrans requested reinitiation of section 7 consultation on December 23, 2011 (Caltrans 2011c) to include actions associated with the October 11, 2011, Mitigation and Monitoring Proposal, which is associated with the overall Willits Bypass Project. NMFS previously analyzed mitigation and monitoring for the Willits Bypass Project during the 2006 and 2010 consultations. Caltrans, based on their October 11, 2011, Mitigation and Monitoring Proposal, determined the proposed mitigation and monitoring actions may affect listed salmonids in ways not previously considered during the 2006 and 2010 consultations with NMFS, and described these potential effects in an Addendum to the Biological Assessment dated December 2011.

This latest biological opinion addresses the Willits Bypass Project described in the June 22, 2010 biological opinion and also includes the activities described in the October 11, 2011, Mitigation and Monitoring Proposal, other minor construction modifications that reduce impacts to aquatic habitat, and fish passage improvement actions on Ryan Creek that were not analyzed during the previous consultations.

A complete administrative record for this consultation is on file at the NMFS North Central Coast Office in Santa Rosa, California.

II. DESCRIPTION OF THE PROPOSED ACTION

The Willits Bypass, with a total length of 13.8 kilometers (km) (8.5 miles) will traverse creeks, riparian corridors, streets, and railroad right-of-ways using 20 bridges, two viaducts, and three retaining walls. The project, as newly proposed, will be constructed in two phases, the first phase beginning in 2012 and ending in four to five years. The start of Phase 2 construction may take up to 10 years from Phase 1, in which case Caltrans may have to reinitiate consultation (see the *Consultation History*). Table 1 details the project activities that will occur under each construction phase.

Right-of-Way	Acquire right-of-way for full four-lane project	None required. All acquisitions, relocations, and utility involvements addressed under Phase 1
Environmental Mitigation	Perform environmental mitigation for full four-lane Hwy.	More mitigation may be required depending on the start of Phase 2.

		Current mitigation covers both phases
Haehl Creek Interchange	Construct the full interchange	All construction accomplished in Phase 1
Quail Meadows Interchange	Construct two lane interchange with southbound ramps in their ultimate locations and northbound ramps adapted to ultimate southbound mainline, which serves both directions in Phase 1	Construct the northbound mainline structures, realign northbound ramps, and replace the northbound on-ramp Upp Creek bridge to its ultimate location.
Viaduct	One viaduct with two lanes to service one lane of northbound and one lane of southbound traffic	One viaduct with two lanes that will service northbound traffic and Phase 1 viaduct will switch over to two lanes that will service southbound traffic
Median	Construct full project median to just south of East Hill Road where it tapers to no median.	Construct the full median from transition constructed under Phase 1 north to ultimate project transition north of Quail Meadows interchange.
Lanes	Construct four lanes to a point between Haehl Creek interchange and East Hill Road, where Phase 1 roadbed reduces to one lane each direction. Construct ultimate southbound lanes from the reduction area north to the end of the project.	Construct the northbound lanes from the previous transition north to ultimate project transition north of the Quail Meadow interchange. Remove Phase 1 transition from the median.
Shoulders	Construct standard 3 m outside and 1.5 m inside shoulders in the four-lane section between Haehl Creek interchange and East Hill Road. Construct 2.4 m shoulders north of where the Hwy. will transition to two lanes	Construct standard 3 m outside and 1.5 m inside shoulders for the northbound lanes.
Grade Separation	Construct two-land grade separation structures.	Grade separation is in accordance with full four-lane project.
Earthwork	Perform full earthwork to the transition area south of East Hill Road. Place full embankment from the left ultimate catch point to centerline of ultimate median[1].	Complete earthwork for Phase 2–Additional Phase 2 work discussed in section 2 *of the DESCRIPTION OF THE PROPOSED ACTION.*
Drainage	Construct full drainage, including roadside ditches, and design pollution prevention BMPs, and treatment BMPs for ultimate project, except lanes and median drainage to be completed in Phase 2.	Construct drainage for lanes and completed median.

Table 1. Project activities that will occur under Phase 1 and Phase 2

[1] Fill for the roadbed for Phase 2 will no longer be placed during construction of Phase 1.

A. General Description

Caltrans proposed the Hwy. 101 Willits Bypass to reduce delays on U.S. Route 101. Currently, Hwy. 101 runs through the City of Willits, California. The bypass project will re-route Hwy. 101 around the City of Willits, providing a stable flow of traffic at 65 miles per hour. The proposal includes the construction of a four-lane freeway that crosses the Little Lake Valley east of Willits. The bypass would begin 3.2 km south of Willits, where the existing Hwy. 101 becomes a two-lane road, and extend to about 2.1 km north of Willits, where the new alignment would merge with the existing two-lane Hwy. 101 at the Quail Meadow Interchange. Phase 1 will begin in 2012, and likely take four to five years to complete, followed by Phase 2 at a later date.

The southern end of the proposed bypass project begins at the Haehl Creek Interchange, where future traffic will be able to remain on the freeway by taking the bypass, or exit to the south end of Willits. The freeway bypass project will continue from the Haehl Creek interchange approximately five km along existing and new imported fill to a proposed viaduct structure. The viaduct structure begins near Center Valley Road and crosses Haehl, Baechtel, Broaddus, Outlet and Mill creeks for a distance of 1.7 km. The proposed freeway bypass then continues on new fill for approximately 0.4 km, crosses the railroad grade before reaching the Quail Meadows Interchange 1.5 km to the north of Willits. The proposed freeway bypass continues for approximately one additional km after crossing Upp Creek before re-joining the existing route of Hwy. 101. The overall length of the proposed freeway bypass will be approximately 9.5 km.

North and southbound lanes of the new alignment will be 3.6 meter (m) wide. A 13.8-m median will separate the northbound and southbound lanes. The inside shoulder width, nearest the medium, will be 1.5 m and 3.0 m on the outside shoulder. Cut slopes will vary from 1:1 (vertical: horizontal) to a 1:4 ratio. Fill slopes generally will vary between 1:2 and 1:4 ratios. Interchange ramps will have single lanes. Some local roads will be improved or constructed to two lanes with 2.4-m shoulders. Private access roads will be improved or constructed to meet Mendocino County Standards.

The proposed bypass will cross Haehl Creek at three locations (hereafter, termed upper (southernmost reach), middle and lower (northernmost reach)), Baechtel Creek, Broaddus Creek, Mill Creek, and Upp Creek. The crossings at middle Haehl Creek would consist of bridges for the north- and south-bound lanes, located just south of Shell Lane.

There are five crossings proposed for the upper Haehl Creek location resulting from the Haehl Creek Interchange: southbound off-ramp over Haehl Creek; northbound on-ramp over Haehl Creek; northbound freeway lanes over Haehl Creek; southbound freeway lanes over Haehl Creek. A replacement of an existing culvert for the Schmidbauer (private landowner) access road with a natural bottom culvert will also occur at the upper Haehl Creek location.

There are six crossings proposed at Upp Creek as a result from the Quail Meadows Interchange: the southbound freeway lanes; the northbound freeway lanes; the northbound on-ramp, (Phase 1); another northbound on-ramp (proposed for Phase 2); the southbound off-ramp; and at the roundabout local intersection. The crossings at lower Haehl, Baechtel, Broaddus, and Mill

Creeks will consist of the north and southbound viaduct structures with construction of the southern viaduct occurring in Phase 1 and the northbound viaduct occurring in Phase 2. Also during Phase 1 there will be a culvert removal at old Highway 101.

B. Specific Construction Actions

1. Staging Areas

In Phase 1 of construction, four staging areas will be established in the following locations: the south-central staging area (parcel 007-100-08) to be located south of Shell Lane, just east of the Northwest Pacific Railroad (NWPRR) tracks, and west of Haehl Creek; the central staging area (parcel 007-04-09) to be located near the lower Haehl Creek viaduct crossing, which will replace the old Schuster's Trucking location; the concrete batch plant to be located at the central staging area; and the northern staging area that will remain in its original location east of US 101, just west of the proposed Quail Meadows interchange and south of the proposed roundabout.

These staging areas are located where the contractor can gain easy access to the project corridor and will be used to store equipment and materials, and in the case of the concrete batch location, mix materials. Access roads from the staging areas to the project corridor will be constructed where necessary. The work will begin at several areas at the same time. Where staging areas are located adjacent to salmonid-bearing creeks, a sufficient buffer will be maintained along with appropriate best management practices (BMPs) to ensure storm runoff from these areas does not directly flow into any natural drainage. No riparian vegetation will be removed within the staging areas.

2. Road Construction

In Phase 1 of construction, the highway will consist of four lanes on the southern end and taper down to two lanes due north, between the Haehl Creek Interchange and East Hill Road. In Phase 2 of construction, the additional northbound lanes will pick up from the end of the four lanes at East Hill Road and continue north where they will terminate at the Quail Meadows Interchange.

Caltrans will lay out the new alignment and the contractor will demolish structures and clear the work area. Excavated material from a permitted borrow site, such as Oil Well Hill, will be transported to the alignment where it is placed and compacted to support the pavement section. Earthen material will be excavated, transported, and compacted to build the road bed for Phase 1. A haul road will be constructed within the limits of the alignment, and used to transport material from the borrow site to the areas of new construction. At a later date, earthen material will be excavated, transported, and compacted to build Phase 2.

Once the material is transported to its desired location, heavy equipment including bulldozers, graders, scrapers, and large trucks will shape the freeway embankment. Compaction occurs simultaneously during this process. Drainage facilities will be installed during this phase of the project.

When the embankment is completed, aggregate will be brought in with belly dump trucks and spread on the roadbed surface. The roadbed will then be watered, and further shaped and compacted to design specifications. Trucks will then haul in asphalt concrete, spread it with specialized paving equipment, and compact it to specified dimensions.

Each lane will be 3.6-m wide with five foot-wide inside shoulders, ten foot outside shoulders and a 13.7-m median – for a total width of 26.7 m. The median width was reduced from 18.5 m, thus reducing the construction footprint and the environmental impact from the project.

a. *Quail Meadows Interchange*

Under the new project description, this interchange will move approximately 366 m north of its original proposed alignment and a roundabout will be added onto the west side of the interchange. The Quail Meadows overhead (*i.e.*, the grade separation for the nearby NWPRR crossing) is designed to have a lower profile and consequently reduce the ramp lengths and their impact footprints.

Following Phase 1 of construction, the Quail Meadows Interchange will be two lanes with southbound ramps in their final locations and the northbound ramps converted over to a southbound mainline that will service both directions. In Phase 2 construction, the northbound lanes will be rerouted to their final locations north of the Quail Meadows Interchange and the Phase 1 transition from the median will be removed.

b. *Haehl Creek Interchange*

The amount of excavation required at this interchange has been reduced from the 17 acres originally planned to 12.7 acres as a result of realigning the southbound onramp to use the existing highway. Under the new proposed project description, the southbound on-ramp was realigned to intersect with what will become State Route 20. The new design will reduce the construction footprint and consequently any associated impacts. The Haehl Creek Interchange will be completed in Phase 1 of construction with all six crossings.

3. Borrow of Earthen Fill from Oil Well Hill

Up to 1.4 million cubic m of earthen material can be excavated from the borrow site at Oil Well Hill for Phase 1 construction, within an excavation area of 4.93 hectares. This activity will occur on the east side of Hwy. 101 beginning approximately 425 m north of the Hwy. 101 Bridge over Outlet Creek. The material will be transported to the project corridor via trucks using the existing Hwy. 101, along haul roads within the limits of the new alignment. Sediment basins and other BMPs will be constructed to minimize and avoid sediment entering Outlet Creek.

If the contractor selected by Caltrans opts to use an alternative borrow site, the contractor will be required to submit a new borrow site plan to the Caltrans Resident Engineer. All borrow sites, whether designated by Caltrans or the contractor must comply with the project contract and environmental laws and regulations. Caltrans will need to submit a project description, detailing activities in the new location to NMFS for review, which may require reinitiation of section 7 consultation.

Caltrans will have on-site inspectors monitoring the Oil Well Hill excavation activities throughout the excavation process and during the monitoring for the maintenance of the Storm Water Pollution Prevention Plan (SWPPP) and BMPs such as the detention basins (Chris Collison, email correspondence, Caltrans 2010). The expanse of the excavation area will not allow for covering, but control of discharges off the site will be addressed in the SWPPP.

4. Concrete Batch Plant

In order to supplement the current commercial production of concrete and to minimize specified haul time, Caltrans will allow contractors to construct a temporary plant(s) near the project site. One possible site is on a state owned property (parcel 007-040-09), located south of East Valley Street, east of the south abutment of the floodway viaduct and west of Haehl Creek. This biological opinion assumes one concrete batch plant will be constructed and if an alternative site is selected or additional temporary concrete plants are constructed, additional review by NMFS and reinitiation of section 7 consultation may be necessary.

5. Retaining Walls

Three retaining walls are proposed for this project at the following locations: two near Haehl Creek, at the southern freeway interchange and one just before the south end of the viaduct near Baechtel Creek. The second retaining wall will be located on the east side of the northbound mainline lanes just south of the new crossing over upper Haehl Creek. Rock slope protection may be needed for a distance of up to 15 m along the south bank of Haehl Creek. The third retaining wall will be located on the west side of the southbound lanes south of the viaduct, and east of Baechtel Creek.

To construct the two retaining walls at the southern interchange, removal of riparian vegetation will be required. A portion of these walls may require rock slope protection. The wall foundations will require the installation of H-piles by pile driving. Equipment may need to enter the Haehl Creek channel at this location for construction activities. However, because this reach of Haehl Creek is normally dry during the summer months, the work in this area will likely occur when the channel is dry. The third retaining wall south of the viaduct will be constructed on grassland and will not require the removal of riparian vegetation.

6. Permanent Bridge Construction

At the upper Haehl Creek interchange area, the proposed bridges will be freespanning and consist of the two freeway structures (northbound and southbound lanes); the southbound off-ramp; and the northbound on-ramp; the northbound freeway lane separation with Hwy. 20; and the southbound freeway lane separation with Hwy. 20, for a total of six bridge crossings. Rock slope protection will be placed only on the banks up and downstream of the abutments.

The proposed new Schmidbauer Ranch access road will be located off the east side of the Haehl Creek Interchange and will connect with an existing dirt road that crosses over Haehl Creek. The reconstruction of this access road will require removal of an existing culvert. This culvert will be replaced with an appropriately sized culvert that provides flood flow conveyance and anadromous fish passage.

At the middle Haehl Creek crossing, the proposed bridges will consist of two separated freeway structures (northbound and southbound lanes). The proposed bridge sites will be cleared of vegetation prior to construction. Rock slope protection will be minimized to areas where erosion of the abutments would likely take place.

At lower Haehl Creek, Baechtel Creek, Broaddus Creek, and Mill Creek, permanent stream crossings will consist of two freeway structures (northbound and southbound lanes) for the viaduct. These viaduct crossings and construction methods are described in further detail below.

Permanent bridge building will begin with construction of approaches, where necessary, followed by construction of the abutments. The abutment work will include excavation for the footings, pile driving, or drilling for the foundations (which will occur outside the creek channels), formwork for concrete placement, steel reinforcement bar placement, concrete pouring, finishing, and curing. Each of the permanent bridge abutments may require approximately twenty 35 centimeter (cm) to 51 cm H-piles, placed by pile drivers at or near the top of bank. The lower Haehl Creek crossing will use 35 cm pipe piles for the abutments in place of H-piles.

The temporary false work at each permanent bridge site will be constructed between June 15 and October 15. The false work substructure will consist of steel beams supported by the piles or wood pads and will span the creek channel, thus eliminating the need to place piles in the streambed below ordinary high water mark. False work supports will consist of hollow, 61 cm to 76 cm diameter steel piles, H-piles, or wood pads. Installation of these supports will require pile driving. Following pile placement, the permanent bridge superstructure forms would then be erected and concrete poured, finished, and cured. After a suitable time to allow the concrete to set and strengthen, the falsework would be removed and other work, including bridge rail and approach work, would be completed.

The use of temporary culverts for construction of the structures crossing salmonid-bearing streams is not anticipated. If dewatering is required at any of these stream crossings, cofferdams will be used to divert stream flow around the work area. Any salmonids in work areas will be collected prior to and during dewatering for relocation to other suitable habitats nearby in the same sub-basin.

7. Temporary Bridge Construction

Temporary bridge crossings will be required to access portions of the project site at the initial stages of construction. The temporary bridges will likely consist of Bailey Bridges, railroad flatcars, or similar types of structure. These bridges would not require placing any piers in the stream channels or banks and no access into the live stream channels would be required.

Temporary trestle crossings will also be constructed in both phases of the project. Their locations will occur in the same areas including middle Haehl, Outlet, and Mill Creeks. The replacement trestle crossings are needed in both phases and their impacts will have identical effects on two separate occasions to the same fish population(s); however, the fish in a given population will likely be from a different cohort.

Temporary trestle crossings, involving the placement of temporary H-piles, will be located at Haehl, Baechtel, Broaddus, Upp and Mill Creeks, or at several other non-fish bearing streams, as necessary. If the placement of these bridges is outside of areas already proposed for temporary riparian removal areas, an additional distance of three m of riparian vegetation will be removed on both sides of the structure. The bridges would be installed during the dry season between June 15 through October 15 and would remain in place throughout the entire Phase 1, four-year construction period. The number of H-piles used for the temporary bridges are outlined further in the *Pile Driving* description of this section.

8. Viaduct Construction

The proposed viaduct will span the regulatory floodway of the Little Lake Valley and allow for runoff in the valley floodway. The viaduct will cross lower Haehl Creek, Baechtel Creek, Broaddus Creek, Outlet Creek and Mill Creek. Consisting of separate northbound and southbound elevated structures at 12.5 m wide and separated by 9.5 m (31.2 feet) from the inside edges, these viaducts will be elevated 5 m (16.5 feet) above the valley floor for their full lengths of approximately 1800 m (6,000 feet). The viaducts will span the Little Lake Valley and allow for runoff in the valley floodway.

Each viaduct span will be supported on 32 (64 total for both viaducts) evenly spaced, two-column supports (bents) with two footings per bent. Each 4.88 m by 4.88 m (16 feet by 16 feet) footing will require no more than nine, 0.61 cm Cast in Steel Shell (CISS) piles that will equate to 18 piles per bent and 576 piles total. The footings placed at Bent 24, the Baechtel/Broaddus/Outlet confluence, will be eight feet below the bottom of the creek channel. The installation of the columns and deck construction would require vegetation removal for a 30.5-m wide temporary work area on the east side of the viaduct, and a 17-m wide temporary work area on the west side of the viaduct. A work area this size will be required to support large cranes and other large-scale construction vehicles.

Permanent fill in the floodway would be limited to the total surface area encompassed by the columns (estimated to be approximately one percent of the area under the viaduct). When each frame (consisting of multiple spans) is completed, work would begin on the next frame, where material and equipment would be located.

Under the newly proposed bypass reconfiguration, the viaduct span to the east of the WWTP will require one support column placement in the wetted channel at the confluence of Baechtel and Broaddus Creeks. This column will be the sole placement within a wetted channel for the entire span of the viaduct and is required in order to preclude the decommissioning and relocation of the wastewater detention ponds. Rock slope protection will also be placed below the Ordinary High Water (OHW) mark to prevent scour around this footing.

The viaduct crossing over Baechtel Creek may require rock slope protection. Rock slope protection may be installed on both banks under the structures and for a maximum distance of eight m upstream and downstream of the structures. The removal of riparian vegetation at each crossing will occur for approximate distances of 17 m (55 feet) upstream and 30 m (100 feet) from the viaduct.

9. Pile Driving

Pile driving is required to construct the bridge abutments and piers, the bents for the viaduct, and temporary falsework supports. The proposed number of piles from the new project description are outlined in Table 2.

Pile type	Amount	Pile type	Amount
0.61 m CISS	136	0.61 m CISS	72
H-Pile *falsework*	55	H-Pile *falsework*	30
H-Pile *trestle*	40	H-Pile *trestle*	40
H-Pile *permanent*	508	H-Pile *permanent*	264
Sheet Pile	40[3]	Sheet Pile	120 (40x3)
.25 m H-pile (Spuds)	4[2]	.25 m H-pile (Spuds)	12 (4x3)
Total	739	**Total**	406

Table 2. Type and amount of piles used for construction of bridges, retainment walls, viaduct, and temporary tressles for Phase 1 and Phase 2.

a. *Cast in Steel Shell (CISS) Piles*

Under the new project description, Caltrans proposes to use 0.61 m (two foot) CISS piles for constructing the viaduct footings. This size of CISS is reduced from the two m size originally proposed for this project; however, additional pile driving using H-piles for temporary trestles that was not previously analyzed in the earlier opinion is proposed under the revised project description. In Phase 1, there will be approximately 644 permanent piles, consisting of 136 CISS and 508 H-piles that will be driven within 15 m of the top of bank of the creeks.

The footing for each bent will consist of 18 piles. The total number of bents in each viaduct is 32, for a total of 576 CISS piles per viaduct and 1,152 total. Most of these CISS piles will be placed in the wetland areas between the creeks at a far enough distance to attenuate sound waveforms. The piles driven at safe distances will not result in adverse effects to salmonids and will not be mentioned further in this biological opinion.

Occurring in both Phases 1 and 2, 72 of these CISS piles will be driven in or near wetted channels and result in fish relocation activities that will be evaluated for impacts to salmonids and habitat.

In Phase 1 construction, approximately 18 of the CISS piles will be driven in the wetted channel of the Baechtel-Broaddus-Outlet Creek confluence for Bent 24. Pile driving for Bent 24 will require fish relocation activities and cofferdam construction. The piles for Bent 24 will be driven within the confines of sheet pile cofferdams to aid in sound attenuation and is explained further below. These piles will create sound levels that will exceed the peak and continuous SPL and

[2] Bent 24 at the Baechtel/Broaddus/Outlet confluence

SEL levels of 206 decibels (dB) and 187 dB, respectively, and will require fish relocation and exclusions from the area. Sound monitoring of the pile driving and attenuation devices will be used at the locations where sound levels exceed these thresholds that are listed in Tables 5 and 6 (Chris Collison, email correspondence, May 19, 2010).

In Phase 2 of construction, the remaining 54 CISS piles for Bents 4, 23, and 28 will require Caltrans to conduct fish relocation to similar or better rearing habitat at distances of at least 35 m (115 feet) in order for sound levels to attenuate to or below the interim threshold level of 187 SEL. The remaining 54 of the CISS piles will be driven on land within 15 m of the creek channels.

b. *H-piles*

H-piles will be installed temporarily to support trestles and falsework during construction and permanently for construction of abutments and retaining walls. The falsework supports and temporary trestle crossings will use piles ranging from 61 cm to 76 cm in diameter on wood pads. Where necessary, benches will be excavated on the stream bank above ordinary high water to provide temporary footings for the false work. Each permanent bridge abutment will require approximately twenty 36 cm to 51 cm H-piles. All permanent bridge abutments will be placed above the top of bank. Where pile sizes have been approximated (*e.g.*, 61 or 76 cm), NMFS will use the larger size under a worse case scenario for pile driving effects analysis in this biological opinion.

Temporary and permanent piles will be installed with a vibratory hammer. Trestle crossings and other piles requiring a bearing load test will receive an additional 10 to 20 strikes with the impact hammer. The time required to drive typical small diameter piles may be one hour. Pile driving activities within 15 m of the top of bank may require up to a week or more, at each crossing. Each CISS pile will take approximately 50 minutes and take up to 2,210 strikes with an impact hammer. Each sheet pile cofferdam will take up to two and one half days to construct. One bent consisting of five H-piles can be installed per day.

Temporary Piles. Some of the temporary H-piles will be driven directly into wetted channels for trestle crossings over creeks where free-span bridges cannot be used. They will remain in place until Phase 1 is complete (4 years) then pulled by vibratory hammer or cut at or below the grade. Due to the possible lag time between phases it is possible to anticipate these piles will have to be reinstalled to build bents for trestles needed to complete Phase 2 of construction, in which case the same impacts will be evaluated in the same areas but for different cohorts of fish populations.

Forty of these H-piles will be installed using vibratory and impact hammers (up to 10 strikes to achieve bearing load) to cross reaches of lower and middle Haehl, Baechtel, and Mill Creeks and then removed at the end of Phase 1 with a vibratory hammer or cut off below grade.

i. H-piles used for falsework (Phases 1 and 2)

Lower Haehl Creek – One bent consisting of five piles

Middle Haehl Creek – Four bents consisting of 20 piles
Baechtel Creek – Two bents consisting of 10 piles
Broaddus Creek – One bent consisting of five piles
Baechtel/Broaddus/Outlet Creek confluence – One bent consisting of five piles
Mill Creek – One bent consisting of five piles and two bents consisting of 10 piles
Upp Creek – One bent consisting of five piles
Outlet Creek – Four bents consisting of 20 piles
Total = 85 H-Piles

ii. H-piles used for trestles (Phases 1 and 2)

Lower Haehl Creek – One bent consisting of five piles
Middle Haehl Creek – Four bents consisting of 20 piles
Baechtel Creek – two bents consisting of 10 piles
Mill Creek – One bent consisting of five piles
Total = 40 x 2= 80 H-Piles[3]

Permanent Piles. All the permanent H-type piles will be located within 15 m (50 feet) from the creeks and installed using an impact hammer. An estimated 508 of these type piles will be used in the construction of permanent structures with 286 of these piles to be used for the abutments and the remaining 222 piles to be used for the retaining walls. The number of these types of pile in the new project description is lower than the 636 H-piles evaluated for effects from pile driving in the 2006 biological opinion. The locations for these pile placements will be Upper and Middle Haehl Creek, Baechtel Creek, and Upp Creek with pile driving to occur within 15 m from creek banks.

c. *Sheet Piles*

Sheet pile coffer dams will be used for Bents 24, 4, 23, and 28 to attenuate sound while driving CISS piles for the footing (see subheading *10. Dewatering and Fish Collection and Relocation Activities*). Forty-four sheet pile pairs will be used with four additional corner pieces that will be driven to a depth of 60 inches below the high water elevation. Prior to placement, two sheet pile sections will be interlocked and then the "pair" is placed in the creek using a vibratory hammer.

In order to guide and align the sheet piles, a framework (whaler) is used to support the sheet piles as they are driven into place and connected. The framework for each cofferdam will consist of up to four to eight H-piles (spuds) that are vibrated five to 10 feet below the high water elevation and then supported with W-type piles that are welded to the frame. The sheet pile cofferdams will be removed once the CISS piles have been placed.

10. Dewatering and Fish Collection, Relocation, and Exclusion Activities

Phase 1 dewatering will occur at the following locations: Baechtel-Broaddus-Outlet Creek confluence at Bent 24 of the viaduct; lower Haehl Creek at Bent 4; Baechtel Creek at Bent 23;

[3] Total amount is double (x2) to reflect actual amount used in both phases.

and Mill Creek at Bent 28. Caltrans proposes to dewater the adjacent reach of wetted stream for a distance up to 150 m at Bents 4, 23, and 28 to prevent fish from injurious sound levels associated with pile driving. Fish including anadromous salmonids will be collected prior to and during dewatering for relocation to suitable and unaffected aquatic habitat nearby. Dewatering of the cofferdam interior will use pumps with fish screens installed at the intakes and outtakes.

For other smaller creek segments requiring dewatering, cofferdams will likely be constructed with impermeable liners placed over clean, washed, commercially available river gravel, ranging in size from approximately 2.5 cm to 7.5 cm, or by use of sand bags or rubber bladders. No native streambed material or angular rock material will be used. Surface water, if present, will be diverted into the upstream entrance of a diversion pipe and around the construction site.

A qualified fisheries biologist who has authorization from NMFS will be on-site to capture and relocate salmonids trapped in dewatered areas and pools. The biologist will relocate fish to suitable habitat outside of the construction area. The methods of fish removal will be limited to a combination of block nets and seining and/or electrofishing to relocate and exclude fish from areas that are predicted to be subjected to exceeded dB from wave forms for more than two consecutive days. Upon completion of construction at each crossing, material used for the cofferdams and water diversion will be removed from the channel. Any imported washed gravel used for cofferdams will be spread out within the stream channel. Cofferdams and diversion facilities will be removed from the channel no later than October 15 of each year.

Fish exclusion and relocation may be achieved by either deployment of nets for short-duration activities or dewatering for long-duration activities. The nets will be place across the channel from bank to bank at the distance where wave forms attenuate to a level below the interim thresholds and fish will then be collected and relocated. The exclusion nets will be removed once pile driving activities have been completed.

11. Stream Realignment and Enhancement Features

At the time of Phase 2 construction, the project will require the realignment of approximately 180 m[4] of an unnamed ephemeral watercourse, located east of the existing roadbed fill near the Schmidbauer Ranch, north of the proposed southern freeway interchange. The 180-m reach affected occurs south of East Hill Road, and averages approximately 3 m wide. This watercourse has a small watershed, consisting of a small portion of the Schmidbauer Ranch. Environmental consultant CHM2Hill prepared the *Task Order No. C05 Amendment No. 4 – Geomorphic Review of Fish Passage Designs* based on their and other recommendations for passage criteria and mitigation from DFG and NMFS. Caltrans has adopted these recommendations into the Willits Bypass Program.

a. *Upper Haehl Creek – Haehl Creek Interchange*

[4] Stream realignment was redesigned and reduced to minimize the impact to a small watercourse on Schmidbauer Ranch.

Review of the habitat above the perched culvert by participating agencies indicated there is potential Chinook salmon and steelhead spawning habitat but there was limited rearing habitat due to lack of perennial flows. Based on these conclusions, the design will use a maximum hydraulic drop for both high design flow and low design flow that will not exceed one foot for adults. The reach downstream of the perched culvert has an incised channel that appears to be stabilized, both vertically and horizontally, by the clay substrate, although the grade is two percent or greater. The reach above the perched culvert is controlled vertically by the presence of the culvert and the hydraulic conditions created by it.

Schmidbauer Ranch Road and Upstream of the Perched Culvert

- Replace the existing corrugated metal pipe culvert with a natural bottom reinforced concrete box culvert.
- Construct grade control structures (sills) immediately upstream and downstream of the new natural bottom reinforced concrete box to minimize the potential for headcuts following removal of the existing culvert. These sills would be placed so that their crests are at the existing grade.
- Realign the channel within the State right-of-way. As part of this realignment, stabilization will be required at the mouth of two right bank tributaries to minimize the potential for continued headcutting into the private property.
- Construct a grade control structure (weir) at the upstream edge of State right-of-way. This channel structure would be designed to provide backwater up to the existing culvert and improve fish passage relative to current conditions.
- Construct a grade control structure (sill) immediately downstream of the new bridge to minimize the potential for headcuts following construction of the new bridge structure.

The reach appears to be vertically stable, primarily because of the downstream control created by the perched culvert at Schmidbauer Ranch Road. The existing eroding left bank will require some stabilization where channels are migrating laterally into the banks.

- Reinforce the high, eroding left bank, upstream of the perched culvert, as part of the proposed retaining wall fill slope. To the extent possible, keep rock at the left bank toe and use vegetated fabric lifts above the 2-year recurrence interval flow (exact elevation to be determined). No bank stabilization is recommended for the right bank. If necessary, when stabilizing the existing left bank, a short channel realignment could be used to redirect flow away from the new fill slope. Slope stabilization would include riparian and overstory vegetation.
- Upstream of the perched culvert, realign the channel immediately downstream of the reinforced left bank. This channel realignment will coincide with reinforcing the left bank below the proposed retaining wall and bridge abutment and redirect flows to the right bank. The proposed channel realignment is required to maintain a similar overall channel length and slope. In addition, the channel realignment will tie into channel improvements downstream of the existing perched culvert.

Downstream of the Perched Culvert. The downstream channel of the perched culvert is steep (2 percent) and may not be vertically stable. Most (if not all) areas that appear to be bedrock are actually clay. The clay banks and bed are likely helping maintain horizontal and vertical stability. Little sediment is stored in the channel; most is routed out (and therefore little habitat potential exists under current conditions).

To allow removal of the perched culvert as part of the construction of the bridges and to reduce the potential of a headcut moving upstream, grade control will be required on each side of the perched culvert.

In addition, to facilitate fish passage and create more fish habitat than currently exists in this reach, weirs will need to be added to the channel downstream of the perched culvert. Based upon field observations and discussions with agency staff, these structures can be constructed to capitalize on the existing bed topography and match the reach-scale channel slope. The design concept presented in Appendix S of the October 11, 2011 Mitigation and Monitoring Proposal shows the rock weir structures spaced over a longer horizontal distance which creates better potential to trap and store more spawning gravels (as suggested by DFG).

- Construct grade control structures (sills) immediately upstream and downstream of the new culvert. These sills should be placed so that their crests are at the existing grade, and locations for them are shown in Appendix S of the October 11, 2011 Mitigation and Monitoring Proposal.
- Construct rock weir structures as proposed. Careful consideration will need to be made in terms of placement of the rock weirs in the clay soil (how to anchor in the bed; key into the banks) so that they are not undermined (scoured), flanked, or washed out. Also, an impermeable geotextile fabric or a mix of graded material should be incorporated into the design of these above-grade structures to reduce the potential for water to flow through the structures and block fish passage during low flow. As much as possible, CH2MHill encourages Caltrans to incorporate the rock weir design concepts described in Section XII of the DFG California Salmonid Stream Habitat Restoration Manual.
- Shifting the bridge abutments was also recommended; however, Caltrans has decided to use the original design with the abutments parallel with the bank.

b. *Lower Haehl Creek – Haehl Creek Bridge*

On the April 15, 2010, site visit, DFG and NMFS confirmed that Caltrans was not required to "create" fish passage using grade control structures where no fish passage currently existed. CH2MHill recommends that channel work be limited to stabilizing the existing eroding right bank using a rock toe with vegetated fabric lifts above the 2-year recurrence interval flow.

c. *Quail Meadows Interchange – Upp Creek*

Following removal of the existing culvert on Upp Creek under the existing Hwy. 101 Caltrans will construct grade control structures that provide adult and juvenile fish passage. The fish passage structure for Upp Creek has been designed with input from and approved by DFG and

NMFS fish passage engineers, details for this passage structure are in Appendix S of the October 11, 2011 Mitigation and Monitoring Proposal. Downstream of the new county road bridge, the design approach could enhance and maintain juvenile passage "naturally" by planting and maintaining vegetation that will hang over the channel, trap sediment, provide shade, and provide a food source (insects). In addition to providing all these benefits, this approach would allow the channel to trend toward narrowing and deepening over time. Under this enhancement approach, the bed, not banks, will be more subject to erosion because the banks will be held in place by deep binding root mass (presently, conditions exist where the banks are bare and therefore most susceptible to erosion). The final channel design will include removal of the existing chain link fence and posts within the channel bed and banks.

Near the on and off ramps, Caltrans could slope the existing streambanks in the channelized segment to provide a better planting medium for vegetation that is between the three structures. Caltrans will need to review the hydraulic model results to assure that bridge abutments are far enough out that water would not pond up behind the abutments, particularly upstream on the right bank. The downstream right bank should be higher than the left so the water stays within the channel should flooding occur.

Construction will occur during the summer months when this reach of Haehl Creek and Upp Creek are normally dry. However, flows through the existing culvert at Haehl Creek create an outfall pool that can retain water throughout the year. If water is present, a qualified fisheries biologist will survey the pool for the presence of salmonids. If present, the fish will be relocated prior to construction activities.

12. Freeway Maintenance and Use

Long-term maintenance for the completed bypass will include mowing, ditch and culvert cleaning, vegetation pruning, pavement sweeping, applying sand, and repair. These normal maintenance activities are conducted using Caltrans BMPs as described in the Storm Water Quality Handbook Maintenance Staff Guide (Caltrans 2003). Caltrans estimates that the freeway bypass will be used by 14,400 vehicles per day (average annual daily traffic estimated for 2008).

C. Proposed Measures to Minimize and Avoid Impacts

In addition to the impact minimization measures described above, the following measures are proposed by Caltrans to further minimize impacts to salmonids during implementation of the project:

- Construction at each of creek crossing will be limited to the period between June 15 and October 15 of each year. This work window is intended to minimize the impacts to migrating salmon and steelhead that utilize Haehl, Baechtel, Broaddus, Outlet, Mill, and Upp Creeks.

- If a rain event occurs between June 15 and October 15, and rock slope protection or other erosion control measures have not been completed, non-rainy season BMPs would be implemented in accordance with the SWPPP, including inspection, maintenance and repair, to minimize delivery of soil to the stream channels.

- The use of vehicles and heavy equipment may not occur in areas below the top of bank when standing or flowing water is present, with the exception of establishing a flow diversion around a work site.

- Equipment will not be stored in the channel when not in use. All equipment will be removed from the channel at the end of each workday. All equipment will be fueled, maintained, and repaired at sites well away from the stream banks. The use of vehicles and heavy equipment in areas below the top of bank will be limited to the extent feasible. Equipment may enter the stream reaches that are normally dry during the summer months (upper Haehl Creek and Upp Creek) to facilitate construction. However, no vehicles or heavy equipment will be allowed below the OHW for the other crossings where flowing water is likely to occur, at any time, either for crossing the creeks or for construction activities (with the exception of installing a cofferdam to isolate work areas from flowing or standing water).

- The project's contractor will be required to implement appropriate BMPs to prevent the discharge of equipment fluids to the stream channel. The minimum requirements will include: storing hazardous materials outside of the stream banks; checking equipment for leaks and preventing equipment with leaks from accessing any areas below the top of bank or from going onto the falsework structures; pressure washing equipment to remove fluid residue on any of its surfaces prior to its entering the live channel (if equipment is needed in the channel to establish a flow diversion); maintaining spill response material and suitably trained personnel at the project site; responding immediately to any fluid releases and applying containment booms and absorbent materials as appropriate; and notifying the Regional Water Quality Control Board of releases and discharges. For minor accidental releases of equipment fluid to the dewatered channel, the contractor will be required to remove and properly dispose of contaminated material.

- Caltrans will monitor underwater sound pressure levels in the wetted stream habitats immediately above and below dewatered areas. A minimum of 10 blows per pile will be monitored for underwater sound levels. If in-stream peak sound pressure levels exceed 187 SEL or 208 SPL (Caltrans 2006), Caltrans will immediately contact NMFS for recommendations to reduce the potential for harm to listed salmonids. Possible measures to reduce harm could include dewatering additional areas and fish relocation. The length of channel that would be dewatered would be determined through consultation with NMFS and CDFG fisheries biologists. If the streambed is dry for a distance of approximately 75 m upstream and downstream of the piles/columns, such that no cofferdams or dewatering is required, no underwater sound monitoring is proposed by Caltrans. For any temporary piles for the trestles and falsework that need to be driven in flowing water, Caltrans will require the contractor to vibrate the piles to design depth, and then proof these piles with an impact hammer (typically 10–20 blows).

- Before driving piles in creek beds with flowing water, Caltrans will exclude fish from stream segments where underwater sound levels are predicted to exceed interim peak or cumulative SEL thresholds (see Section 7.6, Impact Pile Driving). For stream crossings where peak or cumulative SEL thresholds are predicted to be exceeded for no more than two consecutive days, Caltrans may use a combination of block nets and seining and/or electrofishing to relocate and exclude fish from areas that are predicted to exceed SEL thresholds while piles are being driven, or divert streamflow around pile-driving sites and dewater affected reaches using temporary water diversion structures. The precise method used to exclude and relocate fish will depend on the number of consecutive days pile driving would exceed interim SEL thresholds, site conditions (*e.g.*, channel depth and width), or other factors. Use of block nets will be limited to a maximum continuous period of two days to prevent fish from being entangled in the nets and killed or injured. For locations where peak or cumulative SEL thresholds are predicted to be exceeded for more than two consecutive days or stream dewatering is required, Caltrans will use stream diversion structures to dewater affected stream reaches. The length of channel requiring fish exclusion and/or dewatering will be based on predicted SELs. After water diversion structures are in place and before dewatering is initiated, qualified fish biologists who have authorization from NMFS will be on site to capture and relocate salmonids from areas to be dewatered. During dewatering, flow will be incrementally diverted from the affected stream reach at the upstream boundary, with diversion progressively increasing over a four-hour period in the following increments: 50%, 75%, 90%, and 100%. Incremental reduction in flow allows fish that elude initial capture to move to deeper habitats where they can be captured and relocated before affected stream segments are completely dewatered. The biologists will relocate fish to suitable habitat outside of the construction area. The methods of removal and relocation of fish captured during the dewatering of the construction areas will be implemented in close coordination with NMFS and CDFG. If the streambed is dry for a distance of 75 m upstream and downstream of the piles/columns, such that no cofferdams or dewatering is required, no fish relocation will be necessary.

- Permanent CISS piles driven in flowing creeks will be driven within dewatered cofferdams or cofferdams with a bubble ring for sound attenuation. In addition, fish will be excluded from areas predicted to exceed the interim criteria.

- Appropriate BMPs will be developed and implemented in accordance with the Statewide National Pollutant Discharge Elimination System (NPDES) permit for all soil disturbance activities. These BMPs will be submitted by the contractor to Caltrans for approval as a SWPPP prior to engaging in any construction activities related to the proposed Willits Bypass Project.

- Caltrans will have a qualified biologist monitor construction activities in sensitive biological resource areas (*e.g.*, stream crossings) as necessary, to ensure permit conditions and mitigation requirements are implemented and enforced. Appropriate BMPs will be implemented in accordance with the Statewide NPDES permit and the approved current storm water quality guidance documents for all soil disturbances. Erosion control measures will be implemented at the end of each work window or completion of project activities to prevent material from entering watercourses. Caltrans will ensure that a qualified biologist monitors construction activities in sensitive biological resource areas (*e.g.*, stream crossings) as necessary, to ensure permit conditions and mitigation requirements are implemented and enforced.

- Where feasible, turf reinforcement mats (TRM) and rolled erosion control product (RECP) will be substituted in as many locations as possible that traditionally would receive RSP. Unlike RSP, TRM and RECP allow native riparian vegetation to grow through the mat structure while providing erosion protection for affected banks and bridge abutments.

In addition, Caltrans will require contractors to prepare and implement a program to effectively control water pollution during the construction of all phases of this project, per Caltrans Standard Specifications Section 7-1.01G—Water Pollution and Contract Special Provisions. This will consist of the development of a SWPPP, which will be submitted to the Caltrans Regional Engineer for approval before any construction activities can begin. The SWPPP requires that the project meet standards and objectives to minimize water quality impacts during construction of the project.

The SWPPP will include appropriate Caltrans construction BMPs to reduce the potential for sediments and contaminants from entering the creeks. Likely BMPs for this project could also include the following: preservation of existing vegetation; hydroseeding; silt fencing; sandbag barriers; stabilized construction entrance/exit; stabilized construction roadway; dewatering operations; paving and grinding operations; temporary stream crossings; clear water diversion; material delivery and storage; stockpile management; spill prevention and control; solid waste management; hazardous waste management; concrete waste management; sanitary/septic waste management; and liquid waste management.

D. Mitigation and Monitoring Plan

The project includes a mitigation plan for addressing impacts to two species of state listed plants, wetlands, oak woodlands, and riparian zones bordering salmonids habitat. These areas include 2,098 acres of offsite mitigation properties that have been acquired by Caltrans to implement the required mitigation for various state and federally listed, or sensitive species. These properties are located in the Little Lake Valley and are described fully in the Mitigation and Monitoring Proposal dated October 11, 2011 (Caltrans 2011b). To mitigate for the loss of wetlands Caltrans proposes to compensate for the direct loss and impacts to 86.74 acres of waters and wetlands of the United States. Caltrans proposes to mitigate for wetland impacts by receiving 34.85 acres of credit on 59 acres wetland establishment area, and 48.22 acres of credit on 325 acres of rehabilitation area.

Adverse effects to salmonid habitat will be mitigated through the creation of riparian areas, improved grazing management and culvert removals as described in Caltrans (2010 and 2011b). The long-term management of the off-site mitigation property will be conducted by the Mendocino County Resource Conservation District (MCRCD). Caltrans will transfer fee title over to MCRCD and a conservation easement will be placed on the properties for future management. DFG will be the endowment holder, compliance monitor, and will hold the conservation easement.

At this time the scope of the future State Mitigation and Monitoring Proposal, which is in development, does not anticipate implementing any additional mitigation activities that may affect any federally listed species, including California Coastal Chinook salmon, Southern

Oregon/Northern California coho salmon, and Northern California steelhead. However, any long-term management or habitat maintenance actions found to be necessary that may affect listed species will be consulted on with NMFS prior to implementation. Described below are the proposed actions in the mitigation and monitoring proposal (Caltrans 2011b) that may affect listed salmonids:

1. Riparian Mitigation

To compensate for stream impacts Caltrans proposes to establish and enhance a total of 101.4 acres of riparian habitat along Category 1 riparian corridors (salmonid streams). Caltrans also proposes to conduct riparian establishment and enhancement along Category II streams (intermittent streams), and Category III streams (small streams that flow in response to rain). A total of 2.58 acres of Category II stream, and 3.95 acres of Category III stream will be established or enhanced.

Riparian rehabilitation would consist of planting native trees and shrubs to widen the riparian corridor and installing livestock exclusion fences that would permanently exclude cattle from the riparian corridors. Appropriate, local native plant species would be used for the revegetation of impacted riparian areas within the project area as well as in off-site mitigation areas within the Outlet Creek watershed. Riparian trees are proposed for planting at the ratio of five new trees for each tree lost with the goal of four living trees after five years of monitoring. Associated shrubs, herbaceous perennial plants and annuals would be seeded or planted along with riparian trees. Planting methods would include the installation of stem (pole) cuttings from plants such as willow (*Salix spp.*), cottonwood (*Populus spp.*), thimbleberry (*Rubus parviflorus*), California blackberry (*Rubus ursinus*), coyote bush (*Baccharis spp.*), or other species capable of easy rooting from cuttings.

Pole cuttings will also be utilized to revegetate areas where riprap is installed. Cuttings would be planted in openings between the rock riprap. As part of project mitigation, pole cuttings may be utilized to armor active erosion headcuts, eroding gully banks, and unstable stream banks in the project area and its vicinity. Container grown or bare rootstock plants, such as alder, Oregon ash, valley oak, or box elder would also be planted in areas at or above ordinary high water. Selected sensitive plants growing in areas impacted by the project could be relocated.

The temporary impacts on riparian habitat will be mitigated through onsite restoration. The permanent impacts on riparian habitat will be mitigated offsite through the establishment, enhancement, preservation, and protection at offsite mitigation parcels. The permanent impacts on other waters will be mitigated through riparian enhancement on the offsite mitigation parcels, stream restoration, at Haehl and Upp Creeks (mentioned earlier in the project description) in the bypass project footprint, financial contribution for the development of the Ryan Creek culvert project outside the bypass project footprint and Little Lake valley and protection. The permanent impacts on oak woodland will be mitigated through the creation, preservation, and protection at the offsite mitigation parcels.

The monitoring aspect of the plan will focus on the abundance and associated plant species, especially invasive plant species and will be conducted at the transplantation sites and at the offsite mitigation parcels at known and potential habitat locations. Monitoring to qualitatively document the success of offsite planting efforts will also be conducted using four types of monitoring methods, including baseline surveys, performance monitoring , reference site monitoring, and project impact minimization monitoring which are detailed in Caltrans (2011b).

2. <u>Bank Stabilization</u>

Bank stabilization to reduce erosion is proposed along Outlet Creek on one of the Ford parcels (Assessors Parcel Number [APN] 108-010-06). This location was selected based on an erosion site assessment performed at each of the offsite mitigation parcels. At this location, three instream eroding bank sections on the east bank of Outlet Creek in the center of the parcel would be repaired. All three sites have unstable, mostly vegetated cut banks created by convergence flow on the riffle/gravel bar complex on the opposite side of the cut (eroding) bank. The banks are approximately 6 feet tall and actively slumping. These areas would be repaired using the following methods:

- Laying back the vertical banks, incorporating instream structures at the toe of slope and planting riparian vegetation.
- Grading back the vertical bank, which will in turn decrease shear stress on the bank.
- Planting native riparian vegetation, which will stabilize the banks through increased ground cover and root density.
- Incorporating instream biotechnical structures that will likely establish instream aquatic habitat in the form of lateral scour pools that support listed fish species and other aquatic organisms.

All bank repair activities would occur in late summer when there is typically no flow in proposed work areas of Outlet Creek. All work is expected to occur outside the wetted channel; however, some limited amount of channel work may be required to install some of the near shore features. If in-channel work is required, it would only be performed when Outlet Creek is dry and any construction related disturbance to the creek bed would be restored to preproject conditions.

The first phase of construction would be to grade back the existing vertical bank to create an area for the new meander areas and planting benches. The banks would be laid back approximately 60 feet at the widest point. The area adjacent to the channel would be overexcavated to allow for the placement of engineered streambed fill material. This material would be placed outside of the existing channel bed and would serve as the substrate for the constructed meanders (Caltrans 2011b). The engineered streambed fill material would include those described in the California Salmonid Stream Habitat Restoration Manual by DFG and would consist of a combination of hardscape materials such as rock, natural river-run gravel, sand, and biotechnical measures such as willow waddles, brush layering, coir fabric, live staking, native soil and large rootwad revetment. A linear bank of vegetated rock slope protection (RSP) would be placed at the interface of the streambed fill material and the planting bench. The RSP would be composed of ¼ ton rock that would be placed to stabilize the bank toe. The majority of the RSP, with the exception of the top of the feature, would be below grade. Additional RSP would be placed at the upstream and downstream end of each site to prevent bank erosion at these locations.

Rootwads would be placed at the extreme outside bend on the newly graded meander to establish instream aquatic habitat. Rootwads would also be placed on the west bank opposite of each bank erosion repair site. The rootwads on the west bank would serve to provide biotechnical bank stabilization methods along the meander belt opposite the repair sites.

The planting bench would consist of native soil and would be relatively flat and slope gently toward the creek to ensure that water is not retained on the planting bench as high flows recede. The planting bench and other disturbed surfaces would be seeded and planted following construction to provide erosion protection and riparian vegetation. Native riparian trees and shrubs would be planted as container stock and pole cuttings and would extend along the entire length of each site.

3. Group 2 Wetland Establishment

Group 2 wetland establishment would consist of lowering the land surface of existing uplands to establish new wet meadow habitat adjacent to Outlet Creek and Davis Creek. The following design criteria were used to develop the wetland establishment design approach.

- Establish wet meadow wetlands on offsite mitigation parcels with appropriate soils and hydrology, as indicated by existing jurisdictional wet meadow wetlands located in the immediate vicinity of the proposed established wetlands.
- Establish wet meadow wetlands that support similar native wetland plants and have a species richness and native species cover on par with existing jurisdictional wet meadow wetlands located in the immediate vicinity of the proposed established wetlands.
- Establish wet meadow wetlands with a hydroperiod similar to that of existing jurisdictional wet meadow wetlands located in the immediate vicinity of the proposed established wetlands.
- Minimize effects on existing sensitive biological resources from wetland establishment activities.

Wetland establishment would consist of constructing three wet meadows that occur over five parcels which total 24 acres in all. One wet meadow would be constructed on two adjoining Ford parcels (APN 108-020-04 and APN 108-030-02). A second wet meadow would be constructed on the Lusher parcel (APN 108-030-04). The third wet meadow would be constructed on two adjoining Wildlands parcels (APN 108-060-01 and APN 108-070-09) (Caltrans 2011b).

Proposed wetland establishment areas currently consist of existing uplands that are located between existing wet meadow complexes and riparian corridors. The uplands appear to be composed of both a low, natural levee and soil placed to widen the natural levee. Annual grassland is the current land cover type on the wetland establishment sites. The adjacent riparian corridor includes a linear band of riparian vegetation along Outlet and Davis Creeks, as well as the limit of the proposed riparian rehabilitation (enhancement) zone, which ranges from 75–100 feet on each side of the creek as measured from the creek's centerline. Wetland grading would consist of lowering a portion of the upland to match, or be slightly higher than, the elevation of the adjacent wet meadows. To ensure that wetland establishment would not result in providing any new potential movement corridors for fish onto the floodplain, wetland grading would not modify or lower any existing natural berms or levees to avoid an increase in the potential for overbank flow. Wetland establishment sites are expected to support wet meadow because the established wetland would share similar surface and groundwater characteristics with the existing wet meadow (i.e., it would be seasonally saturated or inundated by rainfall and/or be subject to a seasonal shallow groundwater table). The established wetlands would be seeded and planted with native wetland species following construction.

4. Grazing Management

The offsite mitigation parcels have historically supported agricultural practices including livestock grazing and hay production, both of which are currently the primary land use on these parcels. As part of the overall offsite mitigation plan, grazing will be discontinued on some parcels and continued on others. Grazing will be discontinued on the offsite mitigation sites that will be designated as Corps-jurisdictional wetland mitigation. Grazing will continue on approximately 1200 acres of non-Corps offsite mitigation parcels under a prescribed grazing management plan which would follow management as described in the Mitigation and Monitoring Proposal dated August 2010 (Caltrans 2010). Overall, the intensity of grazing following implementation of the MMPs will be reduced compared to existing conditions.

The land management goals for the offsite mitigation parcels on which grazing will be continued is to protect and manage for sensitive biological resources. For example, seasonal grazing at a prescribed moderate level of intensity may be beneficial for Baker's meadowfoam (*Limnathes bakeri*) and North Coast semaphore grass (*Pleuropogon hooverianus*). Grazing management will focus on three grazing management measures: exclusion fencing, grazing rotation, and designated livestock stream crossings. These measures have been shown to limit cattle access to stream and riparian areas and minimize effects on water quality (Hoorman and McCutcheon 2005).

Exclusion fencing will be installed along all riparian corridors to prevent livestock access to all creeks on the offsite mitigation parcels. The purpose of this exclusion fencing will be to create grazing management units (GMUs) and to exclude livestock from the stream channels and riparian corridors. Fence construction and materials would be consistent with Caltrans design standards to ensure that livestock are excluded from these areas. The fences and gates will be maintained by the MCRCD, which will serve as the long-term land manager.

A rotational grazing program will be implemented for the GMUs. Grazing rotation would improve water quality by reducing the amount of overgrazed pastures. By reducing the grazing pressure on each GMU, vegetation would not be overgrazed and would be allowed time for regrowth, thereby reducing the bare ground that would contribute sediment to the stream during storms. The grazing season would be from May through November, and the GMU rotation would occur approximately every 30 to 45 days. To ensure productivity of grazed areas, Caltrans has committed to meet productivity thresholds for Residual Dry Matter (RDM) at the end of each grazing season. A minimum end of season RDM value of 700 pounds per acre is proposed in the grazing management plan (Caltrans 2010). This end of season RDM production meets the recommended value for maintaining high biodiversity of California grasslands as reported in Wildlands Solutions (2008).

Under the grazing management plan, a limited number (approximately 12) of the improved livestock crossings would be utilized to facilitate GMU rotation. The stream crossings would be located at the existing improved crossings. These permanent stream crossings would be designed to reduce erosion and restrict livestock access to the stream and riparian corridors during crossings. All engineered crossings would be controlled with gates, and the crossings would be fenced with barbed wire running across the stream to prevent livestock from entering the stream and riparian corridors during crossings.

Some crossings would be used more frequently than others. Given the proposed 30 to 45 day rotation schedule, crossings would be used approximately 1 to 6 times per grazing season, with most being used an average of 2 to 4 times per season. Most crossings would be used during the dry season (June through October) when creeks have relatively little flow or are dry.

To facilitate livestock crossings, the gates will be opened for 1 to 2 days to allow livestock to move into the greener pasture at a slow pace. No round-up or herding of animals will occur. Caltran's expects this gentle movement of livestock would result in less disturbance to the stream bed and banks that otherwise could occur if a large number of animals initiate a crossing at the same time.

<u>5. Ryan Creek Fish Passage</u>

Caltrans proposes to improve fish passage at both of the existing crossings located along Highway 101 at Ryan Creek. Fish passage on culverts located at the South Fork and North Fork of Ryan Creek will be improved for all three anadromous species. NMFS guidelines for passage of salmonids at stream crossings will be met at both culverts. Fill removal and dewatering will be required at each culvert construction site during the low flow summer work window of June 15 to October 15. BMPs to minimize sediment delivery, toxic material, and riparian impacts will be implemented during construction at these sites. Caltrans will use the <u>dewatering and fish collection, relocation, and exclusion methods described above. Dewatering and fish relocation will not impact more than 150 m of streambed at either location.</u> Improved access to 2.8 miles of anadromous habitat on the South Fork, and 1.7 miles of habitat on the North Fork Ryan Creek will result from these passage projects. Both of these projects are required mitigation for the 2081 consultation for coho salmon with the DFG.

E. Action Area

The action area for a consultation includes all areas affected directly and indirectly by the project. For the purposes of this consultation, the action area consists of stream segments of Haehl, Baechtel, Broaddus, Mill, Outlet, and Upp creeks within the Willits Bypass Project footprint. Indirect effects could extend to reaches of Outlet Creek below the confluence of Baechtel and Broaddus creeks, a reach of Mill Creek, and reaches of Haehl Creek between the construction sites. All action area stream reaches eventually flow to Outlet Creek, which flows north out of the Little Lake Valley.

The Action Area footprint has changed due to changes in the project design since the issuance of the 2006 biological opinion. The viaduct realignment around the WWTP will shift the project footprint downstream by approximately 700 feet, reducing the alignment footprint on Baechtel and Broaddus Creeks and create a new alignment footprint on Outlet Creek. The Quail Meadow interchange footprint has been expanded and now includes additional stream crossings on Upp Creek. Also, there will be an additional 5 km reach of Outlet Creek that may be impacted from an increased sediment delivery as a result of the activities at the Oil Well Hill borrow site. These changes will increase the Action Area from 13.9 km to 19.1 km, making the project 5 km longer.

Impacts from direct, indirect, and beneficial effects of this project vary between streams. The extent of the potential impacts by stream length will be greatest along Haehl and Outlet creeks. Baechtel, Broaddus, and Upp creeks will be exposed to less impact by stream length, with one proposed freeway crossing (north and south lanes) at each of them. The Outlet Creek stream reach included in the action area is located downstream of the freeway construction project. Table 3 summarizes the length of each stream that is included in the action area for this biological opinion.

Haehl Creek	1 culvert replacement, 6 bridges, 2 viaducts and 1 culvert removal	5 km
Baechtel Creek	2 viaduct crossings	1250 m
Broaddus Creek	2 viaduct crossings	150 m
Mill Creek	2 viaduct crossing	2 km
Upp Creek	6 crossings, 1 culvert removal	400 m
Outlet Creek	1 viaduct crossing Oil Well Hill	10 km
Ryan Creek	2 crossings	300 m

Table 3. Streams and expected lengths of impacted areas for the Willits Bypass Project.
* All action area lengths are approximate.

The action area also includes the areas described in the October 11, 2011, Mitigation and Monitoring Proposal. These areas include 2,098 acres of offsite mitigation properties that have been acquired by Caltrans in order to implement the required mitigation for various state and federally listed, or sensitive species. These properties are located in the Little Lake Valley and are described in the Mitigation and Monitoring Proposal (Caltrans 2011b). The action area also includes two 150 meter reaches of the Ryan Creek where additional fish passage improvement projects will be implemented.

III. ANALYTICAL FRAMEWORK

A. Jeopardy Analysis

In accordance with policy and regulation, the jeopardy analysis in this biological opinion relies on four components: (1) the *Status of the Species*, which evaluates salmon and steelhead range-wide conditions at the Evolutionary Significant Unit (ESU) and Distinct Population Segment (DPS) levels, the factors responsible for those conditions, and the species' likelihood of both survival and recovery; (2) the *Environmental Baseline*, which evaluates the condition of these listed species in the action area, the factors responsible for those conditions, and the relationship of the action area to the likelihood of both survival and recovery of these listed species; (3) the *Effects of the Action* on these species in the action area, which includes the direct and indirect effects of the proposed Federal action, and are considered together with the effects of any interrelated or interdependent activities; and (4) *Cumulative Effects*, which evaluates the effects of future, non-Federal activities in the action area on these species.

The jeopardy determination is made by adding the effects of the proposed Federal action, effects of interrelated or interdependent activities, and any Cumulative Effects to the Environmental Baseline and then determining if the resulting changes in species status in the action area are likely to cause an appreciable reduction in the likelihood of both the survival and recovery of the listed species in the wild.

The jeopardy analysis in this biological opinion places an emphasis on the range-wide likelihood of both survival and recovery of these listed species and the role of the action area in the survival and recovery of these listed species. The significance of the effects of the proposed Federal action is considered in this context, taken together with cumulative effects, for purposes of making the jeopardy determination. We use a hierarchical approach that focuses first on whether or not the effects on salmonids in the action area will impact their respective population. If the population will be impacted, we assess whether this impact is likely to affect the ability of the population to support the survival and recovery of the DPS or ESU.

B. Adverse Modification Determination

This Biological Opinion does not rely on the regulatory definition of destruction or adverse modification of critical habitat at 50 CPR 402.02[5]. Instead, we have relied upon the statutory provisions of the ESA to complete the following analysis with respect to critical habitat.

The adverse modification analysis in this Biological Opinion relies on four components: (1) the *Status of Critical Habitat*, which evaluates the range-wide condition of critical habitat for the NC steelhead DPS, SONCC coho salmon and CC Chinook salmon ESUs in terms of primary constituent elements (PCEs – sites for spawning, rearing, and migration), the factors responsible for that condition, and the intended conservation value of the critical habitat overall; (2) the *Environmental Baseline*, which evaluates the condition of critical habitat in the action area, the

[5] This regulatory definition has been invalidated by Federal Courts.

factors responsible for that condition, and the conservation value of the critical habitat in the action area; (3) the *Effects of the Action*, which determines the direct and indirect impacts of the proposed Federal action and the effects of any interrelated or interdependent activities on the PCEs in the action area and how that will influence the conservation value of affected critical habitat units; and (4) *Cumulative Effects*, which evaluates the effects of future, non-Federal activities in the action area on the PCEs and how that will influence the conservation value of affected critical habitat units.

For purposes of the adverse modification determination, we add the effects of the proposed Federal action on NC steelhead, SONCC coho salmon, and CC Chinook salmon critical habitats in the action area, and any Cumulative Effects, to the Environmental Baseline and then determine if the resulting changes to the conservation value of critical habitat in the action area are likely to cause an appreciable reduction in the conservation value of critical habitat range-wide. If the proposed action will negatively affect PCEs of critical habitat in the action area, we then assess whether or not this reduction will impact the value of the DPS or ESU critical habitat designation as a whole.

C. Use of Best Available Scientific and Commercial Information

To conduct the assessment, NMFS examined an extensive amount of information from a variety of sources. Detailed background information on the biology and status of the listed species and critical habitat has been published in a number of documents including peer reviewed scientific journals, primary reference materials, and governmental and non-governmental reports. Additional information regarding the effects of the project's actions on the listed species in question, their anticipated response to these actions, and the environmental consequences of the actions as a whole was formulated from the aforementioned resources, the biological assessment for this project, other related documents, meetings, telephone conferences, site visits, and analyses provided during consultation.. For information that has been taken directly from published, citable documents, those citations have been referenced in the text and listed at the end of this document.

IV. STATUS OF THE SPECIES AND CRITICAL HABITAT

This biological opinion analyzes the effects of the proposed action on the following listed salmonids and their designated critical habitat:

Threatened Southern Oregon/Northern California Coasts coho salmon. (*Oncorhynchus kisutch*)
Listing determination (70 FR 37160; June 28, 2005)
Critical habitat designation (64 FR 24049; May 5, 1999);

Threatened California Coastal Chinook salmon (*O. tshawytscha*)
Listing determination (70 FR 37160; June 28, 2005)
Critical habitat designation (70 FR 52488; September 2, 2005);

Threatened Northern California steelhead (*O. mykiss*)
Listing determination (71 FR 834; January 5, 2006).
Critical habitat designation (70 FR 52488; September 2, 2005).

A. Species Description and Life History

Coho salmon, Chinook salmon, and steelhead are anadromous fish, spending some time in both fresh- and saltwater. The older juvenile and adult life stages occur in the ocean, until the adults ascend freshwater streams to spawn. Eggs (laid in gravel nests called redds), alevins (gravel dwelling hatchlings), fry (juveniles newly emerged from stream gravels), and young juveniles all rear in freshwater until they become large enough to migrate to the ocean to finish rearing and maturing to adults. Juveniles migrating to the ocean are called smolts. Both smolts and adults go through physiological changes as they emigrate from fresh- to saltwater (smolts) and immigrate from salt- to freshwater (adults). The timing of migrations, freshwater habitat preferences for spawning and rearing, the duration of freshwater and ocean rearing, distribution in the ocean, age at maturity, and other traits vary by species. Coho salmon and Chinook salmon die after spawning, whereas steelhead can sometimes survive to spawn again (Shapovalov and Taft 1954, Sandercock 1991, Healy 1991, Busby *et al.* 1996).

1. <u>Coho Salmon</u>

The life history of the coho salmon in California has been well documented (Shapovalov and Taft 1954, Hassler 1987, Weitkamp *et al.* 1995). In contrast to the life history patterns of other anadromous salmonids, coho salmon in California generally exhibit a relatively simple 3-year life cycle. Adult salmon typically begin the immigration from the ocean to their natal streams after heavy late-fall or winter rains breach the sand bars at the mouths of coastal streams (Sandercock 1991). Coho salmon are typically associated with small to moderately-sized coastal streams characterized by heavily forested watersheds; perennially-flowing reaches of cool, high-quality water; dense riparian canopy; deep pools with abundant overhead cover; instream cover consisting of large, stable woody debris and undercut banks; and gravel or cobble substrates (Sandercock 1991). Immigration continues into March, generally peaking in December and January, with spawning occurring shortly after arrival at the spawning ground (Shapovalov and Taft 1954). The timing of adult coho salmon migration to the Eel River watershed is October through February, peaking in November and December (Fukushima and Lesh 1998).

The eggs generally hatch after four to eight weeks, depending on water temperature. Survival and development rates depend, in part, on fine sediment levels within the redd. Under optimum conditions, mortality during this period can be as low as 10 percent; under adverse conditions of high scouring flows or heavy siltation, mortality may be close to 100 percent (Baker and Reynolds 1986). McMahon (1983) found that egg and fry survival drops sharply when fines make up 15 percent or more of the substrate. The newly-hatched fry remain in the redd from two to seven weeks before emerging from the gravel (Shapovalov and Taft 1954). Upon emergence, fry seek out shallow water, usually along stream margins. As they grow, juvenile coho salmon often occupy habitat at the heads of pools, which generally provide an optimum mix of high food availability and good cover with low swimming cost (Nielsen 1992). Chapman and Bjornn

(1969) determined that larger juveniles tend to occupy the head of pools, whereas smaller juveniles are found further down the pools. As the fish continue to grow, they move into deeper water and expand their territories until, by July and August, they reside exclusively in deep pool habitat. Preferred rearing habitat has little or no turbidity and high sustained invertebrate forage production. Juvenile coho salmon feed primarily on drifting terrestrial insects, much of which are produced in the riparian canopy, and on aquatic invertebrates growing within the interstices of the substrate and in leaf litter in pools. Juvenile coho salmon prefer well shaded pools at least 1 m deep with dense overhead cover; abundant submerged cover composed of undercut banks, logs, roots, and other woody debris; and preferred water temperatures of 12-15° Celsius (C) (Brett 1952, Bell 1991, Reiser and Bjornn 1979, McMahon 1983), but not exceeding 22-25°C (Brungs and Jones 1977) for extended time periods. Growth is slowed considerably at 18°C and ceases at 20°C (Stein *et al.* 1972, Bell 1991).

In the spring, as yearlings, juvenile coho salmon undergo a physiological process, or smoltification, which prepares them for living in the marine environment. In the Eel River watershed, coho salmon smolts migrate to the ocean from May through July, peaking in April, May, and June (Fukushima and Lesh 1998). Emigration timing is correlated with precipitation events and peak upwelling currents along the coast. Entry into the ocean at this time facilitates more growth and, therefore, greater marine survival (Holtby *et al.* 1990).

2. Chinook Salmon

Chinook salmon are the largest anadromous member of *Oncorhynchus*; adults weighing more than 120 pounds have been reported from North American waters (Scott and Crossman 1973, Page and Burr 1991). Chinook salmon exhibit two main life history strategies: ocean-type fish and river-type fish (Healy 1991). Ocean-type fish typically are fall- or winter-run fish that spawn shortly after entering freshwater and their offspring emigrate shortly after emergence from the redd. River-type fish are typically spring- or summer-run fish that have a protracted adult freshwater residency, sometimes spawning several months after entering freshwater. Progeny of river-type fish frequently spend one or more years in freshwater before emigrating. The Chinook salmon in the Eel River watershed and Outlet Creek sub-basin are ocean-type fish.

Chinook salmon in the CC Chinook salmon ESU generally remains in the ocean for two to five years (Myers *et al.* 1998). In the ocean, Chinook salmon from California tend to stay along the California and Oregon coasts, but migration may continue to higher latitudes if oceanographic conditions are appropriate (Allen and Hassler 1986). Some Chinook salmon return from the ocean to spawn one or more years before full sized adults return, and are referred to as jacks (males) and jills (females). Fall-run Chinook salmon enter the Eel River from October through January (Fukushima and Lesh 1998). These fish typically enter freshwater at an advanced stage of maturity, move rapidly to their spawning areas on the mainstem or lower tributaries of rivers, and spawn within a few weeks of freshwater entry. Fall-run Chinook salmon typically spawn in the lower reaches of rivers and tributaries at elevations of 200 to 1,000 feet. Run timing is also, in part, a response to stream flow characteristics.

Egg deposition must be timed to ensure that fry emerge during the following spring at a time when the river or estuary productivity is sufficient for juvenile survival and growth. Adult female Chinook salmon prepare redds in stream areas with suitable gravel composition, water depth, and velocity. Spawning generally occurs in swift, relatively shallow riffles or along the edges of fast runs at depths greater than 24 cm. Optimal spawning temperatures range between 5.6 and 13.9°C. Redds vary widely in size and location within the river. Preferred spawning substrate is clean, loose gravel, mostly sized between 1.3 and 10.2 cm, with no more than 5 percent fines. Gravels are unsuitable when they have been cemented with clay or fines or when sediments settle out onto redds, reducing intergravel percolation. Minimum intergravel percolation rate depends on flow rate, water depth, and water quality. The percolation rate must be adequate to maintain oxygen delivery to the eggs and remove metabolic wastes. The Chinook salmon's need for a strong, constant level of subsurface flow may indicate that suitable spawning habitat is more limited in most rivers than superficial observation would suggest. After depositing eggs in redds, adult Chinook salmon guard the redd from 4 to 25 days before dying.

Chinook salmon eggs incubate for 90 to 150 days, depending on water temperature. Successful incubation depends on several factors including dissolved oxygen levels, temperature, substrate size, amount of fine sediment, and water velocity. Maximum survival of incubating eggs and pre emergent fry occurs at water temperatures between 5.6 and 13.3°C with a preferred temperature of 11.1°C. Fry emergence begins in December and continues into mid April (Leidy and Leidy 1984). Emergence can be hindered if the interstitial spaces in the redd are not large enough to permit passage of the fry. In laboratory studies, Bjornn and Reiser (1991) observed that Chinook salmon and steelhead fry had difficulty emerging from gravel when fine sediments (6.4 millimeters or less) exceeded 30 to 40 percent by volume.

After emergence, Chinook salmon fry seek out areas behind fallen trees, back eddies, undercut banks, and other areas of bank cover (Everest and Chapman 1972). As they grow larger, their habitat preferences change. Juveniles move away from stream margins and begin to use deeper water areas with slightly faster water velocities, but continue to use available cover to minimize the risk of predation and reduce energy expenditure. Fish size appears to be positively correlated with water velocity and depth (Chapman and Bjornn 1969, Everest and Chapman 1972). Optimal temperatures for both Chinook salmon fry and fingerlings range from 12 to 14°C, with maximum growth rates at 12.8°C (Boles 1988). Chinook salmon feed on small terrestrial and aquatic insects and aquatic crustaceans. Cover, in the form of rocks, submerged aquatic vegetation, logs, riparian vegetation, and undercut banks provide food, shade, and protect juveniles from predation.

The low flows, high temperatures, and sand bars that develop in smaller coastal rivers during the summer months favor an ocean-type life history (Kostow 1995). With this life history, smolts typically emigrate as subyearlings during April through July (Myers *et al.* 1998). The ocean-type Chinook salmon in California tend to use estuaries and coastal areas for rearing more extensively than stream type Chinook salmon. The brackish water areas in estuaries moderate the physiological stress that occurs during parr smolt transitions.

3. Steelhead

General reviews for steelhead in California document much variation in life history (Shapovalov and Taft 1954, Barnhart 1986, Busby *et al.* 1996, McEwan and Jackson 1996). Juvenile steelhead live 1 to 4 years in freshwater before smolting and emigrating, then spend 1 to 4 years maturing in the ocean. Steelhead spawn at 2 to 8 years, and may spawn 1 to 4 times over their life. Although variation occurs, in coastal California, steelhead usually live in freshwater for 2 years, then spend 1 or 2 years in ocean before returning to their natal stream to spawn. Steelhead exhibit much variation in migration timing too. Steelhead can be divided into two reproductive ecotypes, based upon their state of sexual maturity at the time of river immigration and the duration of their spawning migration: stream maturing and ocean maturing. Stream maturing steelhead enter freshwater in a sexually immature condition and require several months to mature and spawn; whereas, ocean maturing steelhead enter freshwater with well developed gonads and spawn shortly after river entry. These two reproductive ecotypes are more commonly referred to by their season of freshwater entry (*i.e.*, summer [stream maturing] and winter steelhead [ocean maturing]). Summer steelhead typically immigrate between May and October and spawn in January and February; winter steelhead typically immigrate between November and April spawning soon after reaching the spawning grounds. Both summer and winter steelhead are reported from the South Fork Eel River, but only winter steelhead are likely found in the action area.

Survival to emergence of steelhead embryos is inversely related to the proportion of fine sediment in the spawning gravels. However, steelhead are slightly more tolerant than other salmonids, with significant reductions in survival when fines of less than 6.4 mm comprise 20-25 percent of the substrate. Fry typically emerge from the gravel two to three weeks after hatching (Barnhart 1986). Upon emerging from the gravel, fry rear in edgewater habitats and move gradually into pools and riffles as they grow larger. Older fry establish territories which they defend. Cover is an important habitat component for juvenile steelhead, both as a velocity refuge and as a means of avoiding predation (Shirvell 1990, Meehan and Bjornn 1991). Steelhead, however, tend to use riffles and other habitats not strongly associated with cover during summer rearing more than other salmonids. Young steelhead feed on a wide variety of aquatic and terrestrial insects, and emerging fry are sometimes preyed upon by older juveniles. In winter, juvenile steelhead become inactive and hide in available cover, including gravel or woody debris. Rearing steelhead juveniles prefer water temperatures of 7.2-14.4°C and have an upper lethal limit of 23.9°C (Barnhart 1986, Bjornn and Reiser 1991). They can survive in water up to 27°C with saturated dissolved oxygen conditions and a plentiful food supply. Fluctuating diurnal water temperatures also aid in survivability of salmonids (Busby *et al.* 1996).

In Waddell Creek, in Santa Cruz County, Shapovalov and Taft (1954) found steelhead juveniles migrating downstream at all times of the year, with the most juvenile steelhead emigrating during spring and summer. Fukushima and Lesh (1998) report the steelhead emigrate from the Eel River watershed from April through July.

B. Status of Species

In this opinion, NMFS assesses the status of each species by examining four types of information, all of which help us understand a population's ability to survive. These population viability parameters are: abundance, population growth rate, spatial structure, and diversity (McElhany *et al.* 2000). While there is insufficient information to evaluate these population viability parameters in a quantitative sense, NMFS has used existing information to determine the general condition of populations in each ESU and factors responsible for the current status of each ESU.

1. SONCC Coho Salmon

A comprehensive review of estimates of historic abundance, decline, and present status of coho salmon in California is provided by Brown *et al.* (1994). They estimated that the coho salmon annual spawning population in California ranged between 200,000 and 500,000 fish in the 1940s, which declined to about 100,000 fish by the 1960s, followed by a further decline to about 31,000 fish by 1991. Brown *et al.* (1994) concluded that the California coho salmon population had declined more than 94 percent since the 1940s, with the greatest decline occurring since the 1960s. More recent population estimates vary from approximately 600 to 5,500 adults (Brown *et al.* 1994). Available information suggests that SONCC coho salmon abundance is very low, and the ESU is not able to produce enough offspring to maintain itself (population growth rates are negative) and has experienced many local extirpations (NMFS 2001, Good *et al.* 2005). In addition, SONCC coho salmon have experienced range constriction, fragmentation, and a loss genetic diversity. Many subpopulations that may have acted to support the species' overall numbers and geographic distribution have likely been lost. While the amount of data supporting these conclusions is not extensive, NMFS is unaware of information that suggests a more positive assessment of the condition of the SONCC coho salmon ESU and its critical habitat. Recent status reviews for SONCC coho salmon conclude that this ESU is presently "likely to become endangered" (NMFS 2001, Good *et al.* 2005). In 2005 NMFS evaluated the listing status of SONCC coho salmon and maintained the threatened status of SONCC coho salmon (70 FR 37160). The most recent status review conducted by NMFS Southwest Fisheries Science Center (Williams *et al.* 2011) raises concerns regarding recent negative population trends across the ESU, but does not suggest a change in extinction risk for the SONCC coho salmon ESU. Negative trends in the last five years are likely due to the apparent low marine survival that have contributed to observed declines in SONCC coho salmon (Williams *et al.* 2011).

2. CC Chinook Salmon

The CC Chinook salmon ESU was historically comprised of approximately 32 Chinook salmon populations (Bjorkstedt *et al.* 2005). Many of these populations (about 14) were independent, or potentially independent, meaning they had a high likelihood of surviving for 100 years absent anthropogenic impacts. The remaining populations were likely more dependent upon immigration from nearby independent populations than dependent populations of other salmonids (Bjorkstedt *et al.* 2005).

Data on CC Chinook abundance, both historical and current, are sparse and of varying quality (Bjorkstedt *et al.* 2005). Estimates of absolute abundance are not available for populations in this ESU (Myers *et al.* 1998). In 1965, CDFG (1965) estimated escapement for this ESU at over 76,000. Most were in the Eel River (55,500), with smaller populations in Redwood Creek (5,000), Mad River (5,000), Mattole River (5,000), Russian River (500) and several smaller streams in Humboldt County (Myers *et al.* 1998). Currently available data indicate abundance is far lower, suggesting an inability to sustain production adequate to maintain the ESU's populations. Recent growth rates are negative for Chinook salmon coast-wide in California. For example, in 2007, 2008, and 2009, dramatic declines in Chinook salmon returns occurred throughout California (SWFSC 2008, Jeffry Jahn, NMFS, personal communication 2010).

CC Chinook salmon populations remain widely distributed throughout much of the ESU. Notable exceptions include the area between the Navarro River and Russian River and the area between the Mattole and Ten Mile River populations (Lost Coast area). The lack of Chinook salmon populations both north and south of the Russian River (the Russian River is at the southern end of the species' range) makes it one of the most isolated populations in the ESU. Myers *et al.* (1998) reports no viable populations of Chinook salmon south of San Francisco, California.

Because of their prized status in the sport and commercial fishing industries, CC Chinook salmon have been the subject of many artificial production efforts, including out-of-basin and out-of-ESU stock transfers (Bjorkstedt *et al.* 2005). It is therefore likely that CC Chinook salmon genetic diversity has been significantly adversely affected despite the relatively wide distribution of populations within the ESU. An apparent loss of the spring-run Chinook life history in the Eel River Basin and elsewhere in the ESU also indicates risks to the diversity of the ESU.
Data from the 2009 adult CC Chinook salmon return counts and estimates indicated a further decline in returning adults across the range of CC Chinook salmon on the coast of California (Jeffrey Jahn, NMFS, personal communication 2010). Ocean conditions are suspected as the principal short term cause because of the wide geographic range of declines (Southwest Fisheries Science Center 2008). However, the number of adult CC Chinook salmon returns in the Russian River Watershed increased substantially in 2010/2011 compared to 2008/09 and 2009/10 returns[6]. Increases in adult Chinook salmon returns during 2010/2011, and 2011/2012 have been observed in the Eel River population as well. Adult counts at the Van Arsdale Fish Station (VAFS) on the mainstem Eel River were the highest ever recorded in 77 years with a record 2,315 Chinook salmon. Current counts for 2011/2012 at VAFS are again the highest in history with 2,430 adult salmon counted as of December 18, 2011 (S. Harris, DFG email communication 2011). These counts on the Eel River must be taken in context of the overall Chinook salmon abundance in the ESU which has recently been reviewed by Williams *et al.* (2011), who found no evidence of a substantial change in the status of the CC Chinook ESU since the last status review by Goode *et al.* (2005).

3. <u>NC Steelhead</u>

Historically, the NC steelhead DPS was comprised of 41 independent populations (19 functionally and 22 potentially independent) of winter run steelhead and 10 functionally independent populations of summer run steelhead (Bjorkstedt *et al.* 2005). Based on the limited data available (dam counts of portions of stocks in several rivers), NMFS' initial status review of NC steelhead (Busby *et al.* 1996) determined that population abundance was very low relative to historical estimates (1930s and 1960s dam counts), and recent trends were downward in most stocks. Overall, population numbers are severely reduced from pre-1960s levels, when approximately 198,000 adult steelhead migrated upstream to spawn in the major rivers supporting this Distinct Population Segment (DPS) (Busby *et al.* 1996, 65 FR 36074).

Updated status reviews reach the same conclusion, and noted the poor amount of data available, especially for winter run steelhead (NMFS 1997, Adams 2000, Good *et al.* 2005). The

[6] http://www.scwa.ca.gov/chinook/

information available suggests that the population growth rate is negative. Comprehensive geographic distribution information is not available for this DPS, but steelhead are considered to remain widely distributed (NMFS 1997). It is known that dams on the Mad River and Eel River block large amounts of habitat historically used by NC steelhead (Busby *et al.* 1996). Hatchery practices in this DPS have exposed the wild population to genetic introgression and the potential for deleterious interactions between native stock and introduced steelhead. Historical hatchery practices at the Mad River hatchery are of particular concern, and included out-planting of non-native Mad River hatchery fish to other streams in the DPS and the production of non-native summer steelhead (65 FR 36074). The conclusion of the most recent status review (Good *et al.* 2005) echoes that of previous reviews. Abundance and productivity in this DPS are of most concern, relative to NC steelhead spatial structure (distribution on the landscape) and diversity (level of genetic introgression). The lack of data available also remains a risk because of uncertainty regarding the condition of some stream populations. NMFS evaluated the listing status of NC steelhead and proposed maintaining the threatened listing determination (71 FR 834) in 2006. The most recent status review by Williams *et al.* (2011) reports a mixture of patterns in population trend information, with more populations showing declines than increases. Although little information is available to assess the status for most population in the NC steelhead DPS, overall Williams *et al.* (2011) found little evidence to suggest a change in status compared to the last staus review by Goode *et al.* (2005).

C. Threats to Salmon and Steelhead Populations

Threats to naturally reproducing salmon and steelhead are numerous and varied. Among the most serious and ongoing threats to the survival of these ESUs/DPS in the action area are habitat degradation and loss. The following discussion provides an overview of the types of activities and conditions that adversely affect salmon and steelhead ESUs/DPS in California watersheds.

1. Habitat Degradation and Destruction

A major cause of the decline of salmon and steelhead is the loss or severe decrease in quality and function of essential habitat. Most of this habitat loss and degradation has resulted from anthropogenic watershed disturbances caused by agriculture, logging, urban development, water diversion, road construction, erosion and flood control, dam building, and grazing. Most of this habitat degradation is associated with the loss of essential habitat components necessary for salmon and steelhead survival. For example, the loss of deep pool habitat as a result of sedimentation and stream flow reductions has reduced rearing and holding habitat for juvenile and adult salmonids (65 FR 36074).

The alteration of the estuaries in conjunction with increased sediment loads in the watersheds from land use activities and lower stream flows due to water diversions and other watershed changes, have delayed sandbar breaching in the fall, delayed adult salmon and steelhead migration into streams, reduced and degraded estuary rearing habitat for juvenile salmon and steelhead, and created a poor freshwater-saltwater transition zone for salmon and steelhead smolts (CDFG 1998).

2. Natural Stochastic Events

Natural events such as droughts, landslides, floods, and other catastrophes have adversely affected steelhead and salmon populations throughout their evolutionary history. The effects of these events are now often exacerbated by anthropogenic changes to watersheds such as logging, road building, and water diversion. These anthropogenic changes have limited the ability of these species to rebound from natural stochastic events and depressed populations to critically low levels.

3. Ocean Conditions

Variability in ocean productivity has been shown to affect salmon production both positively and negatively. Beamish and Bouillion (1993) showed a strong correlation between North Pacific salmon production from 1925 to 1989 and their marine environment. Beamish *et al.* (1997) noted decadal-scale changes in the production of Fraser River sockeye salmon that they attributed to changes in the productivity of the marine environment. They (along with many others) also reported the dramatic change in marine conditions occurring in 1976-77, at the beginning of an El Niño event. El Niño conditions, which occur every 3-5 years, negatively affect ocean productivity. Johnson (1988) noted increased adult mortality and decreased average size for Oregon's Chinook and coho salmon during the strong 1982-83 El Niño. It is unclear to what extent ocean conditions have played a role in the decline of salmon and steelhead; however, ocean conditions have likely affected populations throughout their evolutionary history.

4. Harvest

There are few good historical accounts of the abundance of salmon and steelhead harvested along the California coast (Jensen and Swartzell 1967). Early records did not contain quantitative data by species until the early 1950s. In addition, the confounding effects of habitat deterioration, drought, and poor ocean conditions on salmon and steelhead survival make it difficult to assess the degree to which recreational and commercial harvest have contributed to the overall decline of salmonids in West Coast rivers.

5. Artificial Propagation

Releasing large numbers of hatchery fish can pose a threat to wild salmon and steelhead stocks through genetic impacts, competition for food and other resources, predation of hatchery fish on wild fish, and increased fishing pressure on wild stocks as a result of hatchery production (Waples 1991). The genetic impacts of artificial propagation programs are primarily caused by the straying of hatchery fish and the subsequent hybridization of hatchery and wild fish. Artificial propagation threatens the genetic integrity, and diversity that protects overall productivity against changes in environment (61 FR 56138). The potential adverse impacts of artificial propagation programs are well documented (reviewed in Waples 1991, National Research Council 1995, National Research Council 1996).

6. Marine Mammal Predation

Predation is not believed to be a major factor contributing to the decline of West Coast salmon and steelhead populations relative to the effects of fishing, habitat degradation, and hatchery practices. Predation may have substantial impacts in localized areas. Harbor seal *(Phoca vitulina)* and California sea lion (*Zalophus californianus*) numbers have increased along the Pacific Coast (NMFS 1999). However, at the mouth of the Russian River, Hanson (1993) reported that the foraging behavior of California sea lions and harbor seals with respect to anadromous salmonids was minimal. Hanson (1993) also stated that predation on salmonids appeared to be coincidental with the salmonid migrations rather than dependent upon them.

7. Reduced Marine-derived Nutrient Transport

Reduced marine-derived nutrient (MDN) transport to watersheds is another consequence of the past century of decline in salmon abundance (Gresh *et al.* 2000). Salmon may play a critical role in the survival of their own species in that MDN (from adult salmon carcasses) has been shown to be vital for the growth of juvenile salmonids (Bilby *et al.* 1996, Bilby *et al.* 1998). The return of salmon to rivers makes a significant contribution to the flora and fauna of both terrestrial and riverine ecosystems (Gresh *et al.* 2000). Evidence of the role of MDN and energy in ecosystems infers this deficit may indicate an ecosystem failure that has contributed to the downward spiral of salmonid abundance (Bilby *et al.*1996).

8. Global Climate Change

The acceptance of global climate change as a scientifically valid and anthropogenically driven phenomenon has been well established by the United Nations Framework Convention on Climate Change (UNFCCC), the Intergovernmental Panel on Climate Change, and others (Davies *et al.* 2001, Oreskes 2004, UNFCCC 2006). The most relevant trend in climate change is the warming of the atmosphere from increased greenhouse gas emissions. This warming is inseparably linked to the oceans, the biosphere, and the world's water cycle. Changes in the distribution and abundance of a wide array of biota confirm a warming trend is in progress, and that it has great potential to affect species' survival (Davies *et al.* 2001). In general, as the magnitude of climate fluctuations increases, the population extinction rate also increases (Good *et al.* 2005). Global warming is likely to manifest itself differently in different regions.

Modeling of climate change impacts in California suggests that average summer air temperatures are expected to increase (Lindley *et al.* 2007). Heat waves are expected to occur more often, and heat wave temperatures are likely to be higher (Hayhoe *et al.* 2004). Total precipitation in California may decline; critically dry years may increase (Lindley *et al.* 2007, Schneider 2007). The Sierra Nevada snow pack is likely to decrease by as much as 70 to 90 percent by the end of this century under the highest emission scenarios modeled (Luers *et al.* 2006). Wildfires are expected to increase in frequency and magnitude, by as much as 55% under the medium emissions scenarios modeled (Luers *et al.* 2006). Vegetative cover may also change, with decreases in evergreen conifer forest and increases in grasslands and mixed evergreen forests. The likely change in amount of rainfall in Northern and Central Coastal streams under various warming scenarios is less certain, although as noted above, total rainfall across the state is expected to decline. For the California North Coast, some models show large increases (75% to 200%) while other models show decreases of 15% to 30 % (Hayhoe *et al.* 2004). Many of these changes are likely to further degrade salmonid habitat by, for example, reducing stream flows during the summer and raising summer water temperature. Estuarine productivity is likely to change based on changes in freshwater flows, nutrient cycling, and sediment amounts (Scavia *et al.* 2002). In marine environments, ecosystems and habitats important to sub adult and adult salmonids are likely to experience changes in temperatures, circulation and chemistry, and food supplies (Feely *et al.* 2004, Brewer 2008, Osgood 2008, Turley 2008). The projections described above are for the mid to late 21st Century. In shorter time frames natural climate conditions are more likely to predominate (Cox and Stephenson 2007, Smith *et al.* 2007).

D. Status of Critical Habitat

This biological opinion analyzes the effects of the Project on critical habitat of SONCC coho salmon (May 5, 1999, 64 FR 24049), CC Chinook salmon (September 2, 2005, 70 FR 52488), and NC steelhead (September 2, 2005, 70 FR 52488).

Critical habitat is defined as the specific areas within the geographical areas occupied by the species, at the time it is listed, on which are found those physical and biological features essential to the conservation of the species and which may require specific management considerations or protection, or specific areas outside the geographic area occupied by the species at the time it is listed when the Secretary determines that such areas are essential for the conservation of listed species.

1. <u>NC Steelhead and CC Chinook Salmon</u>

Designated critical habitat for NC steelhead and CC Chinook salmon includes the stream channels within designated stream reaches up to the ordinary highwater line (50 CFR § 226.211). I n areas where the ordinary high-water line has not been defined pursuant to 50 CFR § 226.211, the lateral extent is defined by the bankfull elevation. Critical habitat in estuaries is defined by the perimeter of the water body as displayed on standard 1:24,000 scale topographic maps or the elevation of extreme high water, whichever is greater.

Critical habitat for NC steelhead was designated in steelhead occupied watersheds from the Redwood Creek watershed, south to and including the Gualala River watershed. Critical habitat for CC Chinook salmon was designated in Chinook salmon occupied watersheds from the Redwood Creek watershed, south to and including the Russian River watershed (70 FR 52488). Humboldt Bay and the Eel River estuary are designated as critical habitat for both the NC steelhead DPS and CC Chinook salmon ESU. Some areas within the geographic range were excluded due to economic considerations or because they overlap with Indian lands (Table 4).

Watershed Name	Area Excluded	Watershed Name	Area Excluded
Ruth	Entire watershed	Bridgeville	Entire watershed
Spy Rock	Tribal land	Spy Rock	Indian lands
North Fork Eel River	Entire watershed; Tribal lands	North Fork Eel River	Indian lands
Lake Pillsbury	Entire watershed	Eden Valley	Tributaries only; Indian lands
Eden Valley	Indian lands	Round Valley	Indian lands
Round Valley	Indian lands	Black Butte River	Entire watershed
		Wilderness	Entire watershed
		Navarro River	Entire watershed
		Santa Rosa	Entire watershed
		Mark West	Entire watershed

Table 4. Watersheds excluded, in whole or part, from critical habitat designation for NC steelhead DPS and/or CC Chinook salmon (70 FR 52488).

Designated critical habitat for NC steelhead and CC Chinook salmon overlaps the project action area. In designating critical habitat for NC steelhead and CC Chinook salmon, NMFS focused on the known PCEs essential for the conservation of each species. PCEs are those sites and habitat components that support one or more life stages, including: (1) freshwater spawning, (2) freshwater rearing, (3) freshwater migration, (4) estuarine areas, (5) nearshore marine areas, and (6) offshore marine areas. Within the PCEs, essential elements of CC Chinook salmon and NC steelhead critical habitats include adequate (1) substrate, (2) water quality, (3) water quantity, (4) water temperature, (5) water velocity, (6) cover/shelter, (7) food, (8) riparian vegetation, (9) space, (10) safe passage conditions, and (11) salinity conditions (September 2, 2005, 70 FR 52488).

2. <u>SONCC Coho Salmon</u>

Critical habitat for the SONCC coho salmon ESU encompasses accessible reaches of all rivers (including estuarine areas and tributaries) between Cape Blanco, Oregon and Punta Gorda, California (May 5, 1999; 64 FR 24049). Excluded are: (1) areas above specific dams identified in the FR notice, (2) areas above longstanding natural impassible barriers (*i.e.*, natural waterfalls in existence for at least several hundred years), and (3) tribal lands.

Designated critical habitat for SONCC coho salmon overlaps the project action area. In designating critical habitat for SONCC coho salmon, NMFS focused on the known physical and biological features within the designated area that are essential to the conservation of the species. These essential features may include, but are not limited to, spawning sites, food resources, water quality and quantity, and riparian vegetation. Within the essential habitat types (spawning, rearing, migration corridors), essential features of coho salmon critical habitat include adequate (1) substrate, (2) water quality, (3) water quantity, (4) water temperature, (5) water velocity, (6) cover/shelter, (7) food, (8) riparian vegetation, (9) space, and (10) safe passage conditions (May

5, 1999, 64 FR 24049). The current condition of critical habitat for SONCC coho salmon is discussed in the factors affecting the species below.

3. Conservation Value and Current Condition of Critical Habitat

The essential habitat types of designated critical habitat for SONCC coho salmon and PCEs of designated critical habitat for NC steelhead and CC Chinook salmon are those accessible freshwater habitat areas that support spawning, incubation and rearing, migratory corridors free of obstruction or excessive predation, and estuarine areas with good water quality and that are free of excessive predation. Timber harvest and associated activities, road construction, urbanization and increased impervious surfaces, migration barriers, water diversions, and large dams throughout a large portion of the freshwater range of the ESUs and DPS continue to result in habitat degradation, reduction of spawning and rearing habitats, and reduction of stream flows. The result of these continuing land management practices in many locations has limited reproductive success, reduced rearing habitat quality and quantity, and caused migration barriers to both juveniles and adults. These factors likely limit the conservation value *(i.e.*, limiting the numbers of salmonids that can be supported) of designated critical habitat within freshwater habitats at the ESU/DPS scale.

Watershed restoration activities have improved freshwater critical habitat conditions in some areas, especially on Federal lands. In addition, the five northern California counties affected by the Federal listing of coho salmon (which includes Mendocino County) have created a five County Conservation Plan that will establish continuity among the counties for managing anadromous fish stocks (Voight and Waldvogel 2002). The plan identifies priorities for monitoring, assessment, and habitat restoration projects.

Although watershed restoration activities have improved freshwater critical habitat conditions in isolated areas, reduced habitat complexity, poor water quality, and reduced habitat availability as a result of continuing land management practices continue to persist in many locations.

a. California Coastal Chinook Salmon

NMFS' assessment of the current condition of critical habitat for the CC Chinook salmon ESU shows PCE's for spawning and rearing habitat in the two major rivers within this ESU, the Eel and Russian Rivers, to be severely degraded by the persistence of highly turbid flows during the winter and spring, persisting even at low flows. The persistence is considered to be primarily a result of flows released from Scott Dam and Coyote Valley Dam (Ritter and Brown 1971, USACE 1982, Beach 1996). Migration and rearing habitat PCEs in the Eel River (both riverine and estuarine) are degraded by diminished flows resulting from water storage in Lake Pillsbury (Scott Dam) and by interbasin diversions to the Russian River through the Potter Valley Project tunnel. Rearing habitat PCEs of the Russian River, both riverine and estuarine, are considered to be degraded as a result of land use patterns changing the channel configuration limiting available habitat, and a program of keeping the Russian River estuary breached throughout the year. Within the smaller coastal streams of the ESU, the status of critical habitat PCEs for rearing, spawning, and migration are considered degraded to a lesser extent.

b. SONCC Coho Salmon and NC Steelhead

Coho salmon and steelhead have similar habitat needs as they both require instream residence times during the summer, unlike Chinook salmon that migrate to the ocean within a few months. Therefore, we include the condition of critical habitat for these two species in the same section. The condition of SONCC coho salmon and NC steelhead critical habitat, specifically its ability to provide for their conservation, has been degraded from conditions known to support viable salmonid populations. NMFS has determined that present depressed population conditions are, in part, the result of the following human-induced factors affecting critical habitat: logging, agricultural and mining activities, urbanization, stream channelization, dams, wetland loss, and water withdrawals for irrigation. All of these factors were identified when SONCC coho salmon and NC steelhead were listed as threatened under the ESA, and they all continue to affect this ESU/DPS. However, efforts to improve SONCC coho salmon critical habitat have been widespread and are expected to benefit the ESU. Within the SONCC recovery domain, from 2000 to 2006, the following improvements were completed: 242 stream miles have been treated; 31 stream miles of instream habitat were stabilized; 41 cubic feet per second of water has been returned for instream flow; and 1000s of acres of upland, riparian, and wetland habitat have been treated. Therefore, the condition of SONCC coho salmon critical habitat is likely improved or trending toward improvement compared to when it was designated in 1999.

NC steelhead critical habitat was designated in 2005, and has likely benefitted from some of the restoration work that has occurred across the DPS in the last few years. We have no information that suggests that improvements have significantly improved the overall condition of the DPS from its designation in 2005.

IV. ENVIRONMENTAL BASELINE

The environmental baseline is the current status of species and critical habitat in the action area based on analysis of the effects of past on ongoing human and natural factors. 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 impacts of State or private actions which are contemporaneous with the consultation in process (50 CFR 402.02).

A. Status of the Species in the Action Area

All of the stream segments identified in the action area are located within the Outlet Creek watershed, sub-basin within the Eel River watershed. This basin currently provides habitat for populations of CC Chinook, SONCC coho salmon, and NC steelhead. Chinook salmon, coho salmon, and steelhead utilize the low gradient reaches of the action area streams as migration corridors during adult spawning and smolt migrations (LeDoux-Bloom 2006).

Chinook and coho salmon spawning and rearing are known to occur in upstream areas of

Baechtel, Broaddus, and Mill creeks (S. Harris, CDFG, personal communication, 2005). Coho salmon spawning and rearing is not expected to occur in the action areas of Haehl Creek or Upp,Creek. There is some potential for straying of adult coho salmon into these streams (T. Daugherty, NMFS, personal communication, 2010). Some Chinook salmon spawning does occur in reaches of Outlet and Haehl creeks. Juvenile Chinook and coho salmon may rear for short periods during their outmigration in the spring, but are not expected to utilize any stream reaches identified in the action area for summer rearing.

Juvenile steelhead have been found to utilize all stream segments that are within the project action area (LeDoux-Bloom 2006). Although many of the reaches within the action area either have very low (less than 1 cfs) flow, are intermittent, or dry during the summer months, juvenile steelhead are expected to be found in aquatic habitat present during the summer low flow period. CDFG observed low numbers of juvenile steelhead in Baechtel and Broaddus creeks during 1995 habitat typing surveys. CDFG (2004) conducted spring stream surveys of proposed project crossings and visually observed juvenile steelhead in Baechtel, Broaddus, Mill, lower Haehl, but did not observe salmonid juveniles in Upp or upper Haehl creeks.

B. Habitat Conditions in the Action Area

The majority of the action area is located on the valley floor area in the Willits Valley and has a history of intermittent flow from July to September in most years. LeDoux-Bloom (2006) reports that in 1920 the U.S. Department of Agriculture Soil Survey for the Willits area stated that all streams entering the valley are intermittent, including Baechtel, Broaddus, Haehl, Davis, and Berry creeks. CDFG conducted habitat typing in twenty reaches of the Outlet Creek basin. The following is summary of the habitat conditions for stream segments within the action area.

1. <u>Baechtel Creek</u>

The action area stream reach is located in the valley bottom where several tributaries meet to form Outlet Creek. This lower reach of Baechtel Creek is characterized by an F3 channel type (low gradients (< 2 percent), well entrenched, and gravel/cobble substrates (Rosgen 1994)). CDFG (1995) surveys found that pools in Baechtel Creek are relatively shallow in the summer with only 174 of 463 pools having a maximum depth of greater than two-feet. Pool shelter ratings for Baechtel Creek indicate that habitat complexity is low. Pool tail-outs, or areas where adult fish spawn, had high embeddedness ratings during the 1995 CDFG surveys, indicating poor gravel quality for salmonid spawning. Surveys conducted by CDFG in the spring of 2004 characterized the Baechtel Creek crossing site as having a high proportion of run habitat, high levels of silt and sand substrate and very low gradient, less than 0.5% (CDFG 2004). The lower reach of Baechtel also has poor water temperature conditions, with stream temperatures up to 29° C in late July and August (CDFG 1995).

2. Berry Creek

Berry Creek is a small tributary to Davis Creek and is located on the eastern side of the Little Lake Valley. Like other valley tributaries, this stream has been channelized to facilitate drainage for agricultural and grazing activities. Small dams in the upper watershed of this stream continue to impact hydrology with much of the stream having little or no surface flow during the summer months (CDFG 2004). Habitat typing by CDFG in 2004 report good deciduous canopy, high levels of embeddedness in spawning gravels, and a high frequency of shallow (<2 ft.) pools (CDFG 2004).

3. Broaddus Creek

Surveys of Broaddus Creek by CDFG in 1995 and 2004 characterize this reach as well entrenched, low gradient, and with fine substrates of sand and silt. CDFG's 2004 survey of the stream reach at the proposed crossing indicates a high number of run and riffle habitats with few pools. Spawning habitat is rated as very poor in the CDFG 1995 survey results, with seventy-five percent of the pool tail-outs having high embeddedness ratings (>50 percent fine sediment). Stream temperatures during July of 1995 ranged from 14.5°C to 24°C in Broaddus Creek. The action area considered in this biological opinion is located at the lower end of Broaddus Creek where stream temperatures are likely in the upper end of the documented range.

4. Davis Creek

Davis Creek is a larger tributary that drains most of the eastern portion of the Little Lake Valley. Three dams located in the upper foothills of the Davis Creek watershed currently affect hydrology, with an overall reduction in summer flow. Summer rearing temperatures for juvenile salmonids are marginal for salmonids with Maximum Weekly Average Temperatures (MWATs) of over 20°C measured in July of 2004 (CDFG 2004). Habitat typing conducted by CDFG in 2004 found a frequency of pools, but most pools were not of sufficient depth to provide high quality salmonid habitat.

5. Haehl Creek

Haehl Creek is a well entrenched, low gradient stream with gravel as the dominant substrate (CDFG 1995). Stream temperatures measured by CDFG habitat inventory crews in 1995 ranged from 15.5°C to 24°C in the summer. CDFG reports poor spawning conditions at all three of the proposed Haehl Creek crossing locations (S. Harris, CDFG, personal communication, 2005; Dave Walsh, NMFS, personal observation, 2010). Elevated percentages (estimated > 90 percent) of fine-grained sediment are present within Haehl Creek (CDFG 2004). Riparian canopy cover averaged 80 percent along the total length of Haehl Creek (CDFG 1995). Based on site visits by NMFS in 2005, the proposed crossings areas along Haehl Creek have areas that are sparse or have no riparian vegetation. CDFG characterizes Haehl Creek as having degraded conditions from past land use practices and low potential as summer rearing habitat for salmonids (S. Harris, CDFG, personal communication, 2005). The banks of the upper reach of Haehl Creek are well incised and unstable between the lower and upper culvert locations. The proposed streambed contour for this area proposes to raise the profile of the streambed downstream in order to stabilize the upper reach.

6. Mill Creek

Current habitat conditions for Mill Creek have not been well documented. A general stream survey conducted by CDFG in 2004 evaluated stream conditions at the proposed crossing location (CDFG 2004). This area of Mill Creek is also a very low gradient valley reach characterized by intermittent flows during the summer months. The portion of the action area in Mill Creek consists of a high proportion of pool habitat (85 percent), and substrates dominated by fine sand sized material (CDFG 2004). This area of Mill Creek has a riparian canopy that consists of red alder (*Alnus rubra*), willow (*Salix spp.*), Himalayan blackberry (*Rubus discolor*), and poison oak (*Toxicodendron diversilobum*).

7. Outlet Creek

The portion of the action area in Outlet Creek was created by local ranchers to maintain transport of accumulated sediment where Baechtel, Broaddus and Mill Creek join. The original channel that drained these streams is located to the west, and is currently known as the Outlet overflow channel. This newer channel, created in the 1950s, is a "U" shaped channel that provides marginal salmonid rearing habitat, but does function as a migration corridor for all three listed salmonid species (C. LeDoux-Bloom, CDFG, personal communication, 2005). The Outlet Creek channel provides little in the way of rearing habitat during the summer months. Intermittent pools having high temperature and stagnant conditions characterize the channel during this time (C. LeDoux-Bloom, CDFG, personal communication, 2005).

8. Ryan Creek

Ryan Creek currently has suitable stream temperatures for salmonids, and may serve as a refuge area for species such as coho salmon (CDFG 2004). Large culverts on the South Fork and North Fork of Ryan Creek along Highway 101 reduce habitat utilization to upper stream reaches. Fish passage has been recently restored to a large culvert on Ryan Creek Road, this culvert is downstream of the Highway 101 culverts that are proposed to improved by Caltrans. Pool habitat was found to be suitable in Ryan Creek by DFG habitat typing crews in 1995, and 2004 (CDFG 2004). Fine sediment delivery from unpaved roads continues to be a problem in Ryan Creek.

9. Upp Creek

The segment of stream that makes up the Upp Creek action area is considered to be highly degraded habitat for salmonids, and is typically dry during the summer months. Migration conditions at the existing Hwy. 101 culvert limit adult salmonids passage to the upper segments of Upp Creek that provides spawning and rearing habitat. Spring surveys at the culvert replacement site by CDFG (2004) did not document the presence of salmonids. These surveys also noted that flow was intermittent and the dominant substrate was fine sand-sized sediment mixed with gravel.

C. Value of the Action Area as Critical Habitat for Salmonids

Outlet, Berry, Davis, Haehl, Baechtel, Broaddus, Mill and Upp creeks in the action area are designated critical habitat for CC Chinook salmon, SONCC coho salmon, and NC steelhead. These streams are part of the Outlet Creek hydrologic sub-area, which has a high conservation value as determined by NMFS (NMFS 2005). Conservation Value was determined by a NMFS Critical Habitat Analytical Review Team (CHART), which evaluated the quantity and quality of habitat features, the relationship of the Hydrologic Sub Area (HSA) to other areas within the ESU/DPS, and the significance to the ESU/DPS of the population occupying that area (NMFS 2005). Because quality of habitat was only one of the rating factors used to determine conservation value, and habitat quality was considered at the geographic scale of an HSA, specific stream reaches within an HSA may, or may not, contain a high quality of habitat, regardless of the HSA's overall rating for conservation value.

The longest stream reaches included in the action area are Haehl Creek and Outlet Creek. Both of these stream reaches currently have marginal salmonid rearing habitat during the summer due to intermittent flow and lack of riparian canopy to maintain suitable salmonid stream temperature conditions. During 2004, CDFG conducted stream temperature monitoring in nine streams located within the southern subbasin (action area) of the Outlet Creek basin and all nine had maximum weekly average temperatures considered unsuitable for salmonid rearing (LeDoux-Bloom 2006).

Spawning habitat in the Outlet Creek reach of the action area is limited due to its very low gradient and is typically inundated during the winter by the "Little Lake" for which the valley was named. This reach of Outlet Creek serves primarily as a migration corridor for adult salmon and steelhead during the fall and winter months, and for smolts as they migrate out of tributaries to the Eel River. Chinook salmon and steelhead spawn in Haehl Creek, but it is only used by Chinook salmon in years when high adult escapement occurs (S. Harris, CDFG, personal communication, 2005).

The action areas of Baechtel, Broaddus, Mill, and Upp Creek represent much shorter stream reaches (150-1250 m) of habitat, which are located on the valley floor in the most downstream area of each named stream. These valley segments currently have low quality habitat for juvenile steelhead summer rearing; steelhead have been found at low densities in these areas. Some reaches such as Outlet Creek, Davis Creek, and Berry Creek may not be occupied by salmonids during the late summer months (C. LeDoux-Bloom, CDFG, personal communication, 2005). For the most part, these segments provide migration passage for adult and smolts to and from higher quality habitat, which is upstream and outside of the action area. Some limited spawning and rearing use by steelhead is likely to occur in the lower reaches of Baechtel, Broaddus, Mill, and Outlet creeks, but is not expected to occur in Upp Creek.

D. Factors Affecting the Species and Critical Habitat in the Action Area

Pomo Native Americans occupied the Outlet Creek sub-basin when the first European settlers arrived in the early 1840s. In 1855, Sam and Harry Baechtel drove cattle to the valley from Marin County and settled in the Little Lake Valley (LeDoux-Bloom 2006). In 1892, the California Northwestern Railroad Company began scouting locations along their routes for an egg taking station and hatchery under the direction of Colonel LaMotte. By 1897, fish facilities were open on Gibson Creek in the Russian River Basin and Outlet Creek. Steelhead eggs collected from the Little Lake Valley were grown in the Gibson Creek Hatchery and planted throughout the Outlet Creek Basin, parts of Big River, Russian River, and possibly Lagunitas

Creek (LeDoux-Bloom 2006). LeDoux-Bloom (2006) also reports that trout eggs from the Shasta or McCloud rivers were grown out and planted in Outlet Creek and other Mendocino County watersheds until the facility was closed in 1920.

During the late 1800s and early 1900s many of the creeks in the Outlet Creek basin were relocated for the building of railroads. Today in several areas one can observe where Outlet Creek was moved by cutting off the meander and straightening the stream to build the existing Hwy. 101 alignment (C. LeDoux-Bloom, CDFG, personal communication, 2005). Beginning in 1910, channels were created with oxen and plows to facilitate draining of the Little Lake Valley to lower Outlet Creek for agricultural purposes such as potato production and cattle grazing (DWR 1965, as cited in Le-Doux Bloom 2006). The largest channel, according to longtime landowner John Ford, was constructed to form a straight channel that drains flow from Baechtel, Broaddus, and Haehl creeks, and is currently known as Outlet Creek. The original Outlet Creek, as reported in Le-Doux Bloom (2006), is located to the west and is referred to as the Outlet overflow channel.

By the 1950s and 1960s, many of the upper areas of the Outlet Creek Basin had been logged with little attention to erosion control. According to LeDoux-Bloom (2006), many of the valley floor stream reaches such as Baechtel, Broaddus, and Haehl became aggraded during the winter storms of 1955 and 1964. These same stream reaches went through additional aggradation in the 1980s and in some areas, the adjacent meadows were lower in elevation than the streams. Juvenile steelhead and coho were found rearing in some of the meadow areas only to perish when water temperatures reached lethal levels (W. Jones, private consultant, personal communication, 2006). In order to maintain passage in the aggraded reaches along the valley floor, CDFG funded barrier and sediment removal projects to define channels for adult salmonid migration (LeDoux-Bloom 2006).

Currently reaches within the action area that are affected by cattle grazing are on Haehl, Baechtel, Outlet, and Upp creeks. Based on field observations by NMFS during site visits of the action area, the current grazing practices continue to impact the riparian areas along streams located on the valley floor. The current riparian zone consists of a narrow strip of riparian vegetation including alder, willow, oak, Himalayan blackberry, and poison oak. Much of the riparian zone is inconsistent in forming a functional riparian community, which does not provide adequate protection for salmonid habitat. Evidence of inadequate riparian zones within the action area were found during 2004 temperature monitoring, which documented unsuitable stream temperature conditions for salmonids (LeDoux-Bloom 2006).

Planwest Partners (2002) reports that localized flooding in upstream areas has resulted in efforts to reduce the amount of brush and debris in these valley streams that are part of the action area. An existing water treatment plant releases treated wastewater in Outlet Creek near the confluence with Baechtel Creek. Releases occur during the winter period and are reported to have no impact on spawning salmonids other than providing slightly more flow (Planwest Partners 2002).

Non-native fish have been introduced to some of the streams located within the action area. Bluegill (*Lepomis macrochirus*), green sunfish (*Lepomis cyanellus*), largemouth bass (*Micropterus salmoides*), and smallmouth bass (*Micropterus dolomieu*) have been reported to inhabit reaches of Haehl, Mill, and Outlet Creek (S. Harris, CDFG, personal communication, 2005). Introduction of these non-native species is believed to be from farm ponds and local reservoirs from which they escape. Presence of these warm water species effects salmonids in a number of ways, including competition for habitat space, predation, elimination of natives, reduced growth and survival, and changes in community structure (Spence *et al.* 1996).

V. EFFECTS OF THE ACTION

The purpose of this section is to identify the direct and indirect effects of the proposed action, and any interrelated or interdependent activities, on threatened NC steelhead, SONCC coho salmon, and CC Chinook salmon, and their designated critical habitats. Data to quantitatively determine the precise effects of the proposed action on salmon and steelhead and critical habitat are limited or not available; the assessment of effects therefore focuses mostly on qualitative identification. This approach is based on knowledge and review of the ecological literature concerning the effects of loss and alteration of habitat elements important to salmonids, including the PCEs of critical habitat. This information was used to gauge the likely effects of the proposed project via an exposure and response framework that focuses on the stressors (physical, chemical, or biotic), directly or indirectly caused by the proposed action, to which salmonids and their critical habitat are likely to be exposed. Next, we evaluate the likely response of salmonids and critical habitat to these stressors in terms of changes to salmonid survival, growth and reproduction, and changes to the ability of PCEs to support the value of critical habitat.

A. NMFS Assumptions Regarding the Effects Analysis in this Biological Opinion

Caltrans' plans for the construction and mitigation of the Willits Bypass are complete, yet the SWPPP BMPs will be developed once the contractor(s) have acquired contracts from Caltrans. In order to facilitate the development of this biological opinion, NMFS has had to make certain assumptions regarding the effectiveness of the BMPs and the mitigation plans. NMFS assumes that the BMPs, SWPPP, and mitigation actions will be effective with regard to minimizing impacts and improving salmonid habitat over time. NMFS expects that Caltrans will provide a final list of SWPPPs prior to implementing these actions. Furthermore, NMFS must review these plans to determine if they are sufficient to meet the effectiveness assumptions in this biological opinion regarding potential project impacts. Based on NMFS review, if the BMPs and SWPPP do not meet the anticipated effectiveness in minimizing and mitigating project impacts, NMFS will request Caltrans reinitiate consultation on this project.

B. Effects of Dewatering the Project Areas

Construction of six bridges, construction of eight viaduct crossings, one culvert crossing, and two culvert removals will require in-channel work and pile driving. To minimize effects of the proposed construction and pile driving, Caltrans proposes to dewater stream construction areas and relocate fish to other appropriate stream reaches within the Outlet Creek sub-basin. By removing fish from the stream reaches in and adjacent to construction areas, the project is expected to significantly reduce the number of juvenile anadromous salmonids injured or killed during the summer work season. In the absence of fish relocation, juvenile steelhead, coho and Chinook salmon would be exposed to dewatering, thermal stress, desiccation, physical injury from construction equipment and elevated sound levels during pile driving.

Although fish relocation avoids significant impacts to fish in the project area, the fish relocation activities themselves are expected to result in some stress and mortality. Direct effects to juvenile salmonids from this dewatering and relocation will occur in action areas at Haehl, Baechtel, Broaddus, Outlet, and Mill creeks. The action area for Upp Creek is expected to be dry during the construction phase of the project.

The actual distance that may need to be dewatered will vary with actual summer flow conditions. Summer flows in the Outlet Creek sub-basin are dependent on precipitation levels during the winter and spring preceding construction. Haehl Creek has six bridge crossing locations that can vary from dry channel condition to wetted surface flow conditions in the summer depending the previous winter and spring rains. For evaluation purposes in this biological opinion, NMFS assumes that all stream crossings except for Upp Creek, will have surface flow at the beginning of the proposed construction period (June 15).

Dewatering for construction will likely occur at seventeen stream crossings (bridges or viaducts). Each crossing will have no more than 150 m of channel dewatered with the use of cofferdams for up to six weeks during the summer months. The Haehl Creek culvert replacement for the Schmidbauer Ranch road access and the Haehl Creek culvert removal may require dewatering of intermittent pools. Caltrans proposes to allow the contractor to choose various methods of cofferdam construction, including the use of rubber bladders, clean gravel, or sand bags to block stream flow and divert water around the construction sites. During dewatering of each stream crossing area, juvenile fish, including listed salmonids, will be relocated to other appropriate stream reaches. Capture and relocation efforts will result in stress and potential mortality of some juvenile steelhead and salmon. These activities may occur at each construction site over two construction seasons.

During the dewatering and fish relocation phase, juvenile steelhead are expected to be present at each stream crossing site. Juvenile steelhead densities are expected to be low based on habitat quality and prior survey work by fishery biologists. The likelihood of juvenile Chinook salmon and coho salmon being present during the construction/dewatering phase of the proposed project is very low (S. Harris, CDFG, personal communication, 2005). Juvenile coho salmon may be present in low numbers at Baechtel Creek, Broaddus Creek, Outlet Creek, and Mill Creek project locations, but not present at the four Haehl Creek project sites. Because ocean-type Chinook salmon can reside within streams for up to a year it is possible that juvenile Chinook salmon could be present at the lower Haehl, Baechtel, Broaddus, Outlet, and Mill creek project areas during the dewatering and relocation activities. Ocean-type juvenile Chinook salmon normally migrate out of their natal stream from 60-150 day post-hatching, but under some conditions may remain in freshwater their first year (Myers *et al.* 1998).

Fish relocation at the proposed project sites will be conducted with electroshocking gear, seining gear, or dip nets by qualified biologists. Once cofferdams are in place, water in pool habitats may be removed using screened pumps. When stream habitats have been sufficiently dewatered, relocation efforts will continue until all fish have been removed from the dewatered reach. Despite these measures, some mortality of fish is likely at each stream crossing construction due to injury from relocation methods (seining or electrofishing), stress related to handling, and individual fish eluding capture. These latter fish will die when the work areas are dewatered.

Mortality associated with fish relocation activities is expected to be low. To minimize impacts during fish collection and relocation, Caltrans proposes to use only experienced biologists, approved by NMFS and the CDFG. Fish will be relocated to suitable habitats outside of the construction area. Based on review of up-to-date fish relocation techniques and protocols, unintentional mortality of juvenile anadromous salmonids is not expected to exceed three percent of the fish collected. Biologists with electrofishing experience and skill can reduce injury and mortality rates to near one percent. Juvenile NC steelhead will comprise most or all of the salmonids collected at the stream crossing project sites. Due to the very low densities of juvenile Chinook and coho salmon in the project area, few are likely to be present and, thus, very few coho and Chinook salmon mortalities are expected. Juvenile salmonids that avoid capture in the project work area are not likely to survive within the construction sites once they are dewatered. Due to the poor habitat conditions (lack of hiding cover) at the construction sites, NMFS expects that relocation efforts will be effective and mortalities from dewatering and fish relocation will be less than three percent of the total number of fish present in the affected reach of stream.

C. Effects of Pile Driving During Project Construction

Available information indicates that fish may be injured or killed when exposed to elevated levels of underwater sound pressure generated from driving steel piles with impact hammers (Abbott and Reyff 2004, Abbott *et al* 2005, Caltrans 2001, Caltrans 2004, Vagle 2003, Hastings and Popper 2005). Pathologies associated with very high sound levels are collectively know as barotraumas. These include hemorrhage and rupture of internal organs, including the swimbladder and kidneys in fish. Death can be instantaneous, occur within minutes after exposure, or occur several days later. High sound pressure levels can also result in hearing damage and elicit stress responses in fish (Popper et al. 2003/2004).

In 2004, FHWA and CalTrans formed the Fisheries Hydroacoustic Working Group (FHWG) to address the issue of potential impacts to listed species from exposure to underwater sounds produced by pile driving. CalTrans contracted with prominent experts in the field of underwater acoustics to review existing literature on the effects of underwater sound on fish. The result of that effort (Hastings and Popper 2005) indicated that the use of the sound exposure level (SEL) metric, which is expressed as dB re one micropascal squared-seconds, would be a better metric to use to correlate physical injury to fish from underwater sound pressure produced during the installation of piles than peak sound pressure level (SPL) that was currently being used. The primary rationale for this new metric was the ability to sum the energy over multiple pulses, which cannot be accomplished with peak pressure. Using SEL, the exposure of fish to a total amount of energy (*i.e.*, dose) can be used to determine a physical injury response.

A white paper written for the FHWG by Popper *et al.* (2006) proposed a dual metric approach, incorporating both SEL and peak pressure, in assessing potential physical injuries to fish from exposure to elevated levels of underwater sound produced during pile driving. The authors proposed interim single strike thresholds of 187 dB_{SEL} and 208 dB_{peak} re one micropascal. In a critique of the white paper, NMFS scientists from the Northwest Fisheries Science Center in Seattle, Washington (Memorandum to Mr. Russ Strach and Mr. Mike Crouse, NMFS from Tracy Collier, NMFS, September 19, 2006) stated that exposure to multiple strikes must be considered is assessing impacts. They further stated that the method described in Hastings and Popper (2005) is appropriate. Specifically, to account for exposure to sound impulses generated by multiple hammer strikes, the single strike SEL at a given distance from the pile is added to 10*log (number of strikes). Based on this, NMFS is using a single strike peak SPL of 208 dB and an accumulated SEL of 187 dB to correlate underwater sound with potential injury to fish.

The degree to which an individual fish exposed to underwater sound from pile driving may be affected is dependent on a number of variables, including, but not limited to, size of the fish, hearing ability of fish, presence of swimbladder, lifestage, fish behavior, presence of predators, sound amplitude and frequency, and effectiveness of any sound attenuation technology. Also, sound wave forms are affected by the size and type of pile and installation equipment.

Caltrans analysis of the sound levels concluded that CISS piles and temporary H-piles in some of the proposed locations would exceed the sound thresholds of 206 SPL for single strike and 187 SEL for continuous strikes. During phases 1 and 2 construction, there are nine locations where fish will need to be relocated during the installation of these two pile types. The locations and distances where sound levels drop below the thresholds are listed in Tables 5 and 6 for each construction phase.

Pile type/size	Location	Exceedence SPL criteria 10 m	Exceedence SEL crit. 10 m	Dist. to Atten. to SEL crit.	Number of days SEL crit. exceeded
[redacted]					
Cofferdams in water	Baechtel–Broaddus–Outlet Creek confluence (Bent 24)	NO	192.8	62 feet (19 m)	2
Trestle H-piles in water	Lower Haehl Creek, Middle Haehl Creek, Baechtel Creek, and Mill Creek	NO	192.5	62 feet (19 m)	Lower Haehl Creek–1 Middle Haehl Creek–4 Baechtel Creek–2 Mill Creek–1
CISS piles in water	Baechtel–Broaddus–Outlet Creek confluence (Bent 24)	NO	198	115 feet (35 m)	2
CISS piles within 50 feet (15 m) of water	Bents 4, 23 and 28, adjacent to Lower Haehl, Baechtel, and Mill Creeks, respectively	NO	198	115 feet (35 m)	Lower Haehl Creek–2 Baechtel Creek–2 Mill Creek–2
False H-piles in Water	Middle Haehl Creek, Lower Haehl Creek, Baechtel Creek, Broaddus Creek, Baechtel–Broaddus–Outlet Creek confluence, Mill Creek, and Upp Creek	NO	192.5	62 feet (19 m)	Lower Haehl Creek–1 Middle Haehl Creek–4 Baechtel Creek–2 Broaddus Creek - –1 Baechtel–Broaddus–Outlet Creek confluence–1 Mill Creek–1 Upp Creek–1

Table 5. Sound exceedance of interim criteria from pile driving (Phase 1)

[redacted]					
Cofferdams in water	Middle Haehl Creek, Lower Haehl Creek, Outlet Creek, and Mill Creek	NO	192.8	62 feet (19 m)	Middle Haehl Creek–2 Lower Haehl Creek–2 Outlet Creek–2 Mill Creek–2
Trestle H-piles in water	Middle Haehl Creek, Lower Haehl Creek, Baechtel Creek, and Mill Creek	NO	192.5	62 feet (19 m)	Middle Haehl Creek–4 Lower Haehl Creek–1 Baechtel Creek–2 Mill Creek–1
CISS piles in water	Middle Haehl Creek, Lower Haehl Creek, Outlet Creek, and Mill Creek	NO	198	115 feet (35 m)	Middle Haehl Creek–2 Lower Haehl Creek–2 Outlet Creek–2 Mill Creek–2
Falsework H-piles in water	Outlet Creek Mill Creek	NO	192.5	62 feet (19 m)	Outlet Creek–4 Mill Creek–2

Table 6. Sound exceedance of interim criteria from pile driving (Phase 2)

The underwater sound produced from driving piles for this project is evaluated using a number of parameters including: frequency of hammer strikes; speed of the migrating fish; total number of hammer strikes in a day; estimated peak decibel levels; and closest distance a fish may pass to that peak sound level. By holding the fish speed at zero, the spreadsheet will also calculate the accumulation of sound energy on fish holding and rearing at any given distance within the area, and thus the radial distance upstream and downstream, within which, holding fish would be expected to accumulate sufficient pile driving sound energy to cause physical injury.

1. <u>CISS Piles</u>

CISS piles will be driven above ordinary high water levels of each stream channel with the exception of Bent 24 in construction Phase 1, which will be placed directly at the Baechtel-Broaddus-Outlet confluence within a watered cofferdam. Bent 24 will be the only footing that will be placed in the wetted channel. Three other locations at Bents 2, 23, and 28, in Phase 2, will occur along creeks and require excavated cofferdams to construct footings. These four Bent locations have been determined by Caltrans to exceed interim threshold levels by emitting higher sound pressure levels. Caltrans estimated the number of hammer strikes per 0.61m CISS pile placement will take approximately 2,210 strikes per pile and take 50 minutes for each placement.

a. Bent 24 (eighteen 0.61m CISS piles) – The SPL level for driving the CISS pile within a dewatered cofferdam or within a bubble curtain contained within the cofferdam is between 180 and 190 dB, which is below the interim level for peak levels. The SEL for pile driving will be 198 dB for the installation of 16 sheet piles over two installation days. The SEL will decrease to 187 dB at 19.5m up and downstream of the cofferdam. The third installation day for the remaining eight piles, the SEL will reach 189.8 dB and will decrease to 187 dB at a distance of 14m up and downstream of the cofferdam.

b. *Bent 4* – cofferdam construction will occur on land adjacent to Lower Haehl Creek. CISS pile driving within the cofferdam is anticipated to generate sound levels of 180 dB SPL and 198 dB SEL at 10 m. The SEL sound will attenuate to the 187 dB SEL level at 35 m from the source.

c. Bent *23* (sixteen 0.61m CISS piles) - cofferdam construction will occur on land adjacent to Baechtel Creek. CISS pile driving within the cofferdam is anticipated to generate sound levels of 180 dB SPL and 198 dB SEL at 10 m. The SEL sound will attenuate to the 187 dB SEL level at 35 m from the source.

d. Bent 28 - cofferdam construction will occur on land adjacent to Mill Creek. CISS pile driving within the cofferdam is anticipated to generate sound levels of 180 dB SPL and 198 dB SEL at 10 m. The SEL sound will attenuate to the 187 dB SEL level at 35 m from the source.

2. <u>H-Piles</u>

All permanent H-piles will be exclusively impact driven. It is estimated that it will take 30 minutes to drive each pile with an average of 900 strikes at a rate of one strike every 2 seconds. A crew could install up to 12 H-piles per day. The permanent H-piles will be driven on land within 15m of a given creek channel and sound level for both SPL and SEL will not exceed the interim levels at 10m.

Temporary H-piles for the falsework and trestles will be installed using a vibratory hammer and an impact hammer. It is estimated that each pile will be vibrated for 30 minutes, and proofed with 20 blows from the impact driver and one bent (five piles) can be installed in per day. For this analysis, it is assumed that pile installation within creek beds will occur at the following crossings:

lower Haehl Creek (one bent consisting of five piles total)

middle Haehl Creek (four bents consisting of 20 piles total)

Baechtel Creek (two bents consisting of 10 piles total)

Broaddus Creek (one bent consisting of five piles total)

Baechtel–Broaddus–Outlet Creek confluence (one bent consisting of five piles total)

Mill Creek (one bent consisting of five piles total)

Upp Creek (one bent consisting of five piles total).

It is anticipated that the majority of these creek channels will likely be dry or have low surface water levels when the falsework bents are installed. Removal of the temporary falsework piles will be by vibratory extractor or by cutting the piles off below grade. Caltrans has proposed to dewater all construction areas if surface water exists and relocate any fish to minimize the potential impacts of high sound pressure levels from the pile driving.

Based on the results of hydroacoustic analyses, Caltrans proposes relocating fish to minimum distances of 62 feet (19 m) for sheet piles to 115 feet (35 m) for CISS piles, both upstream and downstream from the activity, in order to minimize the exposure of listed salmonids to harmful sound pressure waves. Minimum distances that fish will be relocated from the temporary H-pile placement areas will be 19 m at 12 locations in Phase 1 and six locations in Phase 2. Although there may be a need to dewater most areas for H-pile placements, NMFS believes a majority of these locations will be dry under summer conditions, thus lowering the amount of dewatering and fish locations significantly.

The two types of piles used in the cofferdam construction are sheet piles and spuds. The sheet piles will be installed and removed using a vibratory hammer. This process typically takes two to three days for installation and two days for removal. The spuds are constructed from four to eight H-piles that are driven into the ground, followed by two "W"-beams that are welded to the H-piles. The H-piles will be installed with a combination of vibratory and impact hammers and are not anticipated to exceed interim thresholds with a SPL of 155 dB and SEL levels of 140 dB at 33 feet (10 m).

Juvenile salmonids are expected to be present upstream and downstream of the dewatered reaches during pile driving. Given what is currently known about the effects on salmonids from pile driving and conditions at the project site, NMFS expects that dewatering of each crossing site (up to 70 m (230 feet)) will be a sufficient distance to reduce sound exposure in nearby wetted habitats to safe levels. Since fish will likely be at least 75 m from the sound source, dB levels during pile driving are not expected to cause mortality or injury of juvenile salmonids. Decibel levels may cause juvenile fish to become startled and abandon preferred habitats, which are adjacent to the dewatered areas. Caltrans has proposed to monitor underwater sound pressure in the wetted aquatic areas immediately above and below dewatered reaches. This information will allow for evaluation of sound exposure levels to fish rearing upstream and downstream of the stream crossing construction sites.

Caltrans will conduct pile driving with an impact hammer from June 15 to October 31 and proposes to attenuate sound by using all means possible while pile driving within the cofferdams and use a hydrophone device to monitor sound levels. If the current thresholds (above 206 dB peak SPL and 187 accumulated dB SEL at 10 m from the pile being installed) that cause death or injury to fish are exceeded, Caltrans will stop the pile driving activities until sound levels can be maintained under the prescribed thresholds.

Under the new proposed project description, pile driving will be divided between the two construction phases. This will lower the amount of accumulated sound levels transferred into wetted areas at one time; however, since the sound impacts may affect a greater demographic of the population by impacting different cohorts from year to year.

Caltrans has incorporated several measures to minimize exposure of fish, and attenuate high levels of underwater sound during pile driving, such as pile driving within cofferdams and using wood blocks between the piles and the impact hammer.[7] Pile driving near water causes sound energy to radiate indirectly into the water as a result of ground borne vibration at the bottom beneath the river. The low-frequency ground borne vibration can cause localized sound pressure waves in the water that are radiated from the bottom of the river. A minimum water depth is required to allow sound to propagate through water in an area. For pile driving sounds, the minimum depth for this propagation is 3 to 6 feet, depending on frequency. Sound waves do not propagate through air as readily as water.

CISS pile driving will occur within dewatered cofferdams at Bents 2, 23, and 28, which will provide a source of attenuation by creating an air space between the pile and the water column. Pile driving at Bent 24 will be conducted within a watered cofferdam; however, hydroacoustic monitoring will occur outside of the cofferdam to certify the attenuation and all pile driving activities will stop if sound levels are exceeded. Based on these measures that will be used for pile driving at these locations, NMFS believes injury or mortality to migrating steelhead is unlikely.

D. Effects of Riparian Vegetation Removal

Removal of riparian vegetation along banks of proposed construction areas is expected to adversely affect designated critical habitat for listed anadromous salmonids and impact juvenile steelhead within the action area. When streamside vegetation is removed, summer water temperatures typically increase in proportion to the increase in sunlight that reaches the stream surface (Chamberlain *et al.* 1991). Increases in solar radiation to stream reaches may also change aquatic species composition, increase algal biomass and alter invertebrate communities (Beschta

[7] As stated above, if current thresholds that cause injury to fish are exceeded, Caltrans will stop the pile driving activities until sound levels can be maintained under the prescribed thresholds.

*et al.*1987). Primary elements of salmonid habitat such as large woody debris, pool and riffle formation, and food inputs are likely to be impacted by the riparian vegetation removal (Caltrans, 2005a). In addition, removal of riparian vegetation can change local microclimate, soil moisture, groundcover, and susceptibility to bank erosion, and influence the re-establishment of vegetation (Spence *et al.* 1996).

Removal of riparian vegetation will be performed with heavy equipment and hand crews. Permanent and temporary removal of vegetation will be conducted along upper Haehl Creek (southern interchange), the Schmidbauer culvert replacement near Haehl Creek, middle Haehl Creek crossing, lower Haehl Creek viaduct crossing, Baechtel Creek viaduct crossing, Broaddus Creek viaduct crossing, Mill Creek viaduct crossing, and the Upp Creek culvert replacement location. Riparian vegetation removal is proposed from the edge of ordinary high water to areas above the top of bank that encompass most of the existing riparian zone. Table 2 presents the amount of bank length of permanent and temporary riparian vegetation removal at each stream crossing on the salmonid bearing streams.

Upper Haehl Creek	767	12	779	392
Middle Haehl Creek	104	91	195	98.5
Lower Haehl Creek	34	160	194	97.5
Baechtel Creek	298	367	665	335
Broaddus Creek	32	156	188	95
Outlet Creek		86	86	
Mill Creek	36	177	213	103.5
Upp Creek	179	5	184	92

Table 7. Permanent and temporary (replanted) riparian removal at proposed stream crossings and construction sites along the Willits Bypass.

With three distinct construction areas, Haehl Creek will require the most extensive amount of permanent riparian vegetation removal. Construction of the north and southbound viaduct crossings at Baechtel, Broaddus, and Mill creeks requires both permanent and temporary removal of riparian bank vegetation. Approximately 92 m of channel will be affected by the permanent removal of riparian vegetation at the Upp Creek culvert crossing.

Impacts associated with the riparian vegetation removal vary within the action area depending on removal type (permanent or temporary), stream flow (absent, intermittent, surface flow present) during the summer, and presence of salmonids. The current condition of riparian habitat also influences the potential impact to salmonid habitat.

1. Removal of Riparian Vegetation along Salmonid Streams

The proposed removal of riparian vegetation at stream crossings is expected to adversely affect water temperature on the salmonid streams in the project action area. Water temperature is a critical environmental factor in most aquatic ecosystems. Chemical and biological processes in aquatic environments ultimately are regulated by temperature. As cold-blooded animals, the metabolism, reproduction, development, and scope of activity of anadromous salmonids are largely controlled by environmental temperature (Marcus *et al.* 1990). The Willits Bypass Project's proposed temporary and permanent removal of riparian vegetation is expected to result in increased solar radiation input and increase summer/fall water temperatures on the five salmonid-bearing streams in the action area.

Gillies (2000) conducted a focused study of the effects of riparian canopy removal on stream water temperature in the Little Lake Valley. Using local stream habitat inventory data, Gillies (2000) concluded that in the Willits Bypass Project area there is a direct relationship between percent canopy cover and elevated water temperatures in streams. Based on this study's results, the riparian vegetation removal associated with the proposed Willits Bypass Project is likely to result in substantial adverse impacts to habitat quality by increasing water temperatures in the action area.

The preferred temperature range for *Oncorhynchus* spp. is generally between 6 and 15° C (Reiser and Bjornn 1979). In the Eel River Basin, stream water temperature is recognized as a critical habitat parameter (Gillies 2000), particularly during the summer months for juvenile rearing salmonids. Summer and fall water temperatures influence growth rates, swimming ability, availability of dissolved oxygen, ability to capture and use food, and ability to withstand disease outbreaks. Steelhead and coho salmon juveniles are known to rear during the summer months in the five salmonid-bearing streams of the action area. Chinook salmon juveniles typically outmigrate to the ocean as juveniles during the spring months in their first year and are generally not expected to be within the streams of the action area over summer.

Due to riparian vegetation losses, additional solar inputs at the project's riparian removal sites will increase summer water temperature and degrade salmonid habitat. Summer stream temperatures are expected to increase as a result of project construction in wetted areas of Haehl, Baechtel, Broaddus, and Mill creeks. In areas where riparian vegetation is re-planted post-construction, the canopy will likely be restored in five to ten years and these additional solar radiation inputs will be reduced or eliminated. In areas of permanent vegetation losses, salmonid habitat including designated critical habitat will be permanently impacted by increased water temperature.

Since Haehl Creek contains the largest linear extent of permanent vegetation removal, thermal impacts are expected to be more extensive and may convey the warmed water into downstream reaches of Baechtel Creek, and Outlet Creek below the confluence with Haehl Creek. However, during the summer and fall months of most water years, portions of the creek bed of Haehl, Baechtel, and Outlet creeks may be naturally dry in the action area. These intermittent flow conditions could help reduce the thermal effects of riparian removal, because subsurface flow through the project area will not be subject to direct solar radiation. The extent of this amelioration due to dry and intermittent stream flows in the action area is unknown. Juvenile steelhead that reside in thermally impacted reaches of Haehl, Baechtel, and Outlet creek are likely to experience reduced survival rates due to increases in water temperatures in portions of the action area. These effects are expected to last for at least a five-year period, until mitigation actions ameliorate the impacts of the project riparian vegetation removal. The few areas that permanently lose riparian vegetation may become uninhabitable to listed salmonids.

CDFG (1995) reports existing stream temperature conditions are marginal for salmonid rearing in most of Haehl Creek. Gillies (2000) estimates reduced canopy cover in the action area due to construction of the Willits Bypass Project could increase water temperatures to levels in excess of 30° C. Although existing summer habitat conditions are marginal due to elevated temperatures, the suitability of salmonid rearing habitat within Haehl Creek and Baechtel Creek is expected to further decrease due to the project's extensive removal of riparian vegetation.

Riparian vegetation removal and the associated effects at Broaddus and Mill creeks are similar, but less extensive than Haehl and Baechtel creeks. At both Broaddus and Mill creeks it is estimated that approximately 100 m of stream will be affected by the viaduct construction at each site. Marginal stream temperature conditions in lower reaches of Broaddus and Mill creeks will become less suitable for salmonid rearing during the summer months due to increased solar radiation input.

Approximately 92 m of channel will be affected by the permanent removal of riparian vegetation at the Upp Creek culvert crossing. Upp Creek typically has dry channel conditions from early spring to late fall. Therefore, riparian vegetation removal along Upp Creek is not expected to effect stream temperatures due to the lack of summer flow at the site.

2. <u>Removal of Riparian Vegetation on Non-Salmonid Streams</u>

Non-salmonid bearing streams located within 305 m of salmonid streams were designated as Category II streams due to their potential influence to fish bearing streams. Other stream courses which are located beyond 305 m of a salmonid stream, and have less potential to impact salmonid streams, were categorized as Category III streams.

Category II streams are typically important sources of water, nutrients, wood, and other vegetative material for streams inhabited by fish and other aquatic organisms (FEMAT 1993). Removal of riparian vegetation in these channels has the potential to increase stream temperatures of salmonid streams, and to deliver sediment and increase turbidity in fish bearing streams. The Willits Bypass Project proposes to permanently remove 1,090 m of riparian vegetation along five Category II stream reaches. Temporary riparian removal is proposed on 726 m of Category II streams.

Category III streams are small ephemeral streams, which are more than 305 m (1000 feet used in California Forest Practice Rules) from fish bearing streams. These streams typically have no flow or aquatic life during the summer months, but are capable of transporting sediment, woody debris, and nutrients during winter rainstorms. Riparian vegetation removal for permanent and temporary impacts to these channels totals 967 m and 21 m, respectively.

Riparian vegetation removal is expected to create increased surface erosion, and bank erosion, which results in increased turbidity and sediment (sand sized particles) to fish bearing channels. The majority of the Category II and III stream channel reaches impacted by the Willits Bypass Project will be placed in culverts. By placing these stream types in culverts, they are not expected to increase stream temperatures of fish bearing streams. Losses of aquatic macro invertebrate food producing areas in Category II channels will likely decrease food delivery to fish bearing channels. Loss of these food-producing areas is not expected to reach levels that would adversely affect fish bearing streams because the length of Class II stream that will be placed in culverts is less than 500 m combined. In addition, there may be some minor reduction in nutrients, woody debris, and vegetative material because of the culvert installations. Response of salmonid lifestages to increased sediment levels, including Category II and Category III streams, will be discussed in the effects section below titled *Effects of Riparian Vegetation Removal on Salmonids*.

Category II channels which are not within constructed culverts may experience stream temperature increases due to vegetation removed from the riparian zone. These streams typically have very low flow, intermittent flow, or are dry by early summer. Thus, the small contribution of flow from Category II drainages is generally not enough to result in stream temperature changes to fish bearing streams during the summer months.

E. Mobilization of Sediment from Construction Activities

Suspended and deposited fine sediment can adversely affect salmonid rearing and spawning habitat if present in excessive amounts. High levels of suspended solids may abrade and clog fish gills, reduce feeding, and cause fish to avoid some areas (Cordone and Kelly 1961). Several activities associated with construction of the Willits Bypass Project may result in an increase delivery of sediment to streams in the action area. These include construction of the roadbed, temporary haul road construction and operation, operation of staging areas, riparian vegetation removal, channel realignment, in-channel work such as rock slope protection and bridge construction, culvert replacements, excavation activities at the southern interchange, and construction and removal of cofferdams. An estimated 1.9 million cubic m of earthen material will be excavated, transported, and compacted to build the project. Caltrans estimates the total ground disturbance for all project areas will total 93 hectares (D. Schmoldt, Caltrans, personal communication, 2006).

Barret *et al.* (1995) reviewed various highway construction projects on an ephemeral stream in Texas and concluded that several projects built in the 1970's resulted in a 50 percent increase in sediment delivery as a result of highway construction. Other studies reviewed by Barret *et al.* (1995) showed short term and minor inputs of sediment to streams from highway construction.

Caltrans currently requires contractors to implement soil stabilization and sediment control BMPs. These actions are designed to contain the majority of erodible material. Proper implementation of the BMPs is expected to reduce the mobilization and delivery of sediments to nearby streams. However, the large quantity of earthen material used in this project over a broad area is expected to result in some level of increased delivery of sediment to salmonid bearing streams in the action area. For the Willits Bypass Project, current BMPs are expected to provide more effective sediment control than that reviewed by Barret *et al*. (1995).

Although increased amounts of sediment input to salmonid bearing streams are expected during project construction, sediment quantities have not been estimated by Caltrans or in this biological opinion. Fine grain sediment will likely enter streams from soil disturbed by construction along stream banks and from upland areas. Staging areas, roadbeds, vegetation removal sites, excavation and compaction areas area likely sources of sediment to the stream channels of the action area. Soils disturbed during construction will provide a source of sediment that can be mobilized by rain events during the subsequent winter/spring. Sediment will travel along gullies and ravines to stream channels and then to the bottom of the creek bed. Once in the creek channel, sediment can increase turbidity levels in the water column, fill-in gravel interstices in the creek bed, and coat the bottom of the channel with layers of fine materials.

Within the action area, sediment originating from construction activities may be deposited in Haehl, Baechtel, Broaddus, Mill, and Upp creeks. In addition, a five km reach of Outlet Creek downstream of the construction sites was included in the action area due the potential for increased rates of sediment delivery. Increased levels of fine sediment can adversely affect salmonid spawning habitat, various life stages of salmonids, and other instream habitat features within the action area.

1. <u>Effects on Salmonid Spawning Habitat</u>

Spawning habitat for Chinook salmon occurs within the action area; although existing conditions are poor. Surveys performed by CDFG in 2005 identified high percentages of sand which reduces the quality of the creek bed for spawning. CDFG reports that during a normal water year, up to 20 Chinook salmon redds may be constructed in creek areas adjacent to the Willits Bypass Project (S. Harris, CDFG, personal communication, 2006). Additional Chinook salmon spawning occurs in creeks both upstream and downstream of the action area. Adult coho salmon and steelhead entering the Little Lake Valley area spawn primarily upstream of the action area. CDFG estimates over 90 percent of the adult coho salmon and steelhead migrate to areas upstream of the project site to spawn (S. Harris, CDFG, personal communication, 2006). Therefore, few coho salmon and steelhead are expected to spawn within the action area.

Sediment input by project construction is expected to further degrade existing spawning habitat conditions in the action area. Fine sediments input associated with project construction will reduce the permeability of gravels, intergravel flow, and the availability of dissolved oxygen for developing embryos, and interfere with emergence success by occluding interstitial pore space (Everest *et al.*1987). Laboratory studies have found an inverse relationship between fine sediment and fry survival, with decreases of 3.4 percent survival for each one percent increase in fine sediment (Everest *et al*. 1987). Fine sediment originating from the project during the four year construction period is expected to further decrease the survival of salmonid embryos and reduce the ability of fry to emerge from redds in the creeks of the action area. However, sediment delivery levels associated with project construction should diminish significantly after project construction is completed.

2. Effects on Salmonid Life Stages

Construction activities are known to cause temporary increases in water turbidity (reviewed in Furniss *et al.* 1991, Reeves *et al.* 1991, and Spence *et al.* 1996). Short-term increases in turbidity could occur during construction, but reach dewatering will generally avoid this problem because work will be performed in the dry. Post construction winter rains will likely result in short-term increases in turbidity as runoff occurs in areas of exposed soil and removed riparian vegetation. High levels of turbidity and suspended sediment in the action area may affect adult and juvenile anadromous salmonids by a variety of mechanisms. High concentrations of suspended sediment can disrupt normal feeding behavior and efficiency (Cordone and Kelly 1961; Bjornn *et al.* 1977, Berg and Northcote 1985), reduce growth rates (Crouse *et al.* 1981), and increase plasma cortisol levels (Servizi and Martens 1992). Even small pulses of turbid water will cause salmonids to disperse from established territories (Waters 1995), which can displace fish into less suitable habitat and/or increase competition and predation, decreasing chances of survival. Increased sediment deposition can fill pools and reduce the amount of cover available to fish, decreasing the survival of juveniles (Alexander and Hansen 1986).

Increased turbidity levels associated with the Willits Bypass Project are not expected to physically injure listed salmonids or result in adverse behavioral effects. Moderate, but temporary increases in turbidity during the summer construction season and during the winter months are expected. These levels will likely result in some limited behavioral effects, such as temporarily reduced feeding efficiency of juvenile salmon or steelhead in the action area. These behavioral changes are not expected to cause mortality or decrease the probability of individual juvenile or adult salmonid survival within the action area.

F. Mobilization of Sediment from Oil Well Hill

Oil Well Hill is the proposed borrow site identified by Caltrans. Project construction will result in the excavation of the required Phase 1 need of 1.4 million cubic m of material from this location. The borrow area will likely encompasses 4.93 hectares, which is less than the 12 to 16 hectares considered in NMFS' 2006 biological opinion. This site is east of Hwy. 101 and approximately 425 m from Outlet Creek.

Sediment delivery reduction measures have been proposed to prevent sediment from reaching Outlet Creek. Sediment detention basins will be located at key drainage areas to capture material that is mobilized. Proper construction and operation of these detention basins are expected to intercept all mobilized sediments prior to reaching Outlet Creek. The detention basin design appears to be adequate to avoid adversely affecting salmonid habitat in Outlet Creek and other streams within the action area.

Caltrans has indicated that alternative borrow site areas may be selected by the contractor, but selection of an alternative site will require submittal of a borrow site plan. Alternative borrow site plans have not been evaluated in this biological opinion. Further review by NMFS may be required if an alternative non-commercial borrow site is proposed.

G. Effects of Rock Slope Protection

Rock slope protection or riprap is proposed for several stream crossings in combination with retaining walls for protection of bridge columns and banks. A total of 140 m of stream length will be impacted by placement of riprap along three sites on upper Haehl Creek: one site on middle Haehl Creek, and one site each on Baechtel, and Upp creeks. Use of riprap to protect banks is expected to result in effects to designated critical habitat for Chinook salmon, coho salmon, and steelhead.

General effects of riprap on salmonid habitat include, elimination of lateral bank erosion, which prevents development of undercut banks, and cover for fish (Schmetterling *et al.* 2001). Placement of large rock can change the sediment transport capacity of a stream reach and affect the natural distribution of particle sizes in a stream (Beschta and Platts 1986). Sediment size changes can affect spawning substrate and food production for salmonids and cover requirements provided by certain substrate (Platts 1979). The loss of riparian vegetation due to the placement of riprap can reduce or eliminate recruitment of new riparian vegetation, reduce habitat complexity, reduce shade to streams which maintain cold water habitat, and reduce recruitment of large woody debris (LWD) (Schmetterling *et al.* 2001).

At each stream crossing on Haehl, Baechtel, and Upp creeks, approximately 15 m of riprap will be placed along one or both banks. Rock will extend from the channel bed to an area approximately two-thirds up the bank. Top of bank areas will be planted with willow. Riprap is expected to reduce habitat complexity and riparian shade adjacent to stream crossings. This action is expected to have long-term adverse effects on designated critical habitat for CC Chinook salmon, SONCC coho salmon and NC steelhead. Existing habitat at the stream crossing sites is in moderate to poor condition. The proposed placement of riprap will further degrade stream habitat for salmonids. Reduced cover, LWD, shade, and changes in stream bed substrate are expected to decrease rearing habitat quality for juvenile Chinook salmon and steelhead, and to a lesser extent coho salmon. Juvenile coho are not expected to utilize the action area during the summer months due to unsuitable stream temperature conditions.

H. Toxic Chemicals

Equipment refueling, fluid leakage, and maintenance activities within and near the stream channel pose some risk of contamination of aquatic habitat and subsequent injury or death to listed salmonids. Caltrans has proposed measures which are designed to prevent the spill of contaminants into the waterways of the action area. Measures include: maintaining fuel storage and refueling sites in upland locations at an appropriate distance from the stream channel; maintaining vehicles and construction equipment in good working condition; and servicing of equipment in an upland location.

Caltrans may use bentonite as a lubricant for pile placement and an accidental release of bentonite may occur. Bentonite is potentially lethal to fish. Sigler *et al.* (1984) reported that steelhead and coho salmon show reduced growth rates or increased emigration rates when exposed to 125 to 175 mg/l bentonite. In addition to toxic chemicals associated with construction equipment, stream water that comes into contact with wet cement can adversely affect water quality by raising the pH of water, which may result in injury or death to listed salmonids. However, these water quality impacts are not anticipated, because the stream will be dewatered around the construction work sites. Measures should minimize the potential for a spill. In addition, Caltrans and its contractors will have ample opportunity to attend to any spill prior to toxic chemicals reaching the waters of the action area.

I. Long-term Maintenance and Use

NMFS believes it unlikely that long-term maintenance actions, including mowing of vegetation, cleaning of ditches, pruning vegetation near bridges, and repairing pavement, will result in adverse affects. Post construction maintenance actions implemented with the use of appropriate BMPs are likely to minimize sediment delivery and associated turbidity within streams in the action area. This includes any sediment generated from infrequent sand applications conducted for icy freeway conditions. BMPs are included in the Caltrans Storm Water Quality Handbook Maintenance-Planning and Design Staff Guide (P&DSG) (Caltrans 2003), and will be used during maintenance of the Bypass. NMFS believes that in general, these BMPs are likely to be effective at avoiding maintenance impacts on listed species and critical habitats. However, a complete maintenance plan is unavailable for the project, and maintenance actions expected to result in sediment and turbidity entering streams would require reinitiation of consultation.

Use of the freeway bypass is expected to generate grease and oil as well as other contaminants along the freeway corridor. Also, accidental spills are expected from freeway related traffic accidents. These contaminants may be washed into nearby streams during the rainy season. Caltrans has developed a standard Hazardous Waste and Spill Response Plan (HW&SRP) which would be implemented during the operation of the project. NMFS believes that hazardous waste and spill response practices contained in the HW&SRP and BMPs contained in the P&DSG are likely to be effective in minimizing the amount of contaminants entering streams. Adverse effects to salmonids and their habitat from introduced chemicals, oils, grease, or accidental spills are expected to be minimal.

The existence of the freeway bypass may cause increased runoff from impervious surfaces that could cause adverse effects to salmonids and their habitat within the action area. For example, increased runoff can scour redds and destroy salmonid eggs and alevins. To address the potential for increased runoff from the impervious freeway surfaces, Caltrans designed permanent BMPs into the design, construction, and maintenance of the project to minimize increased runoff potential (Caltrans 2000). The P&DSG requires the Caltrans design team to account for hydrologic impacts of the project, and provide measures to minimize impacts to stream stability. Based on the information provided in Caltrans' Water Quality Assessment (Caltrans 2000), NMFS concludes that design features, and permanent BMPs, will avoid adverse effects to salmonids and their habitat related to potential increased runoff from the completed project.

J. Effects of Mitigation and Monitoring

1. <u>Riparian Vegetation Mitigation</u>

Caltrans proposes to restore and mitigate temporary and permanent impacts to riparian vegetation on anadromous fish bearing streams (Category I), Category II streams, and Category III streams.

Riparian vegetation mitigation is designed to restore the ecosystem to its natural pre-disturbance riparian community structure and function. In order to accomplish this goal, Caltrans proposes to plant five riparian trees for every tree that has been removed. Anadromous reaches will be planted to achieve a 30-m riparian zone, Category II streams will be re-vegetated to achieve a 15-m riparian zone, and Category III stream will be re-vegetated to create an 8-m riparian zone. In addition, native shrubs and herbaceous perennial plants will be planted along with riparian trees. The general extent and nature of the project's mitigation plantings are described in the mitigation and monitoring proposal (Caltrans 2011b).

Replanting shrubs and trees at a higher ratio will ensure that the riparian areas will be restored to at least preconstruction levels. Some areas like Upp Creek, which lacks a riparian zone in the lower reaches, will be improved, thus increasing its carrying capacity for rearing juvenile fish during wet years. Replanting of vegetation will result in minor disturbance of the bank and increase sediment mobility into creeks, but with the proper BMPs in place at the time of the project activities, this increase in sediment will be at a minimum and is not expected to noticeably increase levels or harm salmonids or salmonid eggs.

Proposed riparian restoration/creation is expected to compensate for project impacts in some areas and improve existing conditions in other areas. Evaluation of past riparian replanting projects in California generally shows improvement in anadromous salmonid habitat. Opperman and Merenlender (2004) found positive responses in salmonid habitat to riparian restoration actions conducted 10-20 years earlier. Factors that may affect success or failure of a riparian planting project may include aspect, slope, existing vegetation, upland drainage, soil moisture conditions, competing vegetation, use of imported soil, native soil conditions, and stock quality (Anderson and Welton 2005). Caltrans has proposed specific success criteria in order to provide a level of certainty for riparian mitigation success. Caltrans has estimated that after a five-year period, riparian tree canopies would provide a ten-foot strip of shade from restored vegetation, at a minimum.

The proposed revegetation of riparian areas may take several decades to produce a riparian forest (Manci 1989). Faster growing species, such as willow (*Salix spp*), and white alder (*Alnus rhombifolia*), are expected to provide shade and bank protection within the first 5-10 years. Restoration of functional riparian areas may take 20-40 years dependent on the growth of species such as big leaf maple (*Acer macrophyllum*), cottonwood (*Populus spp*), California bay laurel (*Umbellularia californica*), and other riparian species proposed for planting. Riparian vegetation is generally in poor condition within the Little Lake Valley due to effects of grazing and urbanization over the last one-hundred and fifty years. Therefore, the proposed plan to provide restoration/creation at the proposed levels is a benefit, but this benefit to aquatic habitat may not be fully realized for 10 to 40 years. Beneficial effects will include improvement of stream temperatures, increased bank stability (5-10 years), and over a longer period, introduction of LWD and improved cover for fisheries habitat (10-40 years).

2. <u>Bank Stabilization Work</u>

The construction-related activities proposed in the mitigation and monitoring plan for three bank stabilization sites on Outlet Creek would occur between the toe and the top of the stream bank, and on land away from the creek (e.g., grading back the vertical banks).

Site clearing, earthwork (soil excavation and re-contouring), and placement of rootwad revetment and RSP would result in minor and temporary disturbance of soil along the bank at each sediment stabilization site, potentially resulting in temporary increases in suspended sediments (turbidity) and sedimentation in Outlet Creek during construction. The severity of these effects depends on the sediment concentration, timing and duration of exposure, and sensitivity of the affected fish life stage. Based on the proposed plan to work on the banks of the stream and to avoid in-water construction, the concentration and duration of turbidity is expected to be minor and of short duration. This low level of turbidity for a short period (less than 4 hours) is not expected to reach levels that will impair habitat or salmonids residing near the sites. The proposed sites along Outlet Creek are generally dry during years when normal or drier rainfall patterns occur, which would further reduce the liklelihood of impacts to listed salmonids during construction.

Exposure of listed salmonids would be minimized by limiting construction activities to a single construction season between June 15 and October 15. By limiting the construction period, the primary spawning and migration periods of all three listed salmonids would be avoided and the risks associated with erosion and transport of fine sediments to Outlet Creek and downstream habitats would be minimized. The number of juveniles potentially residing in the action area is expected to be very low because of the time of year and low quality of existing habitat. Most juveniles at risk of exposure would be juvenile steelhead because of their protracted freshwater life history and greater distribution in Little Lake Valley. The likelihood is low that juvenile coho or Chinook salmon would be present in the summer at these bank erosion repair sites because most juvenile coho salmon rear farther upstream in the watershed and most juvenile Chinook salmon emigrate downstream to the lower watershed and the ocean by June. However, some migrating juveniles and smolts of all three listed species could be at risk of exposure if construction activities occur in June and flows supporting downstream migration are present. Juvenile fish that may be residing in the project area and smolts migrating downstream are expected to exhibit avoidance behavior, but NMFS does not anticipate their fitness will be affected. The limited duration of raised fine sediments will limit behavior responses to those that are likely insignificant to each exposed salmonids' survival. Avoidance behavior by juvenile salmonids during construction is not expected to cause additional predation, or stress due to the low densities of juveniles in the construction reach of Outlet Creek.

Given the avoidance and minimization measures described above, including no in-water or dewatering activities, and low numbers of juveniles expected in the work area, NMFS does not anticipate adverse effects to occur from bank stabilization work. Sediment reduction at these sites may improve spawning habitat quality in downstream reaches of Outlet Creek. Improvement in the quality of known spawning areas downstream of the work area may help to increase survival to emergence of salmonids embryos in the future.

3. <u>Wetland Enhancement Sites</u>

Wetland establishment would result in the conversion of uplands to wetlands. Group 2 wetland establishment would consist of constructing three wet meadows that occur over five parcels located along Outlet and Davis creeks. Wetland establishment would be accomplished by grading upland areas to match the elevation of existing adjacent wetlands.

Construction activities related to wetland establishment could increase turbidity and sedimentation levels. These activities would involve the use of heavy equipment and result in the exposure of approximately 24 acres of bare ground, which would increase the potential for surface erosion of fine sediment. Fine sediment transport to streams could potentially affect listed salmonids through degradation of water quality from increased turbidity and sedimentation. Similarly, heavy equipment operation, refueling, and storage of construction equipment and materials could result in leakage or accidental spills of pollutants (e.g., fuels, lubricants, hydraulic fluid) and potentially cause mortality or physiological stress of listed salmonids if these contaminants enter streams.

The direct and indirect effects associated with increases in turbidity and sedimentation levels and introduction of toxic substances to aquatic habitats on listed salmonids are not expected to occur because appropriate construction work windows and BMPs will be implemented. Construction activities associated with wetland establishment would occur in the dry season in upland and seasonal wetland habitats that are separated from creek channels by natural berms or existing constructed levees, thereby limiting the potential that sediments and contaminants would be discharged directly to flowing streams during construction. In addition, implementation of the erosion control BMPs during construction and seeding of exposed soils following construction and before the onset of winter rains as outlined in Caltrans Biological Assessment, dated December 2011 (Caltrans 2011c) would ensure that bare soils and contaminants are not present in wetland establishment sites prior to the winter season.

Minor grading could lead to increased potential for fish stranding when juvenile fish move into off-channel areas during flood events. Under existing conditions, flood flows periodically overtop natural berms and constructed levees along Davis and Outlet Creeks and flow into seasonal wetlands that form in response to precipitation and overland flows. Wetland establishment would not increase the frequency, magnitude, or duration of overbank flows because the natural berms and levees along Davis and Outlet Creeks would not be breached or lowered. Consequently, wetland establishment would not result in the diversion of more water or fish from Davis and Outlet Creeks into existing or established wetlands.

In addition, grading would be used to provide more natural drainage patterns in existing wetlands by capturing flow that is currently channelized in drainage ditches and using it to provide wetland hydrology for established wetlands. The potential for improved passage for fish that do move into overbank areas was observed during a site visit of proposed grading areas on November 7, 2011. DFG biologists familiar with flood flows and the drainage of the Little Lake Valley stated that proposed grading would likely improve existing drainage/passage and reduce potential stranding of fish entering these areas during bank overtopping events. Fish that may enter these wetland areas are expected to migrate with flow in a northerly direction through seasonal wetlands where they eventually reenter downstream creek channels or flow into the seasonal lake which expands and shrinks in response to storm runoff. Consequently, established Group 2 wetlands proposed in the mitigation plan are not expected to increase the stranding potential of salmonids that may use these areas during flood events.

Beneficial effects may occur from the establishment of approximately 24 acres additional wetland area. This increase in wetland habitat area is expected to have long-term beneficial effects on water quality, which may benefit listed species. Wetlands remove dissolved substances from water through various means, such as absorption, adsorption, oxidation, and biological transformation.. Wetlands, by definition, are vegetated, and this vegetation is responsible for a wide range of physical and biochemical processes. Improvement in these processes may improve water quality in downstream reaches of Outlet Creek located below the proposed construction and mitigation areas for the Willits Bypass Project.

4. Cattle Grazing Management

Livestock grazing activities can directly affect physical, chemical and biological properties of soils and plants within a grazing area. Hoof contact on soils can modify soil structure and compact soil layers, affect stream banks, reduce riparian plant success, and increase sediment delivery to stream channels (BLM 1998). Hoof contact also causes the removal of vegetation that can reduce long term woody debris recruitment, stream shade, and increase stream temperatures (Spence *et al.* 1996). According to studies conducted by Caltrans, the physical habitat characteristics of streams in the action area are currently affected by the presence of livestock grazing, which increases bank erosion, disturbs stream substrates, affects water quality, and increases nutrient input to the streams (Caltrans 2011a).

To reduce the potential impacts of proposed cattle grazing on approximately 1200 acres, the Caltrans grazing management includes three grazing management minimization and avoidance measures: exclusionary fencing, grazing rotation, and designated livestock stream crossings. These measures have been shown to limit cattle access to stream and riparian areas and minimize effects on water quality (Hoorman and McCutcheon 2005).

Exclusion fencing would be installed along riparian corridors to prevent livestock access to Berry, Davis, Mill, Upp, Old Outlet and Outlet creeks. The purpose of this exclusion fencing would be to create grazing management units (GMUs) and to exclude livestock from the stream channels and riparian corridors. Designated stream crossings will also be identified and established to minimize cattle access to the stream channels except at designated crossing periods.

Only existing improved livestock stream crossings would be used in order to restrict livestock from free access to riparian corridors. To support grazing management as well as general land management activities, all crossings would be double gated, and barbed wire cross fences would be installed above and below the crossing. Cattle would be moved passively through the gates by leaving the gates open for 1 or 2 days to allow gentle movement with less streambed disturbance. The number of designated crossings would be reduced from the current 40 to 50 crossings to only 12 improved crossings.

Exclusion fencing would reduce sediment input in several ways. First, exclusion of cattle from the riparian corridor would stop the erosion associated with cattle trampling streambanks, which contributes significant quantities of sediment to the stream. In addition, exclusion would prevent cattle from grazing on and trampling riparian vegetation. This would increase growth, recruitment, and germination of riparian vegetation, and this vegetation would then stabilize eroding banks and intercept sediment. Finally, exclusion fencing would improve water quality by greatly reducing the fecal matter entering the stream. Results of ongoing surface water quality monitoring indicate consistently high fecal coliform and Enterococcus levels for streams in the mitigation area, presumably in response to cattle waste being deposited into streams.

Grazing rotation would improve water quality by reducing the amount of bare ground on grazed land. By reducing the grazing pressure on each GMU, vegetation would not be overgrazed and would be allowed time for regrowth, thereby reducing the bare ground that would contribute sediment to neighboring streams during storms. In addition, specific levels of RDM would be maintained on grazed pasture to ensure long-term productivity and ground cover prior to the onset of winter rain events.

Restricted livestock stream crossings would improve water quality in several ways. The existing crossings have already been graded to ease access and reduce erosion. In addition, the number of crossings would be reduced from 45 scattered crossings to 12 designated crossings, thereby reducing the number of erosion points. Also, crossings would be fenced between gates to prevent cattle from entering the stream when the gates are open. Finally, the designated crossings would reduce the turbidity created by cattle trampling the streambed, and banks.

In addition to minimizing the number of stream crossings and the frequency of cattle crossings, Caltrans proposes to minimize the potential for adverse effects by only allowing cattle to cross designated stream crossings from June to October. Most stream crossings will be dry, or at low flow during these limited crossings (2-4 times per season) and juvenile steelhead which may be residing in these area are expected to be of sufficient size to avoid cattle. Also, substrates at these crossings are comprised of sand and small gravel, which will not provide cover for juvenile salmonids that could be stepped on by cattle during infrequent crossings. This lack of cover makes it more likely juveniles will flee crossing areas when cattle are present. No adverse effects in the form of crushing of juveniles salmonids is expected due to the low availability of cover habitat, avoidance behavior expected by fish, low densities of salmonids, and the likelihood for dry stream channels during the summer period.

Overall, the cattle management proposed as part of the mitigation and monitoring proposal will result in beneficial effects by protecting banks, riparian areas, and improve water quality. These benefits are expected as a result of rotational grazing at moderate stocking levels, and by limiting cattle access to stream channels and riparian areas in the action area.

K. Effects of Haehl Creek, Upp Creek, and Ryan Creek Fish Passage Improvements

Existing culverts on Haehl, Upp, and Ryan creeks are impediments to anadromous fish passage (Caltrans 2005a). The Willits Bypass Project proposes to replace existing culverts with new structures that improve passage for both adult and juvenile lifestages of salmonids. The removal of the culverts on Haehl and Upp creeks are expected to reduce flow velocities and provide passage to more fish of varying sizes over a broader spectrum of flow conditions. At Upp Creek the existing culvert will be removed and the new road will cross Upp Creek at a different location (at the interchange crossing). On upper Haehl Creek, the existing culvert under the new proposed Hwy. 101 alignment will be removed and a second culvert near the headwaters of Haehl Creek will be replaced for improvement of the new Schmidbauer Ranch access road.

Assessments of the existing culvert on upper Upp Creek by DFG and NMFS staff biologists have determined that the culvert is a barrier to adult salmon and steelhead. A fish passage assessment study conducted by Caltrans ranked Upp Creek as one of the top ten locations for restoration of passage conditions in Mendocino County (Caltrans 2005b). Habitat surveys on upper reaches of Upp Creek have documented the presence of approximately 2,300 m of available anadromous salmonid habitat. Replacement of the Upp Creek culvert on existing Hwy. 101 would be most beneficial for NC steelhead due to the higher gradient that exists upstream of the culvert (S. Harris, CDFG, personal communication, 2006). Coho and Chinook salmon are not known to use high gradient stream habitat, and are less likely to use the newly accessible upper reaches of Upp Creek for spawning and rearing. Increased rearing opportunities would be available for juvenile NC steelhead, which, over time, would likely result in increased steelhead production in the Outlet Creek watershed.

The replacement of the culvert on upper Haehl Creek is expected to provide a lesser benefit to anadromous fisheries. Upper Haehl Creek is near the upstream end of anadromous habitat in the streams headwaters. Replacement of the culvert with one that improves fish passage is not expected to increase levels of over summer habitat productivity. Improved fish passage at this site is expected to provide additional spawning of Chinook salmon and steelhead adults, and some use during the winter by juveniles. This reach of upper Haehl Creek is usually dry during the summer months and is not expected to provide juvenile rearing habitat for steelhead or salmon. Downstream reaches of Haehl Creek will benefit from instream structures (sills) to reduce or prevent headcutting in the channel when the Haehl Creek culvert is removed and the culvert on Schmidbauer Ranch Road is improved. Grade control structures downstream of Schmidbauer Ranch Road along with the channel realignments are expected to maintain the conveyance of water and sediment at natural rates.

The fish passage improvements at two culverts on Ryan Creek are expected to improve passage for adult and juvenile salmonids. The improvements will occur at large culverts on the two main tributaries that form Ryan Creek, and will improve access and utilization on a substantial amount of habitat for spawning and rearing. An additional 2.7 miles of salmonid habitat on the South Fork Ryan Creek watershed, and 1.7 miles of fish habitat on the North Fork Ryan Creek will be available to anadromous species. Similar to Haehl and Upp creek, the increase in available habitat at Ryan Creek is expected to increase overall salmonid productivity in the Outlet Creek watershed.

K. Interdependent and Interrelated Actions

NMFS does not anticipate any interdependent or interrelated actions associated with the proposed action.

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 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.

A variety of cumulative effects to salmonid fisheries resources are anticipated within the Outlet Creek sub-basin. Following are the activities that are reasonably certain to occur within these watersheds that will likely result in cumulative effects:

A. Rural Development

BLM *et al.* (1996) reports that many 64.7 hectare parcels within the South Fork Eel River watershed will continue to undergo subdivision down to 16.2 hectare parcels. Although the Outlet Creek watershed is not part of the South Fork Eel River watershed, it is reasonable to assume that similar subdivision activities are and will continue to occur within the Outlet Creek watershed. Impacts to salmonid habitat from rural development include loss of riparian vegetation, changes in channel morphology and dynamics, altered watershed hydrology, increased sediment delivery from roads, elevated water temperatures and increased water demand within the action area.

B. Chemical Use

It is anticipated that chemicals such as pesticides, herbicides, fertilizers, and fire retardants will continue to be used in the action area. Impacts to salmonids may include changes to riparian vegetation and associated organic input into aquatic systems, changes in aquatic invertebrate communities, and increased algae production. Due to the lack of specific information, we are unable to determine the effects of chemical applications in the action area. Due to the undeveloped nature of the action area, the use of chemicals is not expected to be conducted under applicable State and Federal laws.

C. California Streambed Alteration Agreements

CDFG has strengthened the permitting process for activities taking place in, or near, rivers and streams by requiring environmental review. Henceforth, streambed alteration agreements will be reviewed in accordance with the California Environmental Quality Act. This program is expected to result in lessened impacts to salmonids from projects such as temporary summer dams, and stream bank stabilization projects within the action area.

D. Illegal Marijuana Cultivation

Beginning in the 1960's a new significant land use activity arose in the South Fork Eel River watershed. The "back to the land movement" as it is known consisted of individuals leaving urban centers in an attempt to "get back to nature" (BLM *et al.* 1996). Many areas that had been logged were subdivided and real estate activities became very prominent within southern Humboldt and northern Mendocino counties. Many of the "back to the land" individuals could not find employment and turned to illegal marijuana cultivation as a means of economic support (BLM *et al.* 1996). These activities have increased significantly in the last ten years with the legalization of medical marijuana in California in 1996, and is expected to continue into the future. According to BLM *et al.* (1996) this activity has significant impacts on the ecosystem through runoff of fertilizers, poisons to control rodents, and water diversions which some have suggested may rival impacts of logging and grazing. Water withdrawal associated with legal and illegal marijuana cultivation in Baechtel, Broaddus, and Davis creeks has been reported to degrade summer rearing conditions for juvenile steelhead and coho salmon; these impacts are expected to continue (C. LeDoux-Bloom, CDFG, personal communication, 2005).

VII. INTEGRATION AND SYNTHESIS OF EFFECTS

The construction of the Willits Bypass Project is anticipated to affect six salmonid-bearing streams in the Outlet Creek sub-basin of the Eel River watershed over two four-year periods. An estimated 1.9 million cubic meters of material will be excavated, transported and compacted to build a four-lane freeway, crossing the Little Lake Valley, beginning approximately 3.3 km south of Willits to 2.5 km north of Willits. Freeway stream crossings will be worked on in Haehl Creek at six locations (includes 6 bridges and 2 viaducts) and one location each in Baechtel, Broaddus, Mill creeks, and six locations (includes 6 bridges and 1 culvert removal) at Upp Creek. Construction is expected to adversely affect threatened NC steelhead, threatened CC Chinook salmon and threatened SONCC coho salmon as the result of stream dewatering/fish relocation, temporary and permanent riparian vegetation removal, mobilization of sediment, and placement of rock slope protection. Maintenance and use of the highway bypass is not expected to adversely affect salmonids or their critical habitats, as described above. Stream enhancement features in Haehl and Upp creeks will improve long-term fish passage conditions, and mitigation work to riparian areas, streambanks, wetlands, and grazing will improve long-term water quality (e.g., provide shading to reduce stream temperatures) and increase salmonid habitat suitability.

Direct effects to listed salmonids associated with construction activities will be limited to the summer months when juvenile NC steelhead are likely to be present at the stream crossing sites. Construction in channels will be limited to the period between June 15 and October 15. Low numbers of CC Chinook juveniles are expected to be present during construction, because juveniles will have emigrated from the watershed during the spring months. Juvenile SONCC coho salmon are also expected to be present in the action area in low numbers due to unsuitable water temperature conditions during the summer and early fall months. Dewatering and fish collection activities prior to in-water construction are expected to result in the safe relocation of over 97 percent of the juvenile salmonids residing at the stream crossings. NMFS anticipates that the project will injure or kill a small number of listed salmonids.

Effects to salmonid habitat, including designated critical habitat, include loss of riparian vegetation, increased water temperatures, increased levels of sediment delivery to the creek, and placement of rock slope protection. These actions are expected to reduce instream cover, reduce recruitment of LWD, reduce canopy cover and associated shade (increasing water temperatures), degrade spawning habitat, and generally decrease juvenile rearing habitat diversity and complexity. A small number of listed salmonids may be injured or killed as a result. Most of these impacts to habitat are temporary. Impacts to critical habitat caused by reductions in riparian vegetation may persist for a number of years after project construction.

Riparian mitigation is expected to ameliorate impacts to stream temperatures and associated salmonid summer rearing habitat within five years of the completion of the project, and ultimately to improve habitat conditions in certain reaches of the creeks in the action area. More habitat will be improved by riparian mitigation than will be permanently lost. BMPs implemented by Caltrans to control sediment during construction are expected to be sufficient to avoid long-term adverse effects to spawning and rearing habitat in the action area. Culvert removal and replacement with a free span crossing and open bottomed culvert is expected to improve fish passage conditions for both adult and juvenile salmonids in Upp Creek and for adults salmonids in Haehl Creek. Grade control and instream structures on Haehl Creek will also improve the conveyance of water and sediments and prevent or minimize headcutting.

Mitigation actions are expected to improve salmonid habitat conditions within the action area. Caltrans has purchased a large area (approximately 2000 acres) that will be managed into perpetuity by the local resource conservation district and the DFG. Long-term management of this property is expected to improve the function of wetlands and stream corridors in the action area. Implementation of sediment reduction actions will reduce sediment delivery to stream reaches in the action area by implementing bank stabilization at erosion sites on Outlet Creek. Improved grazing management and construction of exclusionary cattle fencing will reduce impacts to riparian areas, stream banks, and improve water quality by maintaining stream buffers and keeping cattle out of stream channels. Minor grading to improve wetland function adjacent to stream corridors is expected to improve drainage for juvenile fish that may migrate out of the main channel during flood events along Outlet and Davis creeks.

The construction project is likely to incrementally degrade critical habitat in the action area until mitigation actions are complete and riparian vegetation has re-established. This degradation is unlikely to affect the conservation value of critical habitat as a whole for these species because the degradation in the action area is minimal relative to baseline conditions and short term, and therefore unlikely to adversely affect the conservation of salmonid species in the Haehl Creek watershed. Early coordination between CDFG, NMFS, and Caltrans during development of project alternatives resulted in selection of a roadway alignment that is least damaging and avoids impacts to the highest quality habitat in the Outlet Creek sub-basin. Reaches of streams that currently provide the best quality of habitat for listed salmonids in the sub-basin will not be affected by the project. Stream crossings proposed in the Willits Bypass Project are at locations that frequently dry out in the summer. In addition, existing conditions at the proposed stream crossings are currently lacking well-developed riparian vegetation and contain high percentages of fine sediment in the streambed. Bypass alignment alternatives that traveled through the western hills of Willits had the potential to impact the highest quality spawning and rearing habitat of Baechtel, Broaddus and Mill creeks. These areas with well-developed riparian vegetation, high quality spawning gravels and perennial flow conditions for summer rearing are not affected by the proposed project. Thus, by design, the selected project alternative avoids and minimizes impacts to listed anadromous salmonids and designated critical habitat in the Outlet Creek sub-basin.

Although incidental take of NC steelhead, CC Chinook salmon, and SONCC coho salmon is anticipated, impacts within the action area are not expected to reduce the probability of these populations surviving and recovering in the wild. NMFS reasons that low numbers of individual NC steelhead are currently produced in the action area and very low numbers of CC Chinook salmon and SONCC coho salmon are produced in the action area. Low reproductive productivity from the action area is due to baseline habitat conditions of high levels of fine sediment and low embryo/fry survival rates.

For NC steelhead, few of the fish originating from the action area are likely to contribute to the adult population given the poor rearing conditions that currently exist. During the summer and fall months, intermittent flow to completely dry conditions in stream channels, high stream temperatures, and poor to moderate habitat diversity currently limits summer habitat conditions and juvenile survival. NC steelhead are sufficiently distributed throughout the Eel River watershed to ameliorate the small losses expected in the action area from the project during the four year construction period, and for the five to ten years required for restored riparian vegetation to provide shade over streams.

CC Chinook salmon primarily use the action area during adult and smolt migrations, although some juvenile rearing occurs prior to emigration from the basin in the spring months[8]. The majority of Chinook salmon spawn and rear in Baechtel, Broaddus, and Mill creeks upstream of the action area (S. Harris, CDFG, personal communication, 2006). A small amount of spawning annually occurs in the action area and it is anticipated sediment from the project will result in a decreased level of embryonic survival. These decreases in survival of embryos within redds are expected to occur after each of the four construction seasons and should diminish to baseline conditions a few years after construction is completed. Mitigation actions and BMPs to decrease sediment delivery to stream channels may compensate for some of the sediment delivery from the construction action. It is anticipated that adverse affects associated with this project will not decrease the probability of survival and recovery of CC Chinook salmon at the ESU level. CC Chinook salmon are sufficiently distributed throughout the Eel River watershed to ameliorate the small losses expected in the action area during this project's four year implementation period.

A small population of threatened SONCC coho salmon is thought to remain in the Outlet Creek sub-basin (S. Harris, CDFG, personal communication, 2006). Due to warm water temperature conditions and poor habitat complexity, low potential for juvenile coho salmon summer rearing currently exists in the action area. For similar reasons of poor habitat quality, few adult fish are likely to spawn in the reaches of the creeks in the action area. Thus, the proposed project has minimal impact on SONCC coho salmon or their habitat in the Outlet Creek sub-basin. Upstream reaches of these creeks in the Outlet Creek sub-basin, and other streams in the Eel River Basin, provide sufficient habitat and population productivity to maintain the SONCC coho salmon ESU during and after construction of the Willits Bypass Project. NMFS expects the

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[8] Because these juveniles rear and outmigrate in the spring, adverse effects from elevated summer water temperatures are not anticipated.

small impact to coho salmon associated with this project is unlikely to affect the SONCC coho ESU population trend. Mitigation actions to improve fish passage, riparian areas, reduce impacts of cattle grazing, and sediment delivery are expected to improve habitat conditions within the action area over time. However, NMFS is unable to reliably quantify the overall benefit that habitat improvements will have on survival of coho salmon residing in the Outlet Creek watershed.

The proposed Willits Bypass Project is not expected to appreciably diminish the value of designated critical habitat for NC steelhead, CC Chinook salmon or SONCC coho salmon. These impacts will be ameliorated, *i.e.*, critical habitat will return to its current condition, within 5-10 years, by the proposed riparian mitigation. Proposed mitigation actions that include riparian planting, sediment reduction work, improved grazing management, as well as fish passage improvements in Haehl, Upp and Ryan creeks, are likely to result in improvements to the current value of critical habitat for listed anadromous salmonids throughout the action area, and Outlet Creek sub-basin, although these improvements may take as long as 40 years to be fully functional (*e.g.* recruitment of felled trees as natural, instream large woody debris).

VIII. CONCLUSION

After reviewing the best available scientific and commercial information, the current status of the species 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 construction of the Willits Bypass Project by Caltrans, in Mendocino County, California is not likely to jeopardize the continued existence of SONCC coho salmon, CC Chinook salmon, or NC steelhead.

After reviewing the best available scientific and commercial information, the current status of 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 construction of the Willits Bypass Project by Caltrans, in Mendocino County, California is not likely to adversely modify or destroy designated critical habitat for SONCC coho salmon, CC Chinook salmon, or NC steelhead.

IX. INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and Federal regulation 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 actually kills or injures fish or wildlife. Such an act may include significant habitat modification or degradation which 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 the purpose of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The measures described below are nondiscretionary, and must be undertaken by the Caltrans and their designees for the exemption in section 7(o)(2) to apply. Caltrans has a continuing duty to regulate the activity covered by this incidental take statement. If Caltrans: (1) fails to assume and implement the terms and conditions, or (2) fails to require any designee to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to any permit, grant document, or contract, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, Caltrans must report the progress of the action and its impact on the species to NMFS as specified in the incidental take statement (50 CFR §402.14(i)(3)).

A. Amount or Extent of Take

The amount or extent of take described below is based on the analysis of effects of the action done in the preceding biological opinion. If the action is implemented in a manner inconsistent with the project description provided to NMFS, and as a result take of listed species occurs, such take would not be exempt from section 9 of the ESA.

The Willits Bypass Project is expected to result in the incidental take of NC steelhead, CC Chinook salmon, and SONCC coho salmon. The majority of take is associated with the de-watering and fish relocation activities at the stream crossing construction sites. Caltrans proposes to implement dewatering and fish relocation to minimize take of juvenile salmonids associated with pile driving and other instream construction activities. Dewatering and fish relocation is proposed at all stream crossings except when the stream is dry and no water is present.

Based on summer electrofishing surveys conducted by the CDFG in 1993, NC steelhead are expected to comprise the vast majority of juvenile salmonids collected during fish relocation. Few or no juvenile Chinook and coho salmon are expected to be present during reach de-watering. No adult salmonids are expected to be present or taken by this project.

The majority of take during de-watering and relocation will be non-lethal take. Qualified biologists will relocate all fish, including salmonids from the dewatered stream channel areas (as much as 150 lineal m) at each stream crossing (bridge, viaduct, or culvert replacement/removal), including Haehl and Ryan creeks. Some mortality of juvenile steelhead is anticipated during seining, electrofishing and other relocation related activities. Up to three percent of the juvenile steelhead, Chinook salmon, or coho salmon could be injured or killed because of relocation efforts. Therefore, the death or injury of no more than three percent of the total number of juvenile steelhead, Chinook salmon, and coho salmon relocated is anticipated at each stream crossing site for each year of construction.

During construction, Caltrans and its construction contractor will implement a SWPPP, to reduce the mobilization of sediment to the action area. It is likely the project construction will mobilize fine-grained (sand sized) sediment and this material will eventually be deposited in the stream channels during the winter months. Increased rates of fine sediment input may decrease the survival of embryos and the emergence of fry from spawning sites (redds) within the Haehl, Baechtel, Broaddus, Mill, Upp, and Outlet creeks within the action area (13.8 km total). It is unlikely that sediment delivery will reach levels in the action area that result in complete loss of spawning success within redds. Some incremental loss is anticipated, but due to many factors[9], the specific number of salmonid eggs lost cannot be counted. Below, NMFS has used the implementation of the SWPPP and resulting low sediment delivery to the action area as a surrogate for the extent of take.

Similarly, loss of riparian vegetation is expected to result in injury or death to juvenile steelhead due to elevated water temperatures. The number of steelhead affected is expected to be very small based on the current condition of habitat in the affected areas, which limits steelhead use of these areas for rearing. The extent of take to juvenile steelhead is likely to persist in the action area for at least a five-year period. Elevated water temperatures may persist for as long as ten years, depending upon how quickly proposed revegetation provides shade to the affected stream reaches. Below, NMFS uses the amount of riparian disturbance a surrogate to describe the extent of this take[10].

Anticipated take will have been exceeded if:

1) more than 3% of each species of juvenile salmonids captured at any individual construction site are injured or killed during capture and relocation, or more than 150 m of stream channel will is dewatered at any one crossing construction site;

2) Caltrans and its contractors fail to implement the SWPPP, or fine sediment monitoring (Caltrans 2011d) at spawning reaches indicates that, on average, the amount of fine sediments less than 0.85 mm in size increases by 10 percent or more[11] than at control reaches in Baechtel, Broaddus, and Outlet Creeks; or

3) riparian vegetation is removed beyond the amounts considered above in the biological opinion's table 7:

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[9] For example, salmonids bury their eggs in stream gravels, and examining those gravels to count eggs destroyed by sediment would likely destroy other eggs in the same redd.

[10] Salmonids killed by high temperatures will be difficult to count because finding dead or dying juvenile salmonids in the stream environment is difficult due to hiding cover for fish and predators/scavengers. In addition, high temperatures likely reduce survival by making salmonids more susceptible to diseases and/or lower body weights, which may harm them after they have been exposed to high temperatures and/or left areas where they were exposed to high temperatures.

[11] While smaller increases may be discernible, in NMFS judgment 10 percent and above would indicate larger amounts of salmonid egg loss than anticipated in the preceding biological opinion.

[redacted]				
Upper Haehl Creek	767	12	779	392
Middle Haehl Creek	104	91	195	98.5
Lower Haehl Creek	34	160	194	97.5
Baechtel Creek	298	367	665	335
Broaddus Creek	32	156	188	95
Outlet Creek		86	86	
Mill Creek	36	177	213	103.5
Upp Creek	179	5	184	92

B. Effect of the Take

In the accompanying opinion, NMFS determined that this level of anticipated take is not likely to result in jeopardy to the species.

C. Reasonable and Prudent Measures

The following reasonable and prudent measures are necessary and appropriate to minimize the impacts of the incidental take of NC steelhead, CC Chinook salmon, and SONCC coho salmon:

1. Measures shall be taken to ensure that fish relocation efforts are carried out in a manner that minimizes injury and mortality to Federally-listed salmonids.

2. Measure shall be taken to minimize harm to listed salmonids resulting from bridge and roadway construction and maintenance.

3. Measures shall be taken to minimize harm to listed salmonids from impacts to stream water quality.

4. Measures shall be taken to monitor the effects of pile driving on listed species.

5. Measures shall be taken to ensure the final mitigation plan and monitoring is implemented.

6. Measures shall be taken to monitor take of salmonids.

D. Terms and Conditions

Caltrans must comply with the following terms and conditions, which implement the reasonable and prudent measures, described above and define the reporting and monitoring requirements. These terms and conditions are non-discretionary.

The following terms and conditions implement **Reasonable and Prudent Measure 1** to ensure that any fish relocation efforts are carried out in a manner that minimizes injury and mortality to federally listed salmonids:

1. Caltrans shall provide NMFS with a Fish Relocation and Dewatering Plan at least 30 days prior to the start of dewatering for fish relocation activities, and must receive written approval for this plan from NMFS prior to beginning any dewatering for fish relocation in streams where federally listed salmonids are present. NMFS shall provide comments and within 30 days of plan submittal. This plan shall outline final collection equipment and a map with the habitat areas for relocating fish. Any alteration in materials for dewatering methods and fish relocation methods shall also be included.

2. Caltrans shall retain a qualified biologist with expertise in the areas of anadromous salmonid biology, including handling, collecting, and relocating salmonids; salmonid/habitat relationships; and biological monitoring of salmonids. Caltrans shall ensure that all fisheries biologists working on this project be qualified to conduct fish collections in a manner which minimizes all potential risks to ESA-listed salmonids. Electrofishing, if used, shall be performed by a qualified biologist and conducted according to the *NOAA Fisheries Guidelines for Electrofishing Waters Containing Salmonids Listed Under the Endangered Species Act*, June 2000.

3. The fisheries biologist shall monitor the construction site during placement and removal of cofferdams to ensure that any adverse effects to salmonids are minimized. The biologist shall be on site during all dewatering events in anadromous fish streams to ensure that all ESA-listed salmonids are captured, handled, and relocated safely. The fisheries biologist shall notify NMFS staff at (707) 468-4057 one week prior to capture activities in order to provide an opportunity for NMFS staff to observe the activities. During fish relocation activities the fisheries biologist shall contact NMFS staff at the above number, if mortality of federally listed salmonids exceeds 3 percent of the total for each species collected, at which time NMFS will stipulate measures to reduce the take of salmonids.

4. If ESA-listed fish are handled, it shall be with extreme care and they shall be kept in water to the maximum extent possible during rescue activities. All captured fish shall be kept in cool, shaded, aerated water protected from excessive noise, jostling, or overcrowding any time they are not in the stream and fish shall not be removed from this water except when released. To avoid predation the biologist shall have at least two containers and segregate young-of-year fish from larger age-classes and other potential aquatic predators. Captured salmonids will be relocated as soon as possible to a suitable instream location (pre-approved by NMFS) where suitable habitat conditions are present to allow for survival of transported fish and fish already present.

5. Non-native fish that are captured during fish relocation activities shall not be relocated to anadromous streams, or areas where they could access anadromous habitat.

6. Pumps used to dewater the work area shall be equipped with screens that meet the following NMFS fish screening criteria:

- Perforated plate: screen openings shall not exceed 3/32 inches (2.38mm), measured in diameter.
- Woven Wire: screen openings shall not exceed 3/32 inches (2.38 mm measured diagonally).
- Screen material shall provide a minimum of 27% open area.
- Approach velocity shall not exceed 0.33 feet per second.

7. Caltrans shall provide their BMPs listed in their biological assessment and the Terms and Conditions of this biological opinion that are specific to the Willits Bypass project to their contractors and ensure that they are followed for the duration of the project.

8. Any woody debris with diameter greater than 12 inches that are removed during dewatering activities will be placed back into the creek following construction activities.

The following terms and conditions implement **Reasonable and Prudent Measure 2** to minimize harm to listed salmonids from the impacts of bridge and roadway construction and maintenance.

9. Caltrans shall notify the NMFS Santa Rosa Area Office, by letter stating the project commencement date, at least fourteen days prior to implementation. The letter shall be sent to the NMFS Santa Rosa Area Office, Attention: Supervisor of Protected Resources Division 777 Sonoma Avenue, Room 325, Santa Rosa, California, 95404-6528.

10. Caltrans shall allow any NMFS employee(s) or any other person(s) designated by NMFS, to accompany field personnel to visit the construction sites during activities provided for in this opinion. NMFS will notify the Caltrans Resident Engineer at least 48 hours prior to the planned site visits and will contact Caltrans personnel prior to entering the construction site.

11. Representatives from NMFS and CDFG shall be notified two weeks in advance of any Caltrans pre-construction meetings for the Willits Bypass Project.

12. Prior to commencement of work on the Ryan Creek fish passage improvement components, Caltrans shall submit the engineering design for the structures related to fish passage to NMFS for evaluation and concurrence prior to implementation. NMFS shall provide concurrence within 30 days of design submittal. Fish passage design at these two structures shall follow the March 2000, *NMFS Guidelines for Salmonid Passage at Stream Crossings*. The designs shall be sent to the NMFS Santa Rosa Area Office, Attention: Supervisor of Protected Resources Division, 777 Sonoma Avenue, Room 325, Santa Rosa, California, 95404-6528.

13. Prior to the completion of Willits Bypass construction, Caltrans shall provide NMFS with a maintenance plan for the project that includes description of specific maintenance activities and

the specific BMPs that will be used to avoid impacts to listed salmonids and their critical habitats.

The following terms and conditions implement **Reasonable and Prudent Measure 3** to minimize harm to listed salmonids from impacts to stream water quality.

14. Water that comes in contact with wet concrete and has a pH greater than 9.0 must not be allowed to enter the ground or stream but shall be either: (1) pumped to a separate, lined basin, and then pumped to a truck or upland for disposal or treatment (not within the bank to bank of any waterway); or (2) pumped directly to a truck for disposal at a site that is not within the top of bank to top of bank of any waterway.

15. Construction equipment used within the creek channel shall be checked each day prior to work within the creek channel (top of bank to top of bank) and if necessary action shall be taken to prevent fluid leaks. If leaks occur during work in the channel (top of bank to top of bank), Caltrans, or their contractor, shall contain the spill and remove the affected soils.

16. Water drafting must not be acquired from any source that may affect salmonid habitat. Water drafting from the action area is not permitted.

17. Working waters from the project area shall not be discharged to the live stream, unless Caltrans can demonstrate that no impact to stream water temperature or other water quality parameters will occur as a result of the discharge.

18. A biologist shall monitor in-channel activities and performance of sediment control or detention devices for the purpose of identifying and reconciling any condition that could adversely affect salmonids or their habitat. If sediment delivery does occur, work activities that are the cause of the sediment shall be halted and corrective measures implemented until the sediment source is eliminated.

19. Prior to the commencement of any ground disturbing actions Caltrans shall submit a draft SWPPP to NMFS for approval. Ground disturbing actions shall not occur until Caltrans has a NMFS approved SWPPP. When updates to the SWPPP occur, Caltrans shall notify NMFS of these changes. Caltrans shall submit a re-certified SWPPP annually to NMFS, and indicate any substantial changes within the SWPPP.

20. All necessary erosion control BMPs shall be in place by October 31 of each construction season. Caltrans shall provide NMFS with a site tour to view the BMPs during the month of November.

21. Caltrans shall provide NMFS with a detailed description of any proposed contractor-constructed concrete batch plant, including the location and measures to avoid impacts to stream water quality.

22. Construction work conducted outside of the June 15 to October 15 work window shall not create conditions that mobilize sediment or concentrate over-land flow from construction areas into the stream-channel network.

23. Caltrans shall provide NMFS with the detailed plan for non-fish bearing stream realignments that are proposed. The channel realignment plan will include a detailed map of channel(s) to be realigned, methods of construction, restoration, and BMPs to be implemented to minimize sediment delivery to downstream stream reaches.

The following terms and conditions implement **Reasonable and Prudent Measure 4** to reduce effects of pile driving on listed species.

24. Caltrans shall submit a hydroacoustic monitoring plan to NMFS that provides details of the sound monitoring that is proposed in the project proposal. The hydroacoustic monitoring plan shall be submitted for NMFS review 30 days prior to the start of pile driving actions. NMFS shall provide comments and approval within 30 days of plan submittal.

25. Caltrans shall conduct hydroacoustic monitoring during pile driving events in wetted aquatic habitats upstream and downstream of de-watered stream areas.

In the event that pile driving creates sound pressure levels in excess of 183 dB accumulated SEL in aquatic habitats upstream or downstream of de-watered stream areas, and these areas are in streams known to contain small juvenile salmonids (e.g., young-of-the-year steelhead), Caltrans will stop pile driving activities until sound levels can be maintained under the thresholds described in the Fisheries Hydroacoustic Working Group memo dated June 12, 2008. Criteria set forth in that memo for fish weighing less than 2 grams is 183 dB accumulated SEL.

The following terms and conditions implement **Reasonable and Prudent Measure 5** to ensure the final mitigation plan adequately compensates for potential impacts.

26. Caltrans or its designee shall provide NMFS with the monitor reports conducted as part of the Mitigation and Monitoring Plan.

27. Caltrans shall provide a riparian planting plan for Category I, II, and III streams, describing final planting areas along streams, size and species to be planted, and success criteria expected. This plan shall be submitted to NMFS for approval prior to conducting construction or mitigation actions.

The following terms and conditions implement **Reasonable and Prudent Measure 6** to provide a monitoring take of salmonids.

28. Caltrans shall provide NMFS with a summary report within 90 days of the completion of fish relocation activities each year. The report shall include the methods used during the fish relocation efforts, location, number and species captured, number of mortalities by species, and other pertinent information related to the fish relocation activities.

29. Caltrans shall monitor stream temperatures associated with riparian vegetation removal with specific emphasis on sampling baseline conditions to detect project related impacts, and provide the data to NMFS no later than 120 days after the last day of data collection. Caltrans shall provide NMFS with a draft monitoring plan, and receive NMFS approval of the final monitoring plan prior to the commencement of project actions.

30. Caltrans shall monitor an agreed upon number of salmonid spawning sites that may be affected by project construction and ground disturbance with specific emphasis on sampling baseline conditions to detect project related impacts, and provide the data to NMFS no later than 120 days after the last day of data collection. Caltrans shall provide NMFS with a final monitoring plan prior to the commencement of project actions.

31. All reports , plans, and monitoring data required for the above terms and conditions shall be sent to:

Santa Rosa Field Office Supervisor, Protected Resources Division
National Marine Fisheries Service
777 Sonoma Avenue, Room 325
Santa Rosa, California 95404.

X. CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs Federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of the 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.

1. One or more years in advance of construction of stream crossings, Caltrans should plant riparian vegetation along the banks of Haehl, Baechtel, Broaddus, Mill, and Upp creeks to enhance the riparian corridor prior to the project's vegetation removal. By increasing the canopy cover in areas with sparse or no existing riparian vegetation, the project can minimize the effects of increased solar radiation on stream water temperature.

XI. REINITIATION NOTICE

This concludes formal consultation for the proposed Caltrans Hwy. 101 Willits Bypass Project in Mendocino County, California. As provided in 50 CFR ' 402.16, reinitiation of formal consultation is required if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered in this opinion; (3) the 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.

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Enclosure 2

Hwy. 101 Willits Bypass Project

ESSENTIAL FISH HABITAT CONSERVATION RECOMMENDATIONS

(Magnuson-Stevens Fishery Conservation and Management Act - EFH Consultation)

The 1996 amendments to the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) set forth new mandates for the National Marine Fisheries Service (NMFS), regional fishery management councils, and Federal action agencies to identify and protect important marine and anadromous fish habitat. The regional fishery management councils, with assistance from NMFS, are required to delineate essential fish habitat (EFH) in fishery management plans (FMPs) or FMP amendments for all managed species. Federal action agencies, which fund, permit, or carry out activities that may adversely impact EFH are required to consult with NMFS regarding potential adverse effects of their actions on EFH, and respond in writing to NMFS conservation recommendations. In addition, NMFS is required to comment on any state agency activities that would impact EFH. Although the concept of EFH is similar to that of critical habitat under the Endangered Species Act, measures recommended to protect EFH are advisory, not proscriptive. The Pacific Fisheries Management Council has delineated EFH for Pacific coast salmon (PFMC 1999).

I. IDENTIFICATION OF ESSENTIAL FISH HABITAT

EFH is defined in the MSFCMA as those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. NMFS regulations further define waters to include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; substrate to include sediment, hard bottom, structures underlying the waters, and associated biological communities necessary to mean the habitat required to support a sustainable fishery and the managed species contribution to a healthy ecosystem; and spawning, breeding, feeding, or growth to maturity to cover a species full life cycle.

For Pacific coast salmon, the geographic extent of EFH currently being considered includes both marine and freshwater habitat. For purposes of this consultation, Pacific coast salmon EFH corresponds closely to Critical Habitat designated under the Endangered Species Act for Southern Oregon-Northern California Coasts Coast coho salmon (*Oncorhynchus kisutch*) and California Coastal Chinook salmon (*O. tshawytscha*) (64 FR 24049 and 70 FR 52488).

II. PROPOSED ACTION

The California Department of Transportation (Caltrans) proposes the Hwy. 101 Willits Bypass to reduce delays on U.S. Route 101. Currently Hwy. 101 runs through the City of Willits, California. The bypass project will re-route Hwy. 101 around the City of Willits, providing a stable flow of traffic at 65 miles per hour. The proposal includes the construction of a four-lane freeway that crosses the Little Lake Valley east of Willits. The bypass would begin 3.2 kilometers (km) south of Willits, where the existing Hwy. 101 becomes a two-lane road, and extend to about 2.1 km north of the Willits, where the new alignment would merge with the existing two-lane Hwy. 101. Construction would begin in 2010 and likely take four years to complete.

III. EFFECTS OF THE PROJECT ACTION

The associated biological opinion has a general description of the non-fishing related activities that may directly or cumulatively, temporarily or permanently threaten the physical, chemical, and biological properties of the habitat utilized by Pacific coast salmon and their prey within the proposed project area. The direct result of these threats is that the function of EFH may be eliminated, diminished or disrupted.

Potential impacts to salmonid habitat are described in the preceding biological opinion. Adverse effects of the proposed action on salmonid EFH may occur through dewatering and in-channel construction activities, riparian vegetation removal, and associated freeway construction work within Haehl, Baechtel, Broaddus, Mill, Upp, and Outlet creeks, which are tributaries to the Eel River.

IV. CONCLUSION

Upon review of the anticipated effects, NMFS believes that proposed freeway construction actions are likely to cause adverse effects to Pacific coast salmon EFH.

V. EFH CONSERVATION RECOMMENDATIONS

Pursuant to Section 305(b)(4)(A) of the Magnuson-Stevens Act, NMFS recommends that the terms and conditions 7 through 21 of the preceding biological opinions Incidental Take Statement be adopted as EFH conservation recommendations for Pacific coast salmon habitat.

VI. FEDERAL AGENCY STATUTORY REQUIREMENTS

The Magnuson-Stevens Act (Section 305(b)(4)(B)) and Federal regulations (50 CFR Section 600.920(j)) to implement the EFH provisions of the MSFCMA require Federal action agencies to provide a written response to EFH Conservation Recommendations within 30 days of its receipt. A preliminary response is acceptable if final action cannot be completed within 30 days. The final response must include a description of measures proposed to avoid, mitigate, or offset the adverse impacts of the activity on delineated EFH. If the response is inconsistent with our EFH

Conservation Recommendations, it must provide an explanation of the reasons for not implementing them.