Appendix D Biological Opinions and Species Lists

This appendix contains Biological Opinions from the following resource agencies:

US Fish & Wildlife Service Biological Opinion (***March 2006***)

National Marine Fisheries Service Biological Opinion (***September 11, 2006***)

Species List:

US Fish & Wildlife Species List

U.S. Fish & Wildlife Service
Biological Opinion
March 2006

United States Department of the Interior

FISH AND WILDLIFE SERVICE

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In Reply Refer To:
1-14-1998-0095

MAR 30 2006

Gene K. Fong
Division Administrator
Federal Highway Administration
California Division
650 Capitol Mall, Suite 4-100
Sacramento, California 95814

Subject: Formal Consultation on the Proposed Willits Bypass Project, on U.S. Highway 101, Mendocino County (EA 01-262000, Document # P53181)

Dear Mr. Fong:

This correspondence transmits the Fish and Wildlife Service's (Service's) biological opinion, based on our review of the Federal Highway Administration's (FHWA's) proposed action, construction of the Willits Bypass Project, located between post miles (PM) 43.1 and 52.3, on U.S. Highway 101, in Mendocino County, California, and its effects on the threatened northern spotted owl (*Strix occidentalis caurina*) (spotted owl). You determined that the proposed action may affect and is likely to adversely affect the spotted owl. You also determined that the proposed action may affect but is not likely to adversely affect the threatened bald eagle (*Haliaeetus leucocephalus*). In this response, we also transmit the Service's concurrence with your determination of effects to the bald eagle. This document is prepared in accordance with section 7 of the Endangered Species Act of 1973, as amended (16 O.K. 1531 et seq.) (Act). We received your September 7, 2005, request for consultation on September 12, 2005.

The proposed action is not located within critical habitat designated or proposed for any listed or proposed species, and will not affect any primary constituent element of critical habitat. Therefore, critical habitat need not be addressed further in this consultation.

This consultation is based on information you provided in the August 2005 biological assessment (BA) and its appendices submitted with your request, telephone conversations between staff biologists of the Service's Arcata Fish and Wildlife Office (AFWO) and the California Department of Transportation (Caltrans), field visits to the site of the proposed construction

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project, and other sources of information. A complete administrative record of this consultation is on file at this office.

Consultation History

As early as 1995, Caltrans and other Federal and State agencies began planning numerous design and alignment alternatives for the Willits Bypass project. Various studies and documents have been published by Caltrans since that time. A complete list of those documents can be found on page 14 of the BA. More intensive planning has occurred since 1998, and especially during the most recent five-year period. Field visits to the Willits Bypass project area occurred on several occasions during the years 2002 through 2005, including a visit to the proposed excavation site. The purpose of those field visits was to gain a better understanding of the effects of the proposed project on wetlands in Little Lake Valley, the potential spotted owl suitable habitat in the vicinity of Oil Well Hill, and the effects of design alternatives on fish, wildlife and plant habitat. Several meetings of the project development team (PDT) occurred during this time period as well to discuss project design alternatives, potential effects to wetlands and listed species, and community needs. Additional meetings among Federal, State and local agency representatives were held to discuss effects of various design alternatives, mitigation measures for impacts to wetlands, and scheduling of planning and construction activities. On September 27, 2005, FHWA submitted a request for formal consultation on the Willits Bypass project to AFWO. A biological assessment, dated August 2005, was enclosed with that request.

Concurrence on Effects to Bald Eagle

FHWA determined that the Willits Bypass Project may affect bald eagles in or near Little Lake Valley. These potential effects are analyzed in the August 2005 BA. Based on this analysis, FHWA determined that the proposed action may affect but is not likely to adversely affect the bald eagle. The following discussion documents the Service's concurrence with FHWA's determination. The proposed action is briefly described in the biological opinion which follows, and is discussed in detail in the BA, and will not be repeated here. The reader is referred to the BA for details regarding location, extent of effects, and timing of the proposed action.

Bald eagle nest sites are always associated with a lake, river, or other body of water, and usually occur within approximately 1 mile (1.6 km) of these water bodies (Lehman 1979). Nests are usually constructed in a tree that provides an unobstructed view of the water body and that is almost always the dominant or co-dominant tree in the surrounding stand (Lehman 1979). Snags and dead-topped live trees are important habitat components in a bald eagle nesting territory and provide perch and roost sites. Bald eagles winter along rivers, lakes, or reservoirs that support adequate fish or water bird prey, and that have mature trees or large snags available for perch sites. They often roost communally during the winter, typically in mature trees or snags with open branching structures that are isolated from human disturbance.

No bald eagle nests were observed during field surveys, and no bald eagles are known to nest in the Little Lake Valley area (Caltrans 2000). One adult bald eagle was observed incidentally during other surveys conducted in winter 1993 (Caltrans 1997). Scott Harris (CDFG fisheries biologist, pers. comm., cited in BA) has observed bald eagles in Little Lake Valley on only three

or four occasions over the past 10 years while conducting salmonid surveys in Little Lake Valley, and noted that these birds did not remain in the area for any length of time.

The proposed project will permanently affect approximately 48 acres of wetlands, with approximately 81 percent (39 acres) consisting of wet meadow habitat, and approximately 5.4 acres (11 percent) of mixed marsh. The remaining 8 percent of wetlands affected consist of jurisdictional riparian woodland and scrub habitat. These wetlands are located primarily in the central and southern portions of the valley, and are in the topographically higher central portion of the valley, where flooding occurs only during the wettest years. Hence, these wetlands would provide lower quality habitat for waterfowl, used only during very wet periods. In addition, the majority of the stream reaches within the Modified Alternative J1T project corridor that support salmonids have a fairly dense riparian woodland canopy cover over the creeks, which would restrict the use of these streams by eagles, which require open water to capture their prey.

The northern portion of the valley, north of the project corridor, is topographically lower than the rest of the valley, and standing water in this portion of the valley occurs more regularly, is deeper, and remains longer during the winter months. Approximately 700 acres of higher quality winter waterfowl habitat were identified in the northern portion of the valley outside the action area, which provides the primary habitat for wintering waterfowl in Little Lake Valley (Caltrans 1997). Also, riparian vegetation is sparse along the reach of Outlet Creek north of the project corridor, which would facilitate access to migrating fish by eagles. These areas, which comprise the significant foraging habitat for bald eagles in Little Lake Valley, would not be affected by the proposed action.

Due to the low number of observations of bald eagles in Little Lake Valley, the absence of nesting activity, and the absence of higher quality foraging habitat in and near the proposed project corridor, it is likely that bald eagles observed in the valley are individuals that are occasional winter visitors that forage opportunistically during wet winters, when waterfowl or other suitable prey are present. Hence, project related impacts to wetlands and the streams reaches in the central and southern portions of the valley are not expected to result in a significant loss of foraging habitat for bald eagles.

The Service concurs with your determination that the proposed action may affect but is not likely to adversely affect the bald eagle, based on the following factors:

1. No forest habitat that currently functions as nesting habitat for the bald eagle will be removed, degraded or downgraded. The bald eagle does not currently nest in Little Lake Valley or on Oil Well Hill, and no nest trees currently used or known to have historically been used will be removed as a result of this proposed action.

2. The proposed action will not result in noise or visual disturbance to the species. Bald eagles use Little Lake Valley sporadically during some winters as foraging habitat, and may roost on occasion in or near the valley. However, no communal roosts are known to exist in the valley, so none will be subject to noise or visual disturbance. As indicated above, bald eagles are not known to nest in Little Lake Valley, so nesting bald eagles would not be subject to disturbance.

3. The proposed action will not result in injury or death of any individuals of the species.

4. The action will not result in adverse effects to any primary constituent element of critical habitat, since critical habitat is not designated for the species.

BIOLOGICAL OPINION

The following biological opinion addresses the effects of the proposed action on the northern spotted owl. No other species has been determined by FHWA and Caltrans to be adversely affected by the proposed action. Hence, no other species need be addressed by this opinion.

DESCRIPTION OF THE PROPOSED ACTION

Introduction

A complete description of the proposed action, including construction activities and equipment necessary to complete this action, can be found in the August 2005 BA and its appendices. That document is hereby included by reference. The following discussion provides a brief description of the construction activities most pertinent to this consultation. The reader is referred to the BA for complete details and additional clarification regarding the proposed activities.

Scope of Activities

FHWA and Caltrans propose to construct a bypass highway through Little Lake Valley around the community of Willits. The purposes of this project are to improve the level of service and safety for travelers along U.S. Highway 101; reduce delays for interregional traffic; and improve traffic flow and safety on Main Street, which currently functions as Highway 101 through the city. Caltrans proposes to construct a four-lane, divided highway along an alignment to the east of the city limits. This alignment, referred to as the Modified J1T alternative, would be constructed on a combination of imported fill material and elevated viaduct. Two interchanges are proposed, one each on the south and north ends of the new alignment, to access the community along the existing Highway 101/Main Street.

Construction activities along the proposed alignment through Little Lake Valley will not occur within or near habitat currently occupied, or likely to be occupied in the foreseeable future, by listed species under the regulatory jurisdiction of the Service. However, the road alignment passes through substantial wetlands, and may affect several streams in Little Lake Valley currently occupied by listed salmonid fishes under the jurisdiction of the National Marine Fisheries Service (NOAA Fisheries). Section 7 consultation has been initiated with NOAA Fisheries for those species.

In order to obtain enough fill material to construct the elevated roadway through the valley, Caltrans proposes to import fill material from a major excavation site north of the main roadway construction area and adjacent to the existing highway on Oil Well Hill north of Outlet Creek. Figures 1-3 and 1-4 of the BA, Appendix I, depict the location of the excavation site. Although

Caltrans anticipates that the contractor will obtain fill material from this site, the contractor may choose to import fill from another site if feasible. Caltrans requires that any use of an alternative site comply with all local, state and federal environmental and permitting use regulations, and requires the contractor to prepare and submit documentation of compliance to the Caltrans Resident Engineer. The present consultation addresses only the proposed excavation site on Oil Well Hill, and does not address effects to listed species that may arise from use of any alternative extraction site.

The Oil Well Hill borrow site is immediately adjacent to Highway 101 and north of Outlet Creek. It has been designated as a proposed borrow site because of its proximity to the project corridor, its location within the existing Caltrans right-of-way, and the presence of soil material suitable for use as fill for this project. Other sites were not proposed as designated borrow site(s) for this project due to the cost involved in acquiring land and the distance from the proposed project corridor.

Proposed Construction Activities

Fill material extraction at the Oil Well Hill site would require the removal of forested habitat. This habitat removal has the potential to remove, downgrade or degrade habitat suitable for the spotted owl. Hence, activities related to the extraction and transport of this fill material from Oil Well Hill to the proposed highway alignment in Little Lake Valley are the focus of the following description of proposed activities.

Caltrans proposes to extract soil fill material on a maximum of 40 acres (16.2 ha) for use in constructing the roadbed of a major portion of the Willits Bypass. Caltrans estimates the fill requirements for the Modified J1T alignment to be 1.9 million cubic meters (2.5 million cubic yards), although revisions to the final design standards could reduce the actual acreage and volume of excavated materials. For purposes of this consultation, the estimate of 40 acres of habitat removal and 1.9 million cubic meters of fill are assumed to be reasonable worst case figures. Although the exact amount of fill material to be excavated, and the acreage of forest habitat to be removed, are not precisely known at this time, the extent of habitat removed will be minimized to the extent practicable. As indicate above, some or all of this fill material may come from alternative sites at the discretion of the contractor, provided Caltrans-specified conditions are met.

The material will be excavated by using heavy equipment, assumed to include large excavators, bulldozers, loaders, and large dump trucks, as well as a variety of small power tools and equipment. The material will be transported by truck to the abandoned truck scale area, located about two miles south of the borrow site, via Highway 101, and from there along the new road alignment to its final deposition site. Use of this equipment will modify existing traffic noise dynamics at the excavation site, especially on the east side of extraction area which currently is buffered from the direct noise effects of existing highway use. Changes to the noise dynamics will occur along the haul route as well. The actual effects of these changes to the sound regime on listed species are discussed in detail in the Effects to the Species section of this biological opinion.

Excavation of fill material at Oil Well Hill may require the use of explosives. The number and frequency of charges will be determined by the contractor. The charges will be set below ground to fracture and loosen rock; above-ground use is not anticipated.

Excavation will remove portions of the cut slope on the east side of the existing highway and establish a new cut slope a maximum of 183 meters (600 feet) east of the highway. Caltrans anticipates that these changes will result in minimal alteration of the sound regime within the remaining spotted owl habitat.

Night work is proposed at the excavation site to reduce the cost and time period for construction. Limiting the excavation activities to daylight hours would extend the duration of construction from 2 years to a total of 4 years, and are anticipated to increase costs by approximately $5 million per year of extension (Dave Kelley, Caltrans, pers. comm., as cited in BA).

The area where this fill material would be extracted is currently covered by forested habitat, primarily of the Douglas-fir series. As indicated above, up to 40 acres of forest habitat may be removed to allow the extraction of fill material, although this figure may be reduced to less than 20 acres should substantial modifications be made to the project design. No provisions are identified to reestablish forest habitat on the excavation site due to the permanent removal of suitable topsoil during bypass construction, and the potential use of some of the excavation area for future highway expansion. However, some vegetation reestablishment, including grasses, herbs, and shrubs, is likely as a result of natural colonization. This natural colonization is not expected to result in the establishment of forest habitat in the foreseeable future.

Caltrans anticipates that no disposal sites are needed for this project, as no excess fill material will be generated.

Minimization Measures

Caltrans proposes the following minimization measures at the excavation site to minimize adverse effects:

- The amount of fill material will be minimized to that necessary to complete the proposed project.
- During all timber clearing operations at the proposed Oil Well Hill excavation site, monitoring for the presence of spotted owls will be conducted by a Service-approved biologist to assess potential adverse effects to roosting or nesting adults, their eggs, or juvenile spotted owls. If spotted owls are found on or within 0.8 km (0.5 mile) of the borrow site during timber clearing, Caltrans will consult with the Service immediately to develop a strategy for minimizing impacts to the species.
- All equipment will have sound control devices that are no less effective than those provided by the manufacturer of the equipment.
- All equipment will be operated and maintained to minimize noise generation, and no equipment will have unmuffled exhaust systems.
- Acoustic barriers will be installed around all stationary construction noise sources.
- All large trees that can be avoided will be protected.

- During each construction season, the contractor will limit the removal of vegetation to those portions of the borrow site necessary to provide fill material for that season's construction needs.

Appropriate Best Management Practices (BMP's) would be implemented to minimize impacts to spotted owls and other sensitive resources in the area, and could include: Preservation of Existing Vegetation; Hydroseeding (where feasible); Silt Fencing; Sandbag Barriers; Stabilized construction Entrances/Exits; Material Delivery and Storage; Stockpile Management; Spill Prevention and Control; Solid Waste Management; Hazardous Waste Management; and Sanitary/Septic Waste Management (BMP descriptions are attached as Appendix G of the BA).

A 2-year protocol-level survey will be conducted prior to the start of construction to determine the status of spotted owls in the vicinity of the borrow site prior to excavation. Surveys are anticipated to occur during the years 2007 and 2008. Survey results will be provided to the Service each year upon completion of each survey. If spotted owls are found nesting within 0.8 km (0.5-mile) of the borrow site, Caltrans will reinitiate consultation with the Service to develop a strategy for minimizing adverse impacts.

Conservation Measures

When used in the context of the Act, "conservation measures" represent actions pledged in the project description that the action agency will implement to further the recovery of the species under review. Caltrans is not proposing to include any conservation measures as part of the proposed action.

Action Area

The regulations governing section 7 consultation define "action area" as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action" (50 CFR 402.02). Delineating the analysis area enables the Service to more fully understand the cumulative, interrelated, and interdependent effects of the action within a more appropriate landscape context.

The action area for this proposed action is located in a rural area of Mendocino County, California in the Coast Range Mountains east and north of the community of Willits. The action area includes the existing roadway of U.S. Highway 101 through Willits, as well as the proposed new alignment of the highway as described in planning alternative Modified J1T. The action area also includes the proposed site of fill material excavation adjacent to and east of the highway alignment north of Willits on the grade known as Oil Well Hill.

Areas to be directly affected by the proposed project include the existing road alignment, the proposed new road alignment, and all newly created road cuts, roadbed fills, shoulders, and turnouts. Further, the action area includes all areas affected by the extraction of fill material on the proposed excavation site adjacent to the existing highway on Oil Well Hill. This portion of the action area is also referred to as the "construction footprint".

The action area also extends into a band of natural habitat immediately adjacent to both sides of the road, to a distance of up to one-half mile. This portion of the action area may be subject to elevated sound levels generated by the construction activities, including blasting, heavy machinery, and other sources that have a potential to adversely affect listed species.

STATUS OF THE SPECIES

NORTHERN SPOTTED OWL

Legal Status

The Service listed the northern spotted owl under the Act as a threatened species on June 26, 1990, due to widespread habitat loss across the entirety of its range and the inadequacy of existing regulatory mechanisms to provide for its conservation (USFWS 1990b).

Life History

Taxonomy

The northern spotted owl is one of three subspecies currently recognized by the American Ornithologists' Union, and is the subspecies with the most northerly distribution. The taxonomic separation of these three subspecies is supported by genetic (Barrowclough and Gutiérrez 1990), morphological (Gutiérrez et al. 1995) and biogeographic information (Barrowclough and Gutiérrez 1990). More detailed accounts of the taxonomy, ecology, and reproductive characteristics of the spotted owl are found in the 1987 and 1990 Status Reviews (USFWS 1987, 1990a); the 1989 Status Review Supplement (USFWS 1989); the Interagency Scientific Committee (ISC) Report (Thomas et al. 1990); the Forest Ecosystem Management Assessment Team (FEMAT) Report (Thomas and Raphael 1993); the final rule designating the spotted owl as a threatened species (USFWS 1990b); and the Scientific Evaluation of the Status of the Northern Spotted Owl (Courtney et al. 2004).

Physical Description

The northern spotted owl, the largest of the three subspecies of spotted owl, is medium sized, approximately 46-48 cm in length and 490-850 g in weight (Gutiérrez et al. 1995). The body is dark brown, with a barred tail and white spots on the head and breast. A prominent facial disk surrounds dark brown eyes. Three age classes are distinguishable, based on plumage characteristics (Forsman 1981, Moen et al. 1991). The spotted owl closely resembles the barred owl (*S. varia*), a congeneric species with which it occasionally hybridizes (Kelly et al. 2003). Hybrids exhibit characteristics of both species (Hamer et al. 1994).

Current and Historical Range

The current range and distribution of the spotted owl extends from southern British Columbia through western Washington, Oregon, and California, as far south as Marin County (USFWS 1990a). The southeastern boundary of its range is the Pit River area of Shasta County,

California. The range of the spotted owl is partitioned into 12 physiographic provinces (provinces), based upon recognized landscape subdivisions exhibiting different physical and environmental features (Thomas et al. 1993). These provinces are distributed across the range as follows: four provinces in Washington (Washington Cascades East, Olympic Peninsula, Washington Cascades West, Western Lowlands); five provinces in Oregon (Oregon Coast Range, Willamette Valley, Oregon Cascades West, Oregon Cascades East, Klamath Mountains); and three provinces in California (California Coast, California Klamath, California Cascades). The current range of the spotted owl is similar to its historical range where forested habitat still exists. The relatively contiguous distribution is influenced by the natural insularity of habitat patches within the geographic provinces and by natural and man-caused fragmentation of vegetation. The spotted owl is extirpated or rare in some areas within its historic range, such as southwestern Washington and British Columbia. Timber harvest activities have eliminated, reduced or fragmented spotted owl habitat sufficiently to decrease overall population densities across its range, particularly within the coastal provinces where habitat reduction has been concentrated (Thomas and Raphael 1993).

Behavior

Spotted owls are territorial. However, home ranges of adjacent pairs may overlap (Forsman et al. 1984, Solis and Gutiérrez 1990), which suggests that the area defended is smaller than the areas used for foraging. Territorial defense is primarily effected by hooting, barking and whistle type calls.

Spotted owls are monogamous and usually form long-term pair bonds. "Divorces" occur but are relatively uncommon. There are no known examples of polygyny in this species, although associations of three or more birds have been reported (Gutiérrez et al. 1995).

Habitat Relationships

Home Range

Spotted owl home range size varies by province. Home range generally increases from south to north, which is likely in response to decreasing habitat quality (USFWS 1990a). Home range size is linked to habitat type, availability, and abundance of prey (Zabel et al. 1995).

Based on available radio-telemetry data (Thomas et al. 1990), the Service estimated median annual home range size for the spotted owl by province. Because the actual configuration of the home range is rarely known, and may change from year to year, a circle representative of the median home range size approximates the provincial home range. The circle centers upon a spotted owl activity center, with an area approximating the provincial median annual home range. For example, estimated home range area varies from 3,340 acres (based on a 1.3-mile radius area) in California to 14,271 acres (based on a 2.7-mile radius circle) in Washington. The Service approximates the area most heavily used by spotted owls during the nesting season, identified as the core area, by a 0.7-mile-radius circle (985 acres). The nest tree, location of pre-fledged juveniles, or most significant location of the pair determines the center of the circle. Spotted owls in northern California focused their activities in core areas that ranged from about

167 to 454 acres, with a mean of about 409 acres; approximately half the area of the 0.7-mile radius circle (Bingham and Noon 1997). Spotted owls maintain smaller home ranges during the breeding season and often dramatically increase their home range size during fall and winter (Forsman et al. 1984, Sisco 1990).

Although differences exist in natural stand characteristics that influence provincial home range size, habitat loss and forest fragmentation caused by timber harvest effectively reduce habitat quality in the home range. A reduction in the acreage of suitable habitat results in a reduction in spotted owl abundance and nesting success (Bart and Forsman 1992, Bart 1995).

Habitat Use

Forsman et al. (1984) report that spotted owls have been observed in the following forest types: Douglas-fir (*Pseudotsuga menziesii*), western hemlock (*Tsuga heterophylla*), grand fir (*Abies grandis*), white fir (*Abies concolor*), ponderosa pine (*Pinus ponderosa*), Shasta red fir (*Abies magnifica shastensis*), mixed evergreen, mixed conifer hardwood (Klamath montane) and redwood (*Sequoia sempervirens*). Use of these types coincides with appropriate forest structure (see below). In parts of the Oregon Coast Range, spotted owls have been recorded in pure hardwood stands (Glenn et al. 2004). In California, spotted owls are found from near sea level in coastal forests to approximately 2130 m (7000 ft) in the Cascades (Gutiérrez 1996). The upper elevation limit at which spotted owls occur decreases with increasing latitude in Oregon and Washington (Lint et al. 2005). In all areas, the upper elevation limit at which spotted owls occur corresponds to the transition to subalpine forest, which is characterized by relatively simple structure and severe winter weather (Gutiérrez 1996).

Roost sites selected by spotted owls have more complex vegetation structure than forests generally available to them (Barrows and Barrows 1978, Forsman et al. 1984, Solis and Gutiérrez 1990). These habitats are usually multi-layered forests having high canopy closure and large diameter trees in the overstory.

Spotted owls nest almost exclusively in trees. Like roosts, nest sites are found in forests having complex structure dominated by large diameter trees (Forsman et al. 1984, Hershey et al. 1998). Even in forests that have been previously logged, spotted owls select forests having a structure (i.e., larger trees, greater canopy closure) different than forests generally available to them (Folliard 1993, Buchanan et al. 1995, Hershey et al. 1998).

Foraging habitat is the most variable of all habitats used by territorial spotted owls (Thomas et al. 1990). Descriptions of foraging habitat have ranged from complex structure (Solis and Gutiérrez 1990) to forests with lower canopy closure and smaller trees than forests containing nests or roosts (Gutiérrez 1996).

Habitat Selection

Spotted owls generally rely on the structures and characteristics of older forested habitats for nesting, roosting, foraging, and dispersal. These characteristics include (Thomas et al. 1990, USFWS 1990a):

- A multi-layered, multi-species canopy dominated by large overstory trees;
- Moderate to high canopy closure;
- A high incidence of trees with large cavities and other types of deformities;
- Numerous large snags;
- An abundance of large, dead wood on the ground; and
- Open space within and below the upper canopy for spotted owls to fly.

Forested stands with high canopy closure also provide thermal cover (Weathers et al. 2001), as well as protection from predation. Recent landscape-level analyses in portions of the Klamath Province suggest that a mosaic of late-successional habitat interspersed with other vegetation types may benefit spotted owls more than large, homogeneous expanses of older forests (Zabel et al. 2003, Franklin et al. 2000, Meyer et al. 1998). In redwood forests along the coast range of California, spotted owls may be found in younger forest stands with structural characteristics of older forests (Thomas et al. 1990). However, spotted owls do not generally appear to select for stands of intermediate or younger ages (Solis and Gutiérrez 1990, Thomas et al. 1990).

In mixed conifer forests of the East Cascades province in Washington, 27 percent of nest sites were in old-growth forests, 57 percent in the understory reinitiation phase of stand development, and 17 percent in the stem exclusion phase (Buchanan et al. 1995). In the West Cascades province in Oregon, 50 percent of spotted owl nests were in late-successional (greater than 80 years old) or old-growth stands, and none were found in stands less than 40 years old (Irwin et al. 2000).

Ward (1990) reported that spotted owls foraged in areas that had lower variance in prey densities (prey were more predictable in occurrence) within older forests and near ecotones of old forest and brush seral stages. Zabel et al. (1995) showed that spotted owl home ranges are larger where flying squirrels (*Glaucomys sabrinus*) are the predominant prey. Conversely, home ranges are smaller where woodrats (*Neotoma* spp.) are the predominant prey.

In the Western Washington Cascades, spotted owls used mature/old forests dominated by trees greater than 50 cm diameter-at-breast height (dbh) with greater than 60 percent canopy closure more often than expected for roosting during the non-breeding season. They used young forest (trees 20-50 cm dbh with greater than 60 percent canopy closure) less often than expected based on availability (Herter et al. 2002).

Reproductive Biology

Adult spotted owls exhibit high annual survival rates and are relatively long-lived (USFWS 1992a and Anthony et al. 2004). Spotted owls do not typically reach sexual maturity until after 2 years (Miller et al. 1985 and Thomas et al. 1990). Adult females lay an average of two eggs per clutch, with a range of one to four eggs. Spotted owl pairs typically do not nest every year, nor are nesting pairs successful every year (USFWS 1990a). The small clutch size, temporal variability in nesting success, and somewhat delayed maturation all contribute to the relatively low fecundity of this species (Gutiérrez 1996).

In the Douglas-fir region, nest sites are usually located within stands of old-growth and late-successional forest dominated by Douglas-fir, and they contain structures such as cavities, broken tree tops, and mistletoe (*Arceuthobium* spp.) brooms (Forsman et al. 1984, Blakesley et al. 1992, LaHaye and Gutiérrez 1999). In general, courtship and nesting behavior begins in February to March with nesting occurring from March to June; however, timing of nesting and fledging varies with latitude and elevation (Forsman et al. 1984). After young fledge from the nest, they depend on their parents until they are able to fly and hunt on their own. Parental care continues post-fledging into September (USFWS 1990b), and sometimes into October (Forsman et al. 1984). During this time, the adults may not roost with their young during the day, but they respond to begging vocalizations by bringing food to the young (Forsman et al. 1984).

Some spotted owls, known as "floaters", do not demonstrate territorial behavior, but either remain as residents within the territory of a pair or move among territories (Gutiérrez 1996). Floaters have special significance in spotted owl populations because they may buffer the territorial population from decline (Franklin 1992). Little is known about floaters other than that they exist and typically do not respond to calls as vigorously as territorial birds (Gutiérrez 1996).

Dispersal Biology

Natal dispersal of spotted owls from Oregon and Washington typically begins during mid- to late-September, and shows remarkable synchrony across broad areas (Forsman et al. 2002). When data from many dispersing spotted owls are pooled, the direction of dispersal away from the natal site appears random (Miller 1989, Ganey et al. 1998, Forsman et al. 2002). Dispersal direction from individual territories, however, may be non-random in response to the local distribution of habitat and topography (Forsman et al. 2002). Natal dispersal occurs in stages, with juvenile spotted owls settling in temporary home ranges between bouts of dispersal (Forsman et al. 2002). Median natal dispersal distance is about 10 miles for males and 15.5 miles for females (Forsman et al. 2002, see also Miller 1989, Ganey et al. 1998). Successful dispersal of juvenile spotted owls may depend on their ability to locate unoccupied suitable habitat in close proximity to other occupied sites (LaHaye et al. 2001).

Breeding dispersal occurs among a small proportion of adult spotted owls; these movements were more frequent among females and unmated individuals (Forsman et al. 2002). Breeding dispersal distances were shorter than natal dispersal distances and are apparently random in direction (Forsman et al. 2002).

Large non-forested valleys are apparent barriers to natal and breeding dispersal; forested foothills between valleys may provide the only opportunities for dispersal (Forsman et al. 2002). The degree to which extensive water bodies, such as the Columbia River estuary and Puget Sound, function as barriers to dispersal is unclear. Analysis of genetic structure of spotted owl populations suggests adequate rates of gene flow may occur across the Puget Trough between the Olympic Mountains and Washington Cascades, and across the Columbia River between the Olympic Mountains and the Coast Range of Oregon (Haig et al. 2001). Both telemetry and genetic studies indicate inbreeding is rare.

Dispersing juvenile spotted owls experience high mortality rates, exceeding 70 percent during their first year in some studies (USFWS 1990b, Miller 1989). Leading known causes of mortality are starvation, predation, and accidents (Miller 1989, USFWS 1990b, Forsman et al. 2002). Parasitic infection may contribute to these causes of mortality (Forsman et al. 2002). In a study on habitat use by dispersing juvenile spotted owls in the Oregon Coast Range, Klamath and Western Oregon Cascades Provinces (Miller et al. 1997), mature and old-growth forest were used slightly more than expected, compared to availability, during the transient phase and nearly twice its availability during the colonization phase. Dispersing juvenile spotted owls used closed pole-sapling-sawtimber habitat roughly in proportion to availability in both phases; they used open sapling and clearcuts less than expected based on availability during colonization.

Food Habits

Spotted owls are mostly nocturnal (Forsman et al. 1984), but may forage opportunistically during the day (Laymon 1991, Sovern et al. 1994). Composition of prey in the spotted owl's diet varies regionally, seasonally, annually, and locally, likely in response to prey availability (Laymon 1988, Ganey 1992, Verner et al. 1992, Carey 1993, Ward and Block 1995, Forsman et al. 2001). Northern flying squirrels and woodrats are usually the predominant prey, in biomass and in frequency (Barrows 1980; Forsman et al. 1984; Ward 1990; Bevis et al. 1997; Forsman et al. 2001, 2004), with a clear geographic pattern of diet, paralleling differences in habitat (Thomas et al. 1990). Northern flying squirrels are generally the dominant prey item in the more mesic Douglas-fir/western hemlock forests characteristic of the northern portion of the range. Woodrats are generally the most abundant prey item in the drier mixed conifer/mixed evergreen forests typically found in the southern portion of the range (Forsman et al. 1984, Thomas et al. 1990, Ward et al. 1998, reviewed by Courtney et al. 2004). These prey items were found to be approximately equally abundant in the southwest interior of Oregon (Forsman et al. 2001, 2004).

Other prey species, such as the red tree vole (*Arborimus longicaudus*), red backed voles (*Clethrionomys gapperi*), mice, rabbits and hares, birds, and insects, may be seasonally or locally important (reviewed by Courtney et al. 2004). For example, Rosenberg et al. (2003) showed a strong correlation between annual reproductive success of spotted owls (number of young per territory) and abundance of deer mice (*Peromyscus maniculatus*) ($r^2 = 0.68$), despite the fact they only made up 1.6±0.5 percent of the biomass consumed. However, it is unclear if the causative factor behind this correlation was prey abundance or a synergistic response to weather (Rosenberg et al. 2003). Ward (1990) also noted that mice were more abundant in areas selected for foraging by owls. Nonetheless, spotted owls deliver larger prey to the nest and eat smaller food items, perhaps to reduce foraging energy costs. Therefore, managers should not underestimate the importance of smaller prey items such as *Peromyscus* in the spotted owl diet (Forsman et al. 1984, 2001, 2004).

Population Dynamics

The spotted owl is a relatively long-lived species, produces few but relatively large young, invests significantly in parental care, experiences later or delayed maturity, and exhibits high adult survivorship. The spotted owl's long reproductive life span allows for some eventual recruitment of offspring, even if recruitment does not occur each year (Franklin et al. 2000).

Annual variation in population parameters for spotted owls has been linked to environmental influences at various life history stages (Franklin et al. 2000). In coniferous forests, mean fledgling production of the California spotted owl (*S. o. occidentalis*), a closely related subspecies, was higher when minimum spring temperatures were higher (North et al. 2000), a relationship that may be a function of increased prey availability. Across their range, spotted owls have previously shown a pattern of alternating years of high and low reproduction (Franklin et al. 1999). For reasons unknown, highest reproduction has occurred during even-numbered years. Annual variation in breeding may relate to weather conditions and fluctuation in prey abundance (Zabel et al. 1996). Forsman et al (1996) provided the results of multiple studies showing the effects of weather, specifically temperature and precipitation, on northern spotted owl productivity.

A variety of factors may regulate spotted owl population levels. These factors may be density-dependent (e.g., habitat quality, habitat abundance) or density-independent (e.g., weather). Interactions may occur among factors. For example, severe weather may prove more detrimental to individual spotted owls in fragmented or otherwise poor quality habitat than those living in high quality, contiguous habitat. As habitat quality decreases, density-independent factors may have more influence on variation in survival, which tends to increase variation in the rate of population growth (Franklin et al. 2000). A consequence of this pattern is that, at some point, lower habitat quality may cause the population to be unregulated (i.e., have negative growth) and decline to extinction (Franklin et al. 2000).

Threats

Reasons for Listing

The Service listed the spotted owl as threatened throughout its range "due to loss and adverse modification of suitable habitat as a result of timber harvesting and exacerbated by catastrophic events such as fire, volcanic eruption, and wind storms" (USFWS 1990a). More specifically, significant threats to the spotted owl included low or declining populations; limited or declining habitat; fragmented or isolated distribution of habitat and populations; isolation of provinces; predation and competition; lack of coordinated conservation measures; and vulnerability to natural disturbance (USFWS 1992a). The Service characterized the threats within each province as severe, moderate, low, or unknown. Declining habitat was recognized as a severe or moderate threat to the spotted owl in all 12 provinces, isolation of provinces within 11 provinces, and declining populations in 10 provinces. Consequently, these three factors represented the greatest concern range-wide to the conservation of the spotted owl. Limited habitat was considered a severe or moderate threat in nine provinces, and low populations a severe or moderate concern in eight provinces, suggesting that these factors are a concern throughout the majority of the range. The Service rated the vulnerability to natural disturbances as low in five provinces.

The degree to which predation and competition poses a threat to the spotted owl was unknown in more provinces than any of the other threats, and indicates a need for additional information. Few empirical studies exist to confirm that habitat fragmentation contributes to increased levels of predation on spotted owls (Courtney et al. 2004). However, great horned owls (*Bubo virginianus*), an effective predator on spotted owls, are closely associated with fragmented

forests, openings, and clearcuts (Johnson 1992, Laidig and Dobkin 1995). As mature forest harvest continues, great horned owls may colonize fragmented forests, thereby increasing spotted owl vulnerability to predation.

New Threats

Barred Owls

Since the listing of the spotted owl under the Act, new information suggests that hybridization with the barred owl is less of a threat (Kelly and Forsman 2004) and competition with the barred owl is a greater threat than previously anticipated (Courtney et al. 2004). Since 1990, the barred owl has expanded its range south into Marin County, California and the central Sierra Nevada Mountains, such that it is now roughly coincident with the range of the northern spotted owl and the California spotted owl (Courtney et al. 2004). Further, notwithstanding the likely bias in survey methods towards underestimating actual barred owl numbers (Courtney et al. 2004), barred owl populations appear to be increasing throughout the Pacific Northwest, particularly in Washington and Oregon (Zabel et al. 1996, Dark et al. 1998, Wiedemeier and Horton 2000, Kelly et al. 2003, Pearson and Livezey 2003, Anthony et al. 2004a). Barred owl numbers now may exceed spotted owl numbers in the northern Washington Cascades (Kuntz and Christopherson 1996) and British Columbia (Dunbar et al. 1991) and appear to be approaching spotted owl numbers in several other areas, including Redwood National and State Parks in California (Schmidt 2003). Barred owl populations in the Pacific Northwest appear to be self-sustaining based on current density estimates and apparent distribution (Courtney et al. 2004).

Barred owls apparently compete with spotted owls through a variety of mechanisms: prey overlap (Hamer et al. 2001), habitat overlap (Hamer et al. 1989, Dunbar et al. 1991, Herter and Hicks 2000, Pearson and Livezey 2003), and agonistic encounters (Leskiw and Gutiérrez 1998, Pearson and Livezey 2003). New information on encounters between barred owls and spotted owls comes primarily from anecdotal reports that corroborate initial observations that barred owls react more aggressively towards spotted owls than vice versa (Courtney et al. 2004). Limited circumstantial evidence exists documenting barred owl predation on spotted owls (Leskiw and Gutiérrez 1998, Johnston 2002). Information collected to date indicates that encounters between these two species tend to be agonistic in nature, and that the outcome is unlikely to favor the spotted owl (Courtney et al. 2004).

Although biologists initially thought barred owls were more closely associated with early successional forests than spotted owls (Hamer 1988, Iverson 1993), recent studies indicate that barred owls utilize a broader range of forest successional stages than do spotted owls (Courtney et al. 2004). The only study comparing spotted owl and barred owl food habits in the Pacific Northwest indicated that barred owl diets overlapped strongly (greater than 75 percent) with spotted owl diets (Hamer et al. 2001). However, barred owl diets were also more diverse than spotted owl diets, including species associated with riparian and other moist habitats, as well more terrestrial and diurnal species.

Evidence that barred owls are causing the displacement of spotted owls is largely indirect, based primarily on retrospective examination of long-term data collected on spotted owls. Correlations

between local spotted owl declines and barred owl increases have been noted in the northern Washington Cascades (Kuntz and Christopherson 1996, Herter and Hicks 2000, Pearson and Livezey 2003), on the Olympic peninsula (Wiedemeier and Horton 2000; Gremel 2000, 2003), in the southern Oregon Cascades Johnston 2002), and in the coastal redwood zone in California (Schmidt 2003).

Spotted owl occupancy was significantly lower in spotted owl territories where barred owls were detected within 0.8 km (0.5 mi) of the spotted owl territory center than in spotted owl territories where no barred owls were detected (Kelly et al. 2003). Kelly et al. (2003) found spotted owl occupancy to be significantly lower ($P < 0.001$) when barred owls detections occurred within 0.8 km of the spotted owl territory center. Occupancy was "only marginally lower" ($P = 0.06$) if barred owls were located more than 0.8 km from spotted owl territory centers. In a Roseburg, Oregon, study area, 46 percent of spotted owls moved more than 0.8 km, and 39 percent of spotted owls were not relocated in at least two years, after barred owls were detected within 0.8 km of the territory center. Observations provided by Gremel (2000) from the Olympic National Park are consistent with those of Kelly et al. (2003); he documented significant displacement of spotted owls following barred owl detections "coupled with elevational changes of northern spotted owl sites on the east side of the Park" (Courtney et al. 2004). Pearson and Livezey (2003) reported similar findings on the Gifford Pinchot National Forest where unoccupied spotted owl sites were characterized by significantly more barred owl sites within 0.8-km, 1.6-km, and 2.9-km from the territory center than in occupied spotted owl sites.

In two study areas in Washington, investigators found relatively high numbers of territories, previously occupied by spotted owls, that are now apparently not occupied by either spotted or barred owls. Forty-nine of 107 territories in the Cascades (Herter and Hicks 2000), and 23 of 33 territories in the Olympic Experimental State Forest (Wiedemeier and Horton 2000) were no longer occupied by either species. Since the habitat was still present in these vacant territories, some factor or factors may be reducing habitat suitability or local abundance of both species. For example, weather conditions could cause prolonged declines in abundance of both species (Franklin et al. 2000). Because spotted owls have been reported anecdotally to give fewer vocalizations when barred owls are present, it is possible that these supposed vacant territories are still occupied by spotted owls that do not respond to surveys. Likewise, survey protocols for spotted owls are believed to under-detect barred owls (Courtney et al. 2004). Preliminary results from Olson et al. (2005) suggest that barred owl presence had a negative effect on spotted owl detection probabilities. Thus, some proportion of seemingly vacant territories may be an artifact of reduced detection probability. Nonetheless, previously occupied territories apparently vacant of both *Strix* species suggests that factors other than barred owls alone are contributing to declines in spotted owl abundance and territorial occupancy (Courtney et al. 2004).

Two studies (Kelly 2001, Anthony et al. 2004a) attempted to determine whether barred owls affected fecundity of spotted owls in the long-term demographic study areas. Neither study was able to clearly do so, although the Wenatchee and Olympic demographic study areas showed possible effects (Anthony et al. 2004a). However, both studies described the shortfalls of their methods to adequately test for this effect. Iverson (2004) reported no effect of barred owl presence on spotted owl reproduction, but his results could have been influenced by small sample size (Livezey, in review). Barred owls had a negative effect on spotted owl survival on

the Wenatchee and Olympic study areas and possibly an effect on the Cle Elum study area (Anthony et al. 2004a). Olson et al. (in press) found a significant but weak negative effect of barred owl presence on spotted owl reproductive output but not on survival at a Roseburg, Oregon study area (Courtney et al. 2004).

Regarding interactions between barred and spotted owls, the uncertainties associated with methods, analyses, and possible confounding factors, such as the effects of past habitat loss and weather, warrant caution in interpretation of the patterns emerging from the data and information collected to date (Courtney et al. 2004). Further, data are currently lacking that would allow accurate prediction of how barred owls will affect spotted owls in the southern, more xeric, provinces in the California and Oregon Klamath region. In spite of these uncertainties, the preponderance of the evidence gathered thus far is consistent with the hypothesis that barred owls play some role in spotted owl population decline, particularly in Washington, portions of Oregon, and the northern coast of California (Courtney et al. 2004).

Although the barred owl currently constitutes a significantly greater threat to the northern spotted owl than originally thought at the time of listing (Courtney et al. 2004), it is unclear whether forest management influences the outcome of interactions between species (Courtney et al. 2004, summarized by Lint et al. 2005). The most recent summaries compiled on the barred owl (Courtney et al. 2004, Lint et al. 2005, USDI Fish and Wildlife Service 2004) do not provide recommendations on how to deal with this potential threat. In their status review of the northern spotted owl, the Service (U.S. Fish and Wildlife Service 2004) did not consider the increased risk to northern spotted owl populations due to the uncertainties surrounding barred owls and other factors sufficient to reclassify the subspecies as endangered at this time. Because it was not clear if additional protection of northern spotted owl habitat would reverse the population trends in some portions of the species' range, and because the results of their study did not identify the causes of those trends, Anthony et al. (2004) declined to make any recommendations to alter the current NWFP management strategy.

Wildfire

In 1994, the Hatchery Complex wildfires burned 43,480 acres (17,603 ha) in the Wenatchee National Forest, eastern Cascades, Washington, affecting six spotted owl activity centers (Gaines et al. 1997). Spotted owl habitat within a 2.9 km radius of the affected activity centers was reduced by 8 to 45 percent (mean = 31 percent) due to direct effects of the fire and by 10 to 85 percent (mean = 55 percent) due to delayed mortality of fire-damaged trees and insect caused tree mortality. Spotted owl habitat loss was greater on mid to upper slopes (especially south-facing) than within riparian areas or on benches (Gaines et al. 1997). Direct mortality of spotted owls was assumed to have occurred at one site. Data were too sparse for reliable comparisons of site occupancy or reproductive output between sites affected by the fires and other sites on the Wenatchee National Forest.

Two wildfires burned in the Yakama Indian Reservation, eastern Cascades, Washington, in 1994, affecting home ranges of two radio-tagged spotted owls (King et al. 1997). Although the amount of home ranges burned was not quantified, spotted owls were observed using areas that received

low and medium intensity burning. No direct mortality of spotted owls was observed, even though thick smoke covered several spotted owl site centers for a week.

The short-term effects of wildfires on spotted owl demography are an important consideration for resources managers. Bond et al. (2002) examined the demography of spotted owls post wildfire, in which wildfire burned through spotted owl nest and roost sites in varying degrees of severity. Depending on the severity of the burn, wildfires may have relatively little short-term impact on spotted owl demography (i.e., survival, reproduction and site fidelity). In a preliminary study conducted by Anthony et al. (2004) in the Klamath Province of Oregon, their sample of spotted owls appeared to be using a variety of habitat types within the Timbered Rock Fire, including areas that had experienced moderate burning.

At the time of listing there was recognition that catastrophic wildfire posed a threat to the spotted owl (USFWS 1990a). New information suggests fire may be more of a threat than previously thought. In particular, the rate of habitat loss in the relatively dry East Cascades and Klamath provinces has been greater than expected (see "Habitat Trends" below). However, the total amount of habitat affected by wildfires has been relatively small (Lint et al. 2005). We may be able to influence, through silvicultural management, how fire prone forests will burn, and the extent of the fire when the inevitable fire occurs. Such silvicultural efforts are currently being implemented throughout the spotted owl's range, in an attempt to overcome nearly 100 years of effective fire suppression. However, we now recognize that our ability to protect spotted owl habitat and viable populations of spotted owls from these large fires through risk-reduction endeavors is largely uncertain (Courtney et al. 2004). Lint et al. (2005) indicated that the NWFP recognized wildfire as an inherent part of managing spotted owl habitat in certain portions of the range. The repetitive design of the NWFP can help mitigate the risks associated with large-scale fire (Lint et al. 2005).

West Nile Virus (WNV)

WNV has killed millions of wild birds in North America since it arrived in 1999 (McLean et al. 2001, Caffrey 2003, and Marra et al. 2004). Mosquitoes are the primary carriers (vectors) of the virus that causes encephalitis in humans, horses, and birds. Mammalian prey may also play a role in spreading WNV among predators, like spotted owls. Owls and other predators of mice can contract the disease by eating infected prey (Garmendia et al. 2000, Komar et al. 2001). Recent tests of tree squirrels from Los Angeles County, California, found over 70 percent were positive for WNV (R. Carney, pers. comm. 2004, cited in USFWS 2004). One captive spotted owl in Ontario, Canada, contracted WNV and died.

Health officials expect that WNV will eventually spread throughout the area that includes the range of the spotted owl (Courtney et al. 2004), but it is unknown how WNV will ultimately affect spotted owl populations. Susceptibility to infection and mortality rates of infected individuals vary among bird species, and even within groups of species (Courtney et al. 2004). Owls appear to be quite susceptible. Breeding eastern screech owls (*Megascops asio*) in Ohio experienced 100 percent mortality (T. Grubb, pers. comm., cited in Courtney et al. 2004). In contrast, barred owls showed lower susceptibility (B. Hunter, pers. comm., cited in Courtney et al. 2004). Some level of innate resistance may occur (Fitzgerald et al. 2003), which could

explain observations in several species of markedly lower mortality in the second year of exposure to WNV (Caffrey and Peterson 2003). Wild birds also develop resistance to WNV through immune responses (Deubel et al. 2001). The effects of WNV on bird populations at a regional scale have not been large, even for susceptible species (Caffrey and Peterson 2003), perhaps due to the short-term and patchy distribution of mortality (K. McGowan, pers. comm., cited in Courtney et al. 2004) or annual changes in vector abundance and distribution.

Courtney et al. (2004) offer competing propositions for the likely outcome of spotted owl populations being infected by WNV. One proposition is that spotted owls can tolerate severe, short-term population reductions due to WNV, because spotted owl populations are widely distributed and number in the several hundreds to thousands. An alternative proposition is that WNV will cause unsustainable mortality, due to the frequency and/or magnitude of infection, thereby resulting in long-term population declines and extirpation from parts of the spotted owl's current range.

West Nile virus (WNV) has been identified as a potential threat of unknown magnitude to the spotted owl (Courtney et al. 2004), and has the potential to reduce the population numbers beyond the projected decline anticipated under the NWFP (Lint et al. 2005). Thus far, no mortality in wild, northern spotted owls has been recorded. Habitat restoration and recovery for northern spotted owls is anticipated to take decades, due to the long-term regrowth and development of late-successional forest structure. As such, it is too early to evaluate the long-term effectiveness of conservation efforts and regulatory changes in conserving northern spotted owls. However, the WNV threat to the northern spotted owl may not be influenced by habitat management or improvement (USFWS 2004).

Sudden Oak Death

Sudden oak death was recently identified as a potential threat to the spotted owl (Courtney et al. 2004). The fungus-like pathogen *Phytopthora ramorum* that recently invaded from Europe causes this disease, and it is rapidly spreading. At the present time, sudden oak death is found in natural forest stands that include various oak (*Quercus* spp.) species from Monterey County to Humboldt County in California, and has reached epidemic proportions in oak and tanoak (*Lithocarpus densiflorus*) forests along approximately 300 km of that coast (Rizzo et al. 2002). It also occurs near Brookings, Oregon, killing tanoak, and causing dieback of closely associated wild rhododendron (*Rhododendron* spp.) and evergreen huckleberry (*Vaccinium ovatum*) (Goheen et al. 2002). It has been found in several different forest types and at elevations from sea level to over 800 m elevation. It poses a threat of uncertain proportion because of its potential impact on forest dynamics and alteration of key habitat components (i.e., hardwood trees), especially in the southern portion of the spotted owl's range (Courtney et al. 2004). However, the potential for management to address the additive effects of sudden oak death on habitat availability is unknown and substantial uncertainty about its effects mediated against placing too much weight on this factor in the USFWS Five-Year Review Evaluation (USFWS 2004).

Inbreeding Depression, Genetic Isolation, and Reduced Genetic Diversity

The Service did not consider inbreeding and other genetic problems due to small population sizes an imminent threat to the spotted owl at the time of listing. Recent studies show no indication of reduced genetic variation and past bottlenecks in Washington, Oregon, or California (Barrowclough et al. 1999, Haig et al. in press, Henke et al. unpublished). However, in Canada, Harestad (2004) estimated the breeding population to be less than 33 pairs and annual population decline may be as high as 35 percent. Canadian populations may be more adversely affected by issues related to small population size including inbreeding depression, genetic isolation, and reduced genetic diversity (Courtney et al. 2004). Low and persistently declining populations throughout the northern portion of the species range (see "Population Trends" below) may be at increased risk of losing genetic diversity.

Climate Change

Climate change, a potential additional threat to northern spotted owl populations, is not explicitly addressed in the NWFP. Climate change could have direct and indirect impacts on northern spotted owls and their prey. However, the emphasis on maintenance of serial stage complexity and related species diversity in the Matrix under the NWFP should contribute to the resiliency of the federal forest landscape to the impacts of climate change (Courtney et al. 2004).

Based upon a global meta-analysis, Parmesan and Yohe (2003) discussed several potential implications of global climate change to biological systems, including terrestrial flora and fauna. Results indicated that 62 percent of species exhibited trends indicative of advancement of spring conditions. Bird species manifest these trends in earlier nesting activities. Because the spotted owl exhibits a limited tolerance to heat relative to other bird species (Weathers et al. 2001), subtle changes in climate have the potential to affect this species. However, at this time, there is no agreed-upon, objective means to measure that potential.

Conservation Needs of the Northern Spotted Owl

Based on the above assessment of threats, the spotted owl has the following habitat-specific and habitat-independent conservation (i.e., survival and recovery) needs:

Habitat-Specific Needs

- Large blocks of suitable habitat to support clusters or local population centers of spotted owls (e.g., 15 to 20 breeding pairs) throughout the owl's range;

- Suitable habitat conditions and spacing between local spotted owl populations throughout its range to facilitate survival and movement;

- Suitable habitat distributed across a variety of ecological conditions within the spotted owl's range to reduce risk of local or widespread extirpation;

- A coordinated, adaptive management effort to reduce the loss of habitat due to catastrophic wildfire throughout the spotted owl's range, and a monitoring program to clarify whether these risk reduction methods are effective and to determine how owls use habitat treated to reduce fuels; and

- In areas of significant population decline, sustain the full range of survival and recovery options for this species in light of significant uncertainty.

Habitat-Independent Needs

- A coordinated research and adaptive management effort to better understand and manage competitive interactions between spotted and barred owls; and

- Monitoring to better understand the risk that WNV and sudden oak death pose to spotted owls and (for WNV) research into methods that reduce the likelihood or severity of outbreaks in spotted owl populations.

Conservation Strategy

Since 1990, various efforts have addressed the conservation needs of the spotted owl and attempted to formulate conservation strategies based upon these needs, beginning with the ISC's Conservation Strategy (Thomas et al. 1990). Several ensuing efforts continued to use the basic conservation strategy designed by Thomas et al (1990), including:

- The designation of critical habitat (USFWS 1992b),

- The preparation of a Draft Recovery Plan (USFWS 1992a),

- The Scientific Analysis Team report (Thomas et al. 1993),

- The report of the Forest Ecosystem Management Assessment Team (Thomas and Raphael 1993); and

- The Northwest Forest Plan (USDA/USDI 1994a).

Each conservation strategy was based upon the reserve design principles first articulated in the ISC's report, which are summarized as follows.

- Species well distributed across their range are less prone to extinction than species confined to small portions of their range.

- Large blocks of habitat, containing multiple pairs of the species, are superior to small blocks of habitat with only one to a few pairs.

- Blocks of habitat that are close together are better than blocks far apart.

- Habitat that occurs in contiguous blocks is better than habitat that is more fragmented.

- Habitat between blocks is more effective as dispersal habitat if it resembles suitable habitat.

Federal Contribution to Recovery

The NWFP is the current conservation strategy for the spotted owl on federal lands. It is designed around the conservation needs of the spotted owl and based upon the designation of a variety of land-use allocations whose objectives are either to provide for population clusters (i.e., demographic support) or to maintain connectivity between population clusters. Several land-use allocations, including Late-Successional Reserves (LSRs), Managed Late-Successional Areas (MSLAs), Congressionally Reserved Areas (CRAs), Managed Pair Areas, and Reserve Pair Areas, are intended to contribute primarily to supporting population clusters. The remaining land-use allocations, including Matrix, Adaptive Management Areas (AMAs), Riparian Reserves (RRs), Connectivity Blocks, and Administratively Withdrawn Areas (AWAs), provide connectivity among habitat blocks intended for demographic support.

The range-wide system of LSRs set up under the NWFP captures the variety of ecological conditions within the 12 different provinces to which spotted owls are adapted. This design reduces the potential for extinction resulting from large catastrophic events in one or more provinces. Multiple, large LSRs in each province reduce the potential that spotted owls will be extirpated in any individual province and reduce the potential that large wildfires or other large-scale events will eliminate all habitat within an LSR. In addition, LSRs are generally arranged and spaced to ensure a reasonable likelihood that spotted owls disperse among two or more adjacent LSRs. This network of reserves reduces the likelihood that catastrophic events will substantially reduce habitat connectivity and population dynamics among provinces.

Although FEMAT scientists predicted that spotted owl populations would decline in the Matrix over time, they expected populations to stabilize and eventually increase within LSRs as habitat conditions improved over the next 50 to 100 years (Thomas and Raphael 1993, USDA/USDI 1994a and 1994b). Based on the results of the first decade of monitoring, the NWFP's authors cannot determine if the declining population trend will be reversed because not enough time has passed to provide the necessary measure of certainty (Lint et al. 2005). However, the results from the first decade of monitoring do not provide any reason to depart from the objective of habitat maintenance and restoration as described under the NWFP (Lint et al. 2005). Other stressors, some already in action (e.g., barred owl), and some yet unrealized (West Nile virus), complicate the conservation of the spotted owl. Currently, the new reports generated on the science of the spotted owl offer few management recommendations to address the emerging threats facing the owl. The redundancy and flexibility of the system of NWFP land use allocations may prove to be the most appropriate strategy in responding to these unexpected challenges (Courtney et al. 2004).

Under the NWFP, the agencies anticipated a decline of northern spotted owl populations during the first decade of implementation. Recent reports (Courtney et al. 2004, Anthony et al. 2004a) identified greater than expected northern spotted owl declines in Washington and northern

portions of Oregon, and more stationary populations in southern Oregon and northern California. The reports found no direct correlation between habitat conditions and changes in northern spotted owls at the metapopulation scale. In addition, no evidence currently exists to suggest that dispersal habitat is currently limiting (Courtney et al. 2004, Lint et al. 2005). Even with the population decline, Courtney et al (2004) noted that there is little reason to doubt the effectiveness of the core of the NWFP conservation strategy.

According to the Service (U.S. Fish and Wildlife Service 2004), the current scientific information, including information showing northern spotted owl population declines, indicates that the spotted owl continues to meet the definition of a threatened species. That is, populations are still relatively numerous over most of its historic range, which suggests that the threat of extinction is not imminent, and that the subspecies is not endangered even in the northern part of its range where greater than expected population declines were documented.

Conservation Efforts on Non-Federal Lands

FEMAT noted that limited Federal ownership in some areas constrained the ability to form an extensive reserve network to meet conservation needs of the spotted owl. Thus, non-federal lands were an important contribution to the range-wide goal of achieving conservation and recovery of the spotted owl. The Service's primary expectations for private lands are their contributions to demographic support (pair or cluster protection) to and/or their connectivity with Federal lands. In addition, forest practice rules in effect in each state govern timber harvest, and provide protection of spotted owls and/or their habitat to varying degrees.

Washington: In 1993, the State Forest Practices Board adopted rules (Forest Practices Board 1996) that would "contribute to conserving the spotted owl and its habitat on non-Federal lands" based on recommendations from a Science Advisory Group which identified important non-Federal lands and recommended roles for those lands in spotted owl conservation (Hanson et al. 1993, Buchanan et al. 1994). Spotted owl-related Habitat Conservation Plans (HCPs) in Washington generally provide both demographic and connectivity support as recommended in these reports and the draft recovery plan (USFWS 1992a).

Oregon: The Oregon Forest Practices Act provides for protection of 70-acre core areas around known spotted owl nest sites, but it does not provide for protection of spotted owl habitat beyond these areas (ODF 2000). In general, no large-scale strategy or mechanism for spotted owl habitat protection currently exists for non-federal lands in Oregon. The four spotted owl-related HCPs currently in effect in Oregon address relatively few acres of land; however, they will provide some nesting habitat and connectivity over the next few decades.

California: In 1990, the State amended the State Forest Practice Rules (FPRs), which govern timber harvest on non-federal lands, to require surveys for spotted owls in suitable habitat and to provide protection around activity centers (CDF 2001). Under the FPRs, no timber harvest plan (THP) can be approved if it is likely to result in incidental take of Federally listed species, unless authorized by a federal HCP. The California Department of Fish and Game initially reviewed all THPs to ensure that take was not likely to occur; the Service took over that review function in 2000. Several large industrial owners operate under Spotted Owl Management Plans that have

been reviewed by the Service; the plans specify basic measures for spotted owl protection. The Service has approved three HCPs that authorize take of spotted owls. Implementation of these plans will provide for spotted owl demographic and connectivity support to NWFP lands.

Current Condition of the Spotted Owl

The current condition of the species incorporates the effects of all past human and natural activities or events that have led to the present-day status of the species and its habitat (USFWS and NMFS 1998).

Range-wide Habitat and Population Trends

Habitat Trends

The Service has used information provided by the Forest Service, Bureau of Land Management, and National Park Service to update the habitat baseline conditions on Federal lands for spotted owls on several occasions since the listing of the spotted owl in 1990. The estimated 7.4 million acres used for the NWFP in 1994 (USDA/USDI 1994a) was believed to be representative of the general amount of spotted owl habitat on these lands. This baseline was used to track relative changes over time in the subsequent analyses. The plan's effectiveness monitoring program resulted in the production, in 2005, of a new map depicting suitable spotted owl habitat throughout the species' range (Lint et al. 2005). However, this new habitat map is not yet available for use in tracking individual actions. Therefore, the following analyses indicate changes to the baseline condition established in 1994. The Service is beginning a process to evaluate the map for future use of tracking habitat trends.

Currently, there are no reliable estimates of spotted owl habitat on other land ownerships. Consequently, consulted-on acres can be tracked but not evaluated in the context of change with respect to a reference condition on non-federal lands. However, the production of the monitoring program habitat map provides an opportunity to evaluate trends in non-federal habitat.

Range-wide Analysis 1994 – 2001

In 2001, the Service assessed habitat baseline conditions (USFWS 2001), the first assessment since implementation of the NWFP in 1994. This range-wide evaluation of habitat was necessary to determine if the rate of potential change to spotted owl habitat was consistent with the change anticipated in the NWFP. In particular, the Service considered habitat effects documented through section 7 consultations since 1994. In general, the analytical framework of these consultations focused on the reserve or connectivity goals established by the NWFP land-use allocations (USDA/USDI 1994a). The Service expressed these effects in terms of changes in acreage of suitable spotted owl habitat within those land-use allocations. The Service determined that actions and their effects were consistent with the expectations for implementation of the NWFP from 1994 through June 2001 (USFWS 2001).

Range-wide Analysis 1994 – 2004 (first decade of the NWFP)

This section updates the information considered in USFWS (2001), relying particularly on information in documents the Service produced pursuant to section 7 of the Act and information provided by NWFP agencies on habitat loss resulting from natural events (e.g., fires, windthrow, insect and disease).

In 1994, about 7.4 million acres of suitable habitat were estimated to exist on federal lands. As of April 12, 2004, the Service had consulted on the proposed removal of 575,447 acres of spotted owl habitat range-wide, of which 190,429 acres occurred on federal lands managed under the NWFP. Federal lands were expected to experience an approximate 2.6 percent decline in suitable habitat due to all management activities (not just timber harvest) over the past decade, with about 167,134 acres[1] (approximately 2.3 percent) removed by timber harvest. These anticipated changes in suitable spotted owl habitat were consistent with the expectations for implementation of the NWFP.

Most management-related habitat loss on federal lands, considered range-wide, was concentrated in the Oregon physiographic provinces. In particular, the percentage of habitat to be removed from the Oregon Klamath Mountains province was relatively high (approximately 11 percent) in comparison to other provinces, most of which were characterized by less than a 4 percent decrease in habitat. Habitat removed from the Oregon Klamath Mountains province and the two Oregon Cascades provinces made up 44 percent and 36 percent, respectively, of the habitat loss range-wide since 1994. In summary, habitat loss in Washington accounted for 9.06 percent of the range-wide loss, but it only resulted in a loss of 0.73 percent of available habitat on Federal lands in Washington. In Oregon, habitat loss accounted for 82.37 percent of the range-wide losses, but only 4.13 percent of available habitat on Federal lands in Oregon. Loss of habitat on federal lands in California accounted for 8.57 percent of the losses range-wide, but only 1.34 percent of habitat on federal lands in California.

Since 1994, habitat lost due to natural events was estimated at approximately 168,301 acres range-wide. About two-thirds of this loss was attributed to the Biscuit Fire that burned over 500,000 acres in southwest Oregon (Rogue River basin) and northern California in 2002. This fire resulted in a loss of approximately 113,451 acres of spotted owl habitat, including habitat within five LSRs.

Little information is available regarding spotted owl habitat trends on non-federal lands. Internal Service consultations conducted since 1992 have documented the eventual loss of 407,849[2] acres of habitat on non-federal lands. Most of these losses have yet to occur because they are part of large-scale, long-term HCPs.

Subsequent to the analysis for the first decade (1994–2004) of the NWFP, the Forest Service and Bureau of Land Management reported revised estimates of fire impacts. They also reported that not all effects anticipated during section 7 consultations actually occurred on the landscape, since

[1] Data compiled by the U.S. Fish and Wildlife Service, Northern Spotted Owl Coordination Group.

[2] Data compiled by the U.S. Fish and Wildlife Service, Northern Spotted Owl Coordination Group.

the action agencies have not implemented some projects. Together these reports reduce the anticipated habitat loss during that decade. Therefore, the analysis above represents a reasonable, worst-case assessment. In addition, at the time of this assessment, we had no empirical information on increases in spotted owl habitat on any ownership resulting from suitable habitat that had developed through forest succession and in-growth. The 2005 NWFP monitoring program's recently released reports suggests that approximately 515,000 to over 1 million acres of younger forests may have transitioned into late-successional forest condition, range-wide, since 1994.

Range-wide Analysis from 2004 (first decade) to the Present

This section updates the information considered in the first range-wide, decadal (1994-2004) analysis of the NWFP to the present writing of this BO. In 1994, about 7.4 million acres of suitable habitat were estimated to exist on Federal lands. As of April 2004, the Service had consulted on the removal of 575,447 acres of spotted owl habitat range-wide, of which 190,429 acres occurred on Federal lands managed under the NWFP. From April 12, 2004, to the present, the Service has consulted on the removal or downgrading of 15,455 acres of spotted owl habitat range-wide on Federal lands managed under the NWFP (190,429 acres consulted on for removal through April 12, 2004, subtracted from 205,884 acres consulted on for removal through July 19, 2005). This amount of habitat loss (0.21 percent) is consistent with the expectations for timber management under the NWFP for the second decade of implementation, using the 2004 baseline of 7,038,368 acres of suitable habitat (1994 baseline with all suitable habitat losses subtracted out).

Currently, an estimated 4,876,646 acres of spotted owl habitat in Reserves receive protection under the NWFP.

Spotted Owl Numbers, Distribution, and Reproduction Trends

There are no estimates of the historical population size and distribution of the spotted owl within preferred habitat, although spotted owls are believed to have inhabited most old-growth forests throughout the Pacific Northwest prior to modern settlement (mid-1800s), including northwestern California (USFWS 1989). According to the final rule listing the spotted owl as threatened (USFWS 1990a), approximately 90 percent of the roughly 2,000 known spotted owl breeding pairs were located on federally managed lands, 1.4 percent were located on State lands, and 6.2 percent were located on private lands. The percent of spotted owls located on private lands in northern California was slightly higher (Forsman et al. 1984, USFWS 1989, Thomas et al. 1990).

Gutiérrez (1994), using data from 1986-1992, tallied 3,753 known pairs and 980 singles throughout the range of the spotted owl. At the time the NWFP was initiated (July 1, 1994), BLM estimated 5,431 known locations or site centers of spotted owl pairs or resident singles: 851 sites (16 percent) occurred in Washington, 2,893 (53 percent) occurred in Oregon, and 1,687 (31 percent) occurred in California (BLM 1995). Because some areas were unsurveyed (USFWS 1992a, Thomas et al. 1993), and many remain so, the actual population of spotted owls across the range was believed to be larger than either count.

Because current survey coverage and effort are insufficient to produce reliable population-size estimates, researchers use other indices, such as demographic data, to evaluate trends in spotted owl populations. Analysis of demographic data can provide an estimate of the rate and direction of population growth, identified by the parameter lambda (λ). A λ of 1.0 indicates a stationary population that is neither increasing nor decreasing, a λ less than 1.0 indicates a declining population, and a λ greater than 1.0 indicates a growing population.

In January 2004, at the spotted owl demographic meta-analysis workshop, two meta-analyses were conducted on the rate of population change using the re-parameterized Jolly-Seber method (λ_{RJS}). One meta-analysis applied to all 13 study areas, and a second meta-analysis applied to the eight study areas included in the Effectiveness Monitoring Program of the NWFP (Anthony et al. 2004a). Data were analyzed separately for individual study areas, as well as simultaneously across all study areas (true meta-analysis).

Estimates of λ_{RJS} ranged from 0.896-1.005 for the 13 study areas, and all but one (Tyee) of the estimates were <1.0, suggesting population declines for most areas (Anthony et al. 2004a) (Figure 1). There was strong evidence that populations on the Wenatchee, Cle Elum, Warm Springs, and Simpson study areas declined during the study, and there also was evidence that populations on the Rainer, Olympic, Oregon Coast Range, and HJ Andrews study areas were decreasing (Figure 1). Precision of the λ_{RJS} estimates for the Rainier and Olympic study areas were poor and not sufficient to detect a difference from 1.00. The estimate of λ_{RJS} for the Rainier study area (0.896) was the lowest of all of the areas. Populations on the Tyee, Klamath, South Oregon Cascades, Northwest California, and Hoopa study areas appeared to be stationary during the study, but there was some evidence that the South Oregon Cascades, Northwest California, and Hoopa study areas were declining (λ_{RJS} <1.00).

The weighted mean λ_{RJS} for all of the study areas was 0.963 (SE = 0.009, 95 percent CI = 0.945-0.981), suggesting that populations over all study areas collectively were declining by about 3.7 percent per year from 1985-2003. The mean λ_{RJS} for the eight demographic monitoring areas on Federal lands was 0.976 (SE = 0.007, 95 percent CI = 0.962-0.990), and the mean for non-Federal lands was 0.942 (SE = 0.016, 95 percent CI = 0.910-0.974), an average decline of 2.4 versus 5.8 percent per year, respectively. This suggests that spotted owl populations on Federal lands were declining but at a lower rate than elsewhere. However, interspersion of non-federal and federal land ownership on the study areas confounds this analysis.

The number of populations that have declined and the rate at which they have declined are noteworthy, particularly the precipitous declines on the four Washington study areas (Wenatchee, Cle Elum, Rainier, and Olympic). In these study areas, the population decline is estimated at 30-50 percent over 10 years. A similar decline is estimated for the Warm Springs study area in Oregon (Anthony et al. 2004a). Declines in adult survival rates may be an important factor contributing to declining population trends. Survival rates declined over time on five of the 14 study areas: four study areas in Washington, which showed the sharpest declines, and one study area in the Klamath province of northwest California (Anthony et al. 2004a). In Oregon, apparent survival for four of six study areas showed no time trends, and the remaining two study areas had weak non-linear trends. In California, two study areas showed no

trend, one showed a slight decline, and one showed a significant linear decline (Anthony et al. 2004a). Like the trends in annual rate of population change, trends in adult survival rate showed clear declines in some areas, but not in others.

A small population of spotted owls occurs in British Columbia. This relatively isolated population apparently is declining sharply. Large areas of apparently suitable habitat are currently unoccupied (Courtney et al. 2004). Breeding populations have been estimated at fewer than 33 pairs. The species may be declining as much as 35 percent per year (Harestad et al. 2004). The amount of interaction between spotted owls in Canada and the U.S. is unknown (Courtney et al. 2004). The Canadian population has reached the point where it is now vulnerable to stochastic demographic events that could cause further declines and perhaps extirpation; conditions are not likely to improve in the short term (Courtney et al. 2004).

Status in the Project Vicinity

Information for northern spotted owl territories in Mendocino County was obtained by Caltrans from the most current version of the California Department of Fish and Game (CDFG) database. This database is maintained by CDFG and tracks all known northern spotted owl territories throughout the state of California. Currently, the CDFG northern spotted owl database lists 556 territories in Mendocino County.

Crude density (i.e., the number of owls per square kilometer) has been calculated for several forest lands in northwestern California. The current density of northern spotted owls on Mendocino Redwoods Company lands is 0.272 owls/km^2. This density appears to be one of the greater densities throughout forest lands in northern California. The Biological Opinion for Pacific Lumber Company cites a density of 0.325 owls/km^2 (USFWS 1999c), the greatest known density reported for northern California. Lower densities were found in the Willow Creek study area in Humboldt County, 0.235 owls/km^2 (Franklin et al. 1990); Green Diamond lands in northern California, 0.209 owls/km^2 (Diller and Thome 1999); and Redwood National Park, 0.163 owls/km^2 (Tanner 1999).

Research in California indicates that several northern spotted owl study populations may be stable or slightly declining (Franklin et al. 1996, Franklin et al. 2002). A minimum population estimate for northern spotted owls in California during the late 1980s and early 1990s was 1,111 pairs (Gutierrez et al. 1995). Although populations may be stable in northern California, northern spotted owl populations are declining across a large portion of their range due to destruction and fragmentation of old-growth habitat (Noon and McKelvey 1996). Fragmentation of old-growth and other late-successional forest habitat has isolated populations and reduced prey availability in areas of the northern spotted owls' range other than northern California (Thomas et al. 1990).

ENVIRONMENTAL BASELINE (in the Action Area):

Regulations implementing the Act (50 CFR §402.02) define the environmental baseline as the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have

already undergone formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation process.

Distribution of Northern Spotted Owls in the Action Area

Field Surveys

Potential northern spotted owl habitat was mapped by Caltrans within the Oil Well Hill area according to California Board of Forestry guidelines (Caltrans 1997). Several vegetation communities in the project area were found to be generally consistent with spotted owl habitat characteristics. Initial preparation of the habitat map was conducted using information from the vegetation assessment.

Caltrans' surveys for northern spotted owls followed guidelines endorsed by the Service. Surveys for northern spotted owls occurred from April through August 1991; additional surveys were conducted in 1992 and 1993. Surveys were conducted in areas that provide functional nesting, roosting, and foraging habitat for spotted owls. The surveys were conducted to determine spotted owl presence and nesting status in the project area. The quality and amount of suitable habitat within an occupied spotted owl territory were described in order to assess the effects of altering spotted owl habitat in the project area. The amount of functional nesting, roasting, foraging, and dispersal habitat was measured within the proposed project corridor to determine the ability of these areas to support spotted owls (Caltrans 1997). After spotted owls were detected during night surveys in 1991, intensive day surveys were conducted to locate nest sites or activity centers. Once located, spotted owls were moused to locate nests (Caltrans 1997).

Caltrans biologists conducted informal, non-protocol, site-specific surveys for northern spotted owls in 1998, in habitat known to support spotted owls. These surveys were conducted in order to locate spotted owls detected in the 1991, 1992, and, 1993 surveys (Caltrans 2000). Following this informal survey, protocol-level surveys for northern spotted owls were initiated again, in 1999, in order to assess the status and presence of spotted owls in the project area. These surveys followed the two-year method as described in the 1992 California State Board of Forestry guidelines.

In addition to these survey results, Caltrans also utilized the Natural Environment Study (NES) (Caltrans 1997), local CDF/CDFG Timber Harvest Plans, the California Natural Diversity Database (CNDDB 2003, CNDDB 2005), and discussions with CDFG biologists to update and assess presence of northern spotted owls in the project area.

Current Condition in the Action Area

Northern spotted owls were not found within the Modified J1T project corridor, nor within the footprint of the designated borrow site at Oil Well Hill during the most recent (i.e., 1999) surveys. However, spotted owls were found historically near the project corridor and at Oil Well Hill, west of the existing U.S. Highway 101. Suitable nesting/roosting/foraging habitat does not occur within the Modified JIT corridor; the area is not capable of supporting such habitat.

However, suitable spotted owl foraging and dispersal habitat exists at the Oil Well Hill designated borrow site (Figure 3-2, Appendix I, of the BA).

Suitable northern spotted owl nesting and foraging habitat occurs in the densely forested areas around the western and northwestern perimeter of Little Lake Valley, consisting of mixed north-slope forest, Douglas-fir forest, mixed conifer forest, mixed evergreen forest, and some of the black oak and Garry oak woodland. Large stands occur at the extreme northern end of the valley, north of Outlet Creek, and west of U.S. Highway 101, just southwest of the Louisiana-Pacific mill along the west side of U.S. Highway 101 (Figure 3-2, Appendix I of the BA).

Protocol-level surveys within potential northern spotted owl habitat in the project area resulted in finding two pairs of spotted owls in 1991 and 1992 (Figure 5-4, Appendix I of the BA). Both pairs were located outside of the Modified J1T corridor and outside the proposed Oil Well Hill borrow site. One pair (pair 1) was located west of U.S. Highway 101 in the Wild Oat Canyon drainage, and the second pair (pair 2) was observed just west of U.S. Highway 101 and north of Outlet Creek (Figure 5-4, Appendix I of the BA).

Pair 1 was a breeding pair observed in 1991 and 1992. In 1991, the pair produced one young at a nest within a mature forest grove covering several hectares along an unnamed drainage. The land surrounding the nesting area (or activity center) consisted of dense mixed-conifer forest on all sides. The nest site was within 0.8 km (0.5-mile) of a rural residential area along Highway 101 north of Willits. In late 1991 all but approximately 5.7 hectares (14.1 acres) (designated as a protected area) of this nesting grove was selectively harvested. All large conifers were removed, except those within the 5.7 hectares (14.1 acres) protected area. In 1992, this pair nested in an old stick nest just north of the remnant nesting grove and produced two young. No adults were found during a one-day survey conducted on April 8, 1993. A two-year protocol-level survey conducted in 1999 and 2000 found no evidence of spotted owls nesting at this site. The nesting grove is located outside of the project corridor and designated borrow site at Oil Well Hill, approximately 2.3 km (1.4 miles) southwest of Oil Well Hill.

Pair 2 was located in the area of Outlet Creek, west of Highway 101 and north of Outlet Creek. This pair did not breed in 1991 but did breed in 1992. In 1992, this pair nested within a small unnamed drainage between Highway 101 and Outlet Creek Road, approximately 150 meters (500 feet) west of Oil Well Hill, and produced two young. Based on results of the one-day survey conducted on April 8, 1993, this pair did not breed in 1993. Most of the area is dense, second growth mixed-conifer forest with small pockets of older forest. The nesting grove is outside of the project corridor, but is near the designated borrow site at Oil Wel Hill. A two-year protocol-level survey conducted in 1999 and 2000 found no evidence of nesting activity at this nest site.

The area immediately north of Little Lake Valley, including the proposed borrow site, is the southernmost area in the Coast Range with continuous spotted owl dispersal habitat that connects the coastal spotted owl populations with more interior coastal range spotted owl populations east and south of Willits. South of this area, connections between coastal and more interior populations are fragmented by river valleys, drier forest types, agriculture, and developed areas less conducive to dispersal by spotted owls.

Critical Habitat

No designated critical habitat for northern spotted owl occurs within or near the Modified J1T alignment or the designated borrow site at Oil Well Hill. Therefore, no critical habitat will be affected by this proposed action.

EFFECTS OF THE ACTION

Scientific Basis for Evaluating Potential Effects

This section describes the scientific basis for analyzing the potential direct and indirect effects of human actions, including their interrelated and interdependent actions, on the northern spotted owl. While the implementation of most proposed actions, including the proposed Willits Bypass Project, would not result in all of the potential effects described herein, this discussion provides a general framework and understanding under which the proposed action considered in this biological opinion may be objectively analyzed.

Potential Effects of Habitat Modification

Site-Specific Effects

Forest and fire management practices have the potential to reduce the quantity and quality of spotted owl nest and roost sites. Spotted owls depend upon existing forest structures, such as cavities and broken treetops, for nest sites. Silvicultural prescriptions, timber harvest activities, and fire management activities which result in the removal of the oldest, most decadent trees or require removal of hazard trees and snags may remove potential spotted owl nest sites (Blakesley et al. 1992). Further, prescriptions designed to reduce ladder fuels or release the growth of co-dominant trees often simplify vertical structure in the understory, where spotted owls perch for hunting or roosting (Forsman et al. 1984).

Timber harvest and fire management activities can contribute to changes in habitat microclimate by reducing overall canopy closure within nesting and roosting habitat. A reduction in canopy closure often results in reduced protection from environmental factors, such as rain, wind, snow, and temperature. Laboratory and field studies have determined that spotted owls are less heat tolerant than many other bird species. Physiological limitations corroborate these observations (Weathers et al. 2001).

Removing trees, snags, and downed wood can affect prey composition and/or availability by altering characteristics of the habitat upon which prey species depend. Because the amount of snags and down material on the forest floor is positively correlated with densities of some prey species, a reduction in the abundance of these components may contribute to localized, short-term declines in prey (Williams et al. 1992). Reductions in populations of these prey species could lower spotted owl recruitment.

Landscape-Level Effects

Site-specific effects could change the function which forested stands provide for northern spotted owls. For the purposes of the following discussion, changes in habitat function resulting from cutting of trees and other vegetation are categorized as removal, downgrade, or degrade. Removal represents a complete loss of habitat function following an action. For example, an area functioned as nesting/roosting habitat; after habitat modification, the area does not provide any habitat function. Downgrade is a subset of the term removal and refers to a loss of habitat function and change from one habitat function to another. For example, if an area functioned as nesting/roosting habitat before habitat modification, but is capable of providing only foraging habitat post-project, this would be classified as downgrade. This term could also be used to signify a change in function from foraging to dispersal as well. Degrade, to be distinguished from downgrade, indicates a reduction in habitat quality, but not habitat function. For example, an area that functioned as foraging habitat prior to an action still provides foraging habitat after the effect, but prey abundance may be reduced due to a reduction in some structural components or vegetation.

Removal or downgrading of habitat within home ranges, especially when located close to the nest site, can reasonably be expected to negatively affect northern spotted owls. A reduction in northern spotted owl productivity and survivorship occurs as the amount of suitable habitat within a spotted owl home range declines (Bart 1995). In northwestern California, survivorship of adult spotted owls was greater where greater amounts of older forest were present around the activity center, but reproductive success increased where the amount of edge between older and younger forest was relatively high (Franklin et al. 2000).

Research indicates that spotted owls in northern California focus their activities in heavily-used "core areas" that range in size from about 167 to 454 acres, with a mean of about 409 acres (Bingham and Noon 1997). These core areas, which included 60 to 70 percent of the spotted owl telemetry locations during the breeding season, typically comprised only about 20 percent of the home range area. Therefore, habitat removal within core areas could have disproportionate effects on spotted owls. Spotted owl abundance and productivity significantly decrease when the proportion of suitable habitat within 0.7 mile of an activity center falls below 500 acres, which represents 50 percent of the total 1,000 acres within 0.7 mile (O'Halloran 1989; Simon-Jackson 1989; Thomas et al. 1990). For the purpose of consultation, the Service identifies the following guidelines for the amount of suitable habitat needed to maintain essential behaviors, such as breeding, within the home range area: 500 acres within 0.7 mile of the activity center and 1,336 acres within 1.3 mile of the activity center.

Potential Effects of Noise Disturbance

Some activities, such as timber harvesting, road construction and decommissioning, landslide rehabilitation, trail maintenance, and fire management, use motorized equipment (e.g., helicopters, heavy equipment, or chainsaws) that introduces high levels of noise into the environment. This elevated noise level may have adverse effects on wildlife species by interfering with essential behaviors. The effects of noise on birds are difficult to determine (Knight and Skagen 1988) and quantify. Confounding factors include the tolerance level of individual birds, type and frequency of human activity, ambient sound levels, how sound reacts

with topography and vegetation, and differences in how species perceive noise. Regardless of these difficulties, research conducted on a variety of bird species suggests that disturbance can have a negative impact on their reproductive success (Tremblay and Ellison 1979; Belanger and Bedard 1989; Piatt et al. 1990; Henson and Grant 1991). Disturbance can affect productivity in a number of ways, including interference of courtship (Bednarz and Hayden 1988), nest abandonment (White and Thurow 1985), egg and hatchling mortality, exposure and predation (Drent 1972; Swensen 1979), and altered parental care (Fyfe and Olendorff 1976; Bortolotti et al. 1984).

The few studies which examined responses of northern and Mexican spotted owls to several disturbance sources, such as helicopters, small chainsaws, and hikers, indicate that noise can disrupt spotted owl behaviors, such as flushing from roosts and prey delivery rates (Delaney et al. 1999; Delaney and Grubb 2001; Swarthout and Steidl 2001). However, spotted owl sensitivity varies with stimulus distance, location (i.e., aerial or ground), type, and timing, as well as individual tolerance (Delaney et al. 1999; Delaney and Grubb 2001; Swarthout and Steidl 2001).

Potential Effects of Injury or Mortality

In extreme cases, forest or fire management activities could result in direct injury or mortality of adults, eggs, or young. The potential for northern spotted owls to be struck and killed or injured by falling trees during harvesting or exposed to high levels of smoke during prescribed burning is confined to the area relatively close to the nest tree. Individual adult spotted owls reasonably can be expected to move from the area of disturbance and avoid injury or death. However, adult spotted owls which are incubating eggs or brooding young may be reluctant to leave the area (Delaney et al. 1999) and be vulnerable to injury or death. Young spotted owls are poor fliers immediately after leaving the nest; they develop their flight skills during their first months after leaving the nest. Thus, they are most vulnerable to being struck by falling trees during this time. Young are also susceptible to smoke inhalation. They may disperse prematurely in response to disturbance such as tree falling or smoke, thus increasing the likelihood of predation or starvation outside of the nest grove. Adults may abandon eggs in response to tree felling near the nest (Drent 1972; Swensen 1979; White and Thurow 1985). Forest management that includes falling trees may crack or destroy eggs.

Effects of the Proposed Action

The proposed project corridor and road alignment will avoid direct and indirect impacts to northern spotted owl nesting and foraging habitat, because it is greater than 0.8 km (0.5 mile) from known nesting activity centers, and would not remove any suitable habitat. Because much of the alignment through Little Lake Valley will require fill material upon which to build the road bed, very little excavation will occur in the proposed road prism. However, a substantial amount of fill material is needed to build the roadbed, and a borrow site will be needed. Oil Well Hill, located alongside Highway 101 approximately 3 miles north of the proposed road alignment, is the designated borrow site. Excavation of fill material there will require the removal of existing forest vegetation.

Potential effects of this proposed action to spotted owls within the action area include loss of suitable nesting, roosting and foraging habitat, and temporary noise and visual disturbance within potentially occupied habitat during construction. Minimization measures identified earlier in this biological opinion will reduce but will not eliminate adverse effects. The potential effects to the spotted owl from the proposed action, and reductions in the effects as a result of implementing the proposed minimization measures, are discussed below.

Caltrans anticipates the removal of a maximum of 40 acres (16 ha) of nesting, roosting, foraging and dispersal habitat, and disturbance resulting from potential differences in noise patterns during the excavation activities. In addition, existing traffic noise dynamics resulting from extensive landscape modification on the east side of the highway could change. These impacts to spotted owls are discussed in detail in the following sections. Because of the historic presence of northern spotted owl nesting within approximately 152 meters (500 feet) of the proposed Oil Well Hill borrow site, and the removal of approximately 40 acres (16 ha) of nesting, roosting, foraging and dispersal habitat at the proposed borrow site, the proposed project may adversely affect northern spotted owl.

Effects Due to Habitat Removal and Degradation

Excavation of fill material within the borrow site will require a substantial removal of native forest vegetation. The area has been subject to previous logging activities, but mature and old-growth trees are found within the forest matrix in the excavation area. The removal of this forest habitat will result in the loss of nesting, roosting, and foraging habitat for the spotted owl, as well as some dispersal habitat.

Provincial Home Range

The provincial home range of a spotted owl in the vicinity of the action area is approximated by a circle of radius 1.3 mi. (2.1 km). This circle encompasses the median area of a spotted owl home range within the California Coast Range province, as estimated through research, of approximately 3,340 ac.(1,352 ha). Provincial home ranges apply to nesting or territorial pairs as well as individual spotted owls that demonstrate multi-year occupancy of suitable nesting habitat. The center of the provincial home range is identified by a known nest tree, location of fledglings, or other sign of spotted owl occupancy of a given area.

Project effects to suitable habitat are based on the types of activities and their location within identified provincial home ranges. The threshold for harm to the spotted owl is defined as the reduction of available suitable habitat to less than 1,336 acres (40 percent of the area) within a provincial home range as a result of the current action combined with effects of previous actions. The home range is further defined by a more critical area of about 1,000 ac. (405 ha), approximated by a 0.7 mi. (1.1 km) radius circle from the spotted owl activity center. The threshold within this critical area is the reduction below 50 percent (500 acres) of suitable habitat as a result of the current action combined with previous actions in the area. Any suitable nesting/roosting habitat removal within the closest 70 ac. (2.8 ha) area to the activity center constitutes harm to spotted owls. This 70-acre core area can be approximated by a circle of

radius 985 ft. (0.186 mi., 0.304 km), or may be described as a specific polygon of habitat in a site-specific analysis.

Existing potentially suitable nesting/roosting/foraging habitat was mapped in 2005 within a 1.3-mile radius of the Oil Well Hill borrow site by Caltrans wildlife biologist Peter Lewendal (Appendix F of the BA). This study involved assembling a base map consisting of portions of the USGS 7.5 minute Longvale, Burbeck, Willis Ridge and Willits quadrangles. Aerial photographs were not available, so Caltrans had the area flown to created stereo-pair photographs of the site in 2005. The aerial photos were reviewed in April 2005 to assess spotted owl nesting/roosting, foraging and unsuitable habitats. The area was ground-truthed on April 25 and 26, 2005.

Caltrans' analysis determined that within the 1.3-mile radius polygon of this borrow site (encompassing approximately 4839.1 acres), approximately 3070.3 acres consist of suitable foraging habitat, and 99.2 acres consist of suitable nesting/roosting habitat, encompassing an area of approximately 3169.5 acres of suitable habitat, or approximately 65.5 percent of the 1.3-mile radius polygon.

Approximately 32.4 acres of the Oil Well Hill borrow site consists of suitable nesting, roosting, and foraging habitat. Hence, if the entire Oil Well Hill borrow-site is excavated, Caltrans estimated that approximately 3,137.1 acres (approximately 64.9 percent) of suitable foraging and nesting/roosting habitat would remain within the 1.3-mile radius of the Oil Well Hill borrow site (Habitat Analysis Report, Appendix F of the BA).

In a separate analysis using a slightly different classification of habitat, the Service estimated that approximately 4,802.9 acres occurs within 1.3 miles of the footprint of the borrow site, of which 2,435.5 acres (50.7 percent) currently support suitable nesting, roosting and foraging habitat. For the owl site on Oil Well Hill that would be directly affected by the removal of suitable habitat, approximately 1828.6 acres (53.9 percent) of suitable nesting, roosting, and foraging habitat currently exists within the provincial home range of the known site on Oil Well Hill.

Following the removal of a maximum of 32.4 acres of suitable habitat, the 1.3 mile buffer area around the borrow site would retain at least 2,403.1 acres of suitable, or 50.0 percent of the area. For the affected owl site, the removal of 32.4 acres of suitable will result in an estimated retention of 1,796.2 acres (53.8 percent) of suitable within the provincial home range.

In the more critical area within 0.7 miles of the site center, the Service estimates that approximately 597.9 acres of suitable habitat currently exists, or about 59.8 percent of the area. Following the removal of suitable habitat from the borrow site, approximately 565.5 acres of suitable will remain, or about 56.6 percent of the area.

Site Center

One known owl site center is located near the proposed borrow site, and we estimate that up to 10 acres of suitable nesting, roosting, and foraging habitat would be removed from the 70-acre core area. This estimate is based on the anticipated core area around the known nest site including the most favorable, contiguous nesting and roosting habitat. For this particular site,

approximately 10 acres occurs within the proposed borrow site. The known site center was not occupied during the most recent protocol surveys completed in 1999 and 2000. However, its occupancy status has not been documented since 2000, so it is presumed to still be a functional site center. Site surveys will be conducted during the two years prior to the initiation of project construction to confirm presence or absence during project implementation. These surveys are anticipated to occur during the years 2007 and 2008. It is possible that the site center for this owl site has moved to a new, undetected location since the last confirmed sighting. However, in the absence of new information, the known site center will be adversely affected by the removal of nesting and roosting habitat near a known site center.

Effects Due to Noise Disturbance

Excessive noise generated by the proposed action has the potential to disrupt essential breeding behaviors of spotted owls, or result in reduced reproductive performance through adverse effects to nesting spotted owls and their young. Based on surveys conducted during 1991 to 1993 and repeated in 1999 and 2000, only one spotted owl nest site is known to occur within 0.5 miles or less of the proposed action, on Oil Well Hill. The last known occupancy of this nest site was 1993. Spotted owls located farther than 0.5 miles from the project footprint would not be affected by noise generating activities.

A 65-hour-long, continuous noise survey conducted by Caltrans at Oil Well Hill during the period May 6-8, 2004, found that existing traffic sound levels were fairly high throughout one 24 hour period, ranging from approximately 60 to 83 decibels (dB) (L_{max}, from table in Appendix E of the BA), but were lower during the late evening and early morning hours for the other 24 hour period, ranging between approximately 37 and 52 dB (Appendix E of the BA). Caltrans anticipates that noise levels generated by heavy equipment used for excavation would range from approximately 70 to 80 dB at the project site (Keith Pommerenck, pers. comm.). Hence, it is anticipated that excavation noise levels are not expected to significantly exceed existing traffic levels for excavation occurring immediately adjacent to the existing highway. However, because excavation is expected to occur continuously during both day and night hours, the difference in the frequency of noise patterns could potentially disturb spotted owls, if they are nesting and foraging in the area.

Excavation can occur as far as 600 ft. (183 m) from the edge of the existing highway surface, if the need for fill material dictates. The ambient sound environment at this distance from the highway is anticipated to be substantially lower than what occurs nearer to the highway. The sound level generated by excavation activities may, therefore, substantially exceed the ambient condition. However, these excessive sound levels would be farther from the known nest site, and would likely have less effect on nesting owls there than if their nest site nearer this eastern edge of the excavation area.

The contractor may use explosives at Oil Well Hill as part of the excavation of fill material. The number and frequency of charges would be determined by the contractor. Blasting typically produces a rapid series of impulse type noise with mostly low frequency noise content (Illingsworth and Rodkin 2005). If explosives are used at Oil Well Hill, the charges would be set below ground rather than on the surface, to fracture and loosen the rock. Estimates of noise

levels generated by blasts in a study for the Confusion Hill Relocation Project (Illingsworth and Rodkin 2005) recorded a noise level of approximately 85 dBA at approximately 550 feet. In addition, blasting noise levels recorded for emergency work performed at Confusion Hill, Mendocino County, which involved a surface blast, recorded noise levels of 83 dBA at approximately 500 feet line-of-site from the point of detonation, as reported in the BA.

These numbers reported by Caltrans would translate to sound levels substantially higher than sound levels within the site center or at a potential nest tree under ambient conditions. Sound levels reported for blasting (85 dB at 550 feet) would translate to approximately 106 dB at 50 ft. (15 m), which substantially exceeds the reported sound level (60-83 dB) of traffic on the existing highway. Should owls attempt to nest at the site on Oil Well Hill, this level of disturbance could lead to behavioral modifications, such as flushing from the nest, and injury to owls.

Highway noise levels are not anticipated to increase significantly in the future, and the existing cut banks absorb sound and contribute no more than a minimal echo effect. Therefore, Caltrans anticipates that the transmission of highway traffic noise eastward into potential NSO habitat east of Oil Well Hill would not be significantly higher than existing levels (K. Pommerenck, pers. comm.).

Interrelated and Interdependent Activities

Regulations implementing the Act require the Service to consider the effect of activities which are interrelated and interdependent to the proposed action (50 CFR 402.02). The Act defines interrelated activities as those which are part of a larger action and depend upon the larger action for their justification, and interdependent activities as those projects which have no independent utility apart from the action that is under consideration. This proposed action does not include any interrelated and interdependent activities.

Cumulative Effects

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

Within the Action Area, the only foreseeable action with known construction dates which potentially would have cumulative effects associated with the Willits Bypass is the proposed wastewater treatment facility for the City of Willits. This action would include the construction of new wastewater treatment facilities, including the construction of expanded oxidation ponds, treatment wetlands, mitigation areas for wetland use, and a public trail around these facilities. This project does not occur within or near suitable spotted owl habitat, and is not expected to have any effects on the species.

Other potential activities in or near the Action Area include: a second access road to the Brooktrails subdivision, which may be routed in or near Wild Oat Canyon; a third access road to Brooktrails, connecting to Highway 20 west of Willits; the expansion of public transit and

bicycle/pedestrian facilities near Baechtel Road/Railroad Avenue; repairs to the existing Northwest Pacific Railroad, including its route through the Outlet Creek Canyon; the build-out of the Brooktrails subdivision; the build-out of the City of Willits and adjacent unincorporated Mendocino County lands; and, future timber harvest plans (THPs) in the Action Area. However, none of these activities are currently designed or planned to a level where effects to listed species or their habitats can be reasonably considered at this time, and so do not contribute to cumulative effects for the project considered in this consultation.

The CDF has records of six THPs within, or partially within, the 2.6 km (1.6-mile) radius circle around Oil Well Hill that have been recorded since 1990. These are 1-90-364 MEN (50 acres [20 ha]); 1-90-631 MEN (665 acres [370 ha]); 1-94-155 MEN (20 acres [8 ha]); 1-94-591 MEN (238 acres [96 ha]); 1-95-487 MEN (50 acres [20 ha]); and 1-99-051 MEN (11 acres 4.5 ha]). Portions of two THPs, 1-90-631 and 1-94-591 extend outside the 2.6 km (1.6-mile) radius. The majority of these logging activities involved seed tree and shelterwood cuts.

Because of the existing market the current value of timber is low, there are no immediate future plans to harvest timber within the Oil Well Hill area. Hence, it is not possible to predict future logging activities. All of the land within the 1.6-mile radius is privately owned, and logging on the areas encompassed by these THPs has occurred in the past, and could occur in the future if timber prices are more favorable.

No other actions likely to result in cumulative effects to listed species are currently being implemented or planned in the action area at this time.

CONCLUSION

After reviewing the current status of the northern spotted owl, the environmental baseline for the action area, the effects of implementing the proposed construction of the Willits Bypass project in Mendocino County, and its cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the northern spotted owl. The Service reached this non-jeopardy conclusion based on the following factors:

1. The proposed action will remove suitable spotted owl nesting, roosting and foraging habitat. Most of this loss of habitat will be permanent. That is, those portions of the habitat that will be permanently maintained as roadway, cut banks, fill slopes, and other areas permanently unvegetated or maintained as low vegetation will never recover its function as suitable spotted owl habitat. Despite this loss, the removal of suitable habitat has been reasonably minimized, in regards to the purpose and need of the action, through implementation of minimization measures identified in the project description. After completion of the proposed action, the known active spotted owl site will still encompass more than 40 percent suitable habitat within the provincial home range (1.3 mile radius of the known nest), and will contain more than 50 percent suitable habitat within the 0.7 mile radius area.

2. One owl site will be affected by the loss of up to 32.4 acres of suitable habitat. Only a small portion of this 32.4 acres occurs within the 70-acre owl core area, likely to be less

than 10 acres. All of these acres to be removed are across the highway from the known site center. However, some of the acres to be removed are the better quality habitat remaining available to this already compromised site center. Despite the potential loss of this site center, the regional scale of the effect is small, affecting only a single known site within this province.

3. One spotted owl nest site is known to occur within a distance of the borrow site such that it may be adversely affected by noise disturbance resulting from construction activities, under the proposed minimization measures. However, this site was not occupied when last surveyed in 1999 and 2000. Surveys will be conducted during the two years prior to the start of construction, to confirm occupancy of this site at that time. Surveys are anticipated to occur during the years 2007 and 2008. Should this spotted owl site, or another new site within one-quarter mile of the borrow site, be found to be occupied at that time, FHWA and Caltrans will consult with the Service at that time to address new information and consider minimization measures appropriate to the exact location of any known spotted owls.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulations pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without a special exemption. Take is defined as 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 the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental to and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under that Act provided that such taking is in compliance with this Incidental Take Statement.

Any Reasonable and Prudent Measures described below are non-discretionary, and must be undertaken by the FHWA so that it becomes a binding condition of any grant or permit issued to the applicant, as appropriate, for the exemption in section 7(o)(2) to apply. FHWA has a continuing duty to regulate the activity covered by this incidental take statement. If FHWA (1) fails to assume and implement the terms and conditions or (2) fails to require the applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, FHWA must report the progress of the action and its impact on the species to the Service as specified in the Incidental Take Statement [50 CFR §402.12(I)(3)].

AMOUNT OR EXTENT OF INCIDENTAL TAKE

The Service anticipates that up to one pair of northern spotted owls associated with the site center on Oil Well Hill will be taken as a result of this proposed action. Implementing the proposed action would result in the removal of suitable habitat, and would adversely affect the species. This removal of suitable habitat would occur within a known northern spotted owl site center, and would harm the species as a result of loss of suitable habitat around an historically occupied and successfully nest. The removal of up to 32.4 acres of suitable habitat would occur within the provincial home range of an known owl site, but would not remove sufficient habitat to result in harm to the species at the home range scale. Finally, should blasting occur at the excavation site, the sound level generated by such subsurface explosives would harass the species as a result of substantially elevated sound levels at a potentially occupied nest site. Up to one pair of northern spotted owls would be harassed by this elevated sound level.

EFFECT OF THE TAKE

In the accompanying biological opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the northern spotted owl.

REASONABLE AND PRUDENT MEASURES

No reasonable and prudent measures are necessary to minimize impacts of incidental take of northern spotted owls. Minimization measures agreed to by Caltrans and incorporated into the project description would sufficiently reduce the amount of take.

TERMS AND CONDITIONS

No terms and conditions are necessary because reasonable and prudent measures are deemed unnecessary.

MONITORING REQUIREMENTS

No monitoring requirements are necessary.

REPORTING REQUIREMENTS

Upon locating a dead or injured northern spotted owl, initial notification must be made to the Service's Division of Law Enforcement in Chico, California at (530) 342-8724 and Michael Long, Field Supervisor, Arcata Fish and Wildlife Office at (707) 822-7201 immediately, and in writing within three (3) working days. Notification must include the date, time, and location of the carcass; cause of death or injury, if known; and any other pertinent information. Care must be taken in handling injured animals to ensure effective treatment and care, and in handling dead specimens to preserve biological material in the best possible state for later analysis of cause of death. The finder has the responsibility to ensure that evidence intrinsic to the specimen is not unnecessarily disturbed, unless to remove it from the path of further harm or destruction. Should any treated listed species survive, the Service should be contacted regarding the disposition of the animal. In the case of take or suspected take of northern spotted owl not exempted in this

biological opinion, the Arcata Fish and Wildlife Office and the Division of Law Enforcement shall be notified within 24 hours.

COORDINATION OF INCIDENTAL TAKE WITH OTHER LAWS

The Service will not refer the incidental take of any migratory bird or bald eagle for prosecution under the Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. §§ 703-712), of the Bald and Golden Eagle Protection Act of 1940, as amended (16 U.S.C. §§ 668-668d), if such take is in compliance with the terms and conditions (including amount and/or number) specified herein.

CONSERVATION RECOMMENDATIONS

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

The Service provides Caltrans with the following conservation recommendations:

1. Portions of the habitat disturbed during construction of the Willits Bypass may be appropriate to restore to conditions that promote the future growth of suitable habitat conditions. These conditions include limiting the extent of tree removal to that necessary for completing the construction work, replanting disturbed areas as appropriate to local, native conifer and hardwood tree species, and retention of large woody debris within planted areas.

2. To minimize the permanent loss of suitable habitat, Caltrans should consider ways to minimize the width of the extraction area to that necessary for future highway alignment and right-of-way, avoiding creation of broad areas will little habitat value in the future. This approach would reduce overall habitat loss in the long term, and retain habitat that exists farther from the existing and future highway alignment.

REINITIATION NOTICE

This concludes formal consultation on the action outlined in your September 27, 2005, request. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this opinion; or (4) a new species is listed or critical habitat is designated that may

be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

Please contact staff biologist Ray Bosch at (707) 822-7201 should you have further questions regarding this consultation.

Sincerely,

for Andrew Bickley

Michael M. Long
Field Supervisor

cc:
Federal Highway Administration, Sacramento, California (Attn: Lanh Phan)
California Department of Transportation, Eureka (Attn: John Bulinski)
California Department of Transportation, Sacramento (Attn: Don Schmoldt)
National Marine Fisheries Service, Santa Rosa (Attn: Tom Daugherty)
California Department of Fish and Game, Yountville (Attn: Corinne Gray)

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National Marine Fisheries Service
Biological Opinion
September 2006

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

SEP 1 1 2006

In response refer to:
2005/07370:TKD

Gene K. Fong
Division Administrator
U.S. Department of Transportation
Federal Highway Administration
California Division
650 Capitol Mall, Suite 4-100
Sacramento, California 95814

Dear Mr. Fong:

This document 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 Route 101 Willits Bypass, in Mendocino County, California. FHWA and Caltrans have 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 U.S. 101 that would bypass the City of Willits in Mendocino County, California.

The enclosed biological opinion is based on NMFS' review of information provided with FHWA's request of October 18, 2005, for formal consultation and other documents, meetings, telephone conferences, site visits, and analyses provided during consultation. It 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 North Coast 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, a conservation recommendation is included in the enclosed biological opinion.

Regarding the project's Conceptual Mitigation Plan, Caltrans has proposed creation/restoration, enhancement and preservation of salmonid habitat and riparian areas within Little Lake Valley. Due to the preliminary nature of future in-channel mitigation proposals, NMFS was unable to analyze the impacts of these projects. NMFS staff will work with FHWA and Caltrans to design these future mitigation actions. If these actions may affect listed species or their critical habitats, reinitiation of consultation would be needed.

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 EFH Conservation Recommendations are designed to minimize potential adverse effects on EFH.

Mr. Thomas Daugherty is the lead biologist for this project. If you have any questions regarding the enclosed documents, please contact Mr. Thomas Daugherty at (707) 468-4057.

Sincerely,

Anthony C Morton

for Rodney R. McInnis
Regional Administrator

Enclosures

cc: Russell Strach, NMFS Sacramento
Jeremy Ketchum, Caltrans Sacramento

Enclosure 1

BIOLOGICAL OPINION

ACTION AGENCY:	U.S. Department of Transportation, Federal Highway Administration, California Division
ACTION:	Funding and Construction of the Highway 101 Willits Bypass Project
CONSULTATION CONDUCTED BY:	National Marine Fisheries Service, Southwest Region
PCTS TRACKING NUMBER:	2005/07370
DATE ISSUED:	_____

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.

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 Highway 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 Highway 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 threatened 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 dB_{SEL} or 208 dB peak. 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 level impacts on fish. During the meeting, Caltrans continued to propose that dewatering of the stream area near a pile driving work site not occur unless injurious levels of sound were detected. NMFS expressed concern that waiting until injury occurred 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.

A complete administrative record for this consultation is on file at the NMFS Ukiah, California field office.

II. DESCRIPTION OF THE PROPOSED ACTION

A. General Description

Caltrans and FHWA propose the Highway 101 Willits Bypass to reduce delays on U.S. Route 101. Currently Highway 101 runs through the City of Willits, California. The bypass project will re-route Highway 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 3.3 kilometers (km) south of Willits, where the existing Highway 101 becomes a two-lane road, and extend to about 2.2 km north of Willits, where the new alignment would merge with the existing two-lane Highway 101. Construction would begin in 2009 and likely take four years to complete.

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, 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 Highway 101. The overall length of the proposed freeway bypass will be approximately 9.3 km.

North and southbound lanes of the new alignment will be 3.6 meters wide. A 13.8-meter median will separate the northbound and southbound lanes. Inside shoulder width, nearest the medium, will be 1.5 meters and 3.0 meters 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, and these roads will be two lanes with 2.4 meter 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, middle and lower), Baechtel Creek, Broaddus Creek, Mill Creek, and Upp Creek. The crossings at upper Haehl Creek will consist of the southbound and northbound freeway bridge structures; one bridge each for the southbound off-ramp and the northbound on-ramp associated with the southern interchange; and replacement of an existing culvert for the Schmidbauer (private landowner access) access road with a natural bottom culvert. The crossings at middle Haehl Creek would consist of bridges for the north- and south-bound lanes, south of Shell Lane. The crossing at Upp Creek, at the northern end of the project, will consist of a natural bottom culvert for the north-and southbound lanes. The crossings at lower Haehl, Baechtel, Broaddus, and Mill creeks will consist of the north and southbound viaduct structures.

B. Specific Construction Actions

1. Staging Areas

The first phase of construction is the establishment of three staging areas, one each in the southern, central, and northern portions of the project corridor. The "southern" staging area will be located south of East Hill Road and east of the railroad tracks, and is approximately 365 meters east of Haehl Creek. The "central" staging area is located between Center Valley Road and East Commercial Street (Hearst-Willits Road), and borders Baechtel Creek, just upstream and downstream of the confluence with Haehl Creek. The northern staging area will be located near the proposed Quail Meadows interchange.

The staging areas may be used by the contractor(s) to store equipment and materials, and will be located where the contractor can gain easy access to the project corridor. Access roads from the staging areas to the project corridor will be constructed where necessary. It is anticipated that 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 would be removed within the staging areas.

2. Road Construction

Caltrans will lay out the new alignment and the contractor will demolish structures and clear the area to be worked. 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. A maximum of 1.9 million cubic meters of earthen material will be excavated, transported, and compacted to build the project. A haul road will constructed within the limits of the alignment, and it will be used to transport material from the borrow site to the areas of new construction.

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, 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.

3. Borrow of Earthen Fill from Oil Well Hill

Up to 1.9 million cubic meters of earthen material may be excavated from the borrow site at Oil Well Hill. Up to 16.2 hectares will be excavated. This activity will occur on the east side of Highway 101, beginning approximately 425 meters north of the Highway 101 bridge over Outlet Creek. Material would be transported to the project corridor via trucks using existing Highway 101, and from Highway 101, material will be transported along haul roads within the limits of the new alignment. Sediment basins and other BMPs will be used 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.

4. Concrete Batch Plant

It may be necessary to supplement the current commercial production of concrete and to minimize specified haul time, by allowing contractors to construct a temporary plant(s) near the project site. Caltrans has indicated a likely site for a batch plant is the existing Schusters Transportation site, located north of East Valley Street, and between Haehl Creek and Baechtel Creek. This biological opinion assumes one concrete batch plant will be constructed at the Schusters Transportation site. 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 will be constructed for this project. Two retaining walls will be located near Haehl Creek, at the southern freeway interchange. At this site, one will be located along the west side of the northbound on-ramp. 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 meters 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 foundation 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, 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. This site will not require the removal of riparian vegetation.

6. Permanent Bridge Construction

At the upper Haehl Creek crossing location, the proposed bridges will consist of the two freeway structures (northbound and southbound lanes); the southbound off-ramp; and the northbound on-ramp. Rock slope protection may be required along both banks at the southbound off-ramp and northbound on-ramp for a distance of approximately 8 meters above and below each structure.

The proposed new Schmidbauer Ranch access road will be located off the east side of the 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 freeway structures (northbound and southbound lanes). The proposed bridge sites will be cleared of vegetation prior to construction. Rock slope protection may be required along the south bank for a distance of approximately 8 meters above and below each structure.

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 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 20 or more

35 centimeter to 51 centimeter "H" piles, which will be placed by pile drivers, at or near the top of bank.

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 centimeter to 76 centimeter diameter steel piles, "H" piles, or wood pads. Installation of these supports may require pile driving. 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 bridges may 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 type of structures. These bridges would not require placing any piers in the stream channels or banks. No access into the live stream channels would be required.

Temporary bridges may be located at Haehl, Baechtel, Broaddus, Upp and Mill creeks, or at several (5 or less) 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 meters 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.

8. Viaduct Construction

The proposed viaduct crossings will be located on lower Haehl Creek, Baechtel Creek, Broaddus Creek, and Mill Creek. The proposed viaduct crossings would consist of separate northbound and southbound elevated structures. These viaducts would be elevated above the valley floor for their full lengths of approximately 1730 meters. The viaducts will span the Little Lake Valley and allow for runoff in the valley floodway. Each of the elevated viaduct structures would be approximately 12.5 meters wide. The viaduct superstructures will be supported by piles with a maximum diameter of 2.1 meters. The size and number of columns and the distance between the sets of columns has yet to be determined. The installation of the columns and deck construction would require a 30.5-meter wide temporary work area on the east side of the viaduct, and a 17-meter wide temporary work area on the west side of the viaduct.

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). It is likely

that the northbound and southbound viaduct structures will be constructed simultaneously. When each frame (consisting of multiple spans) is completed, work would begin on the next frame, where material and equipment would be located. One of the viaduct spans would require support columns at the site of the existing aeration ponds at the Willits Wastewater Treatment Plant. These ponds will be decommissioned or relocated prior to construction of the viaduct.

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 8 meters upstream and downstream of the structures.

9. Pile Driving Associated with Bridge and Viaduct Construction

Pile driving will be required to construct the bridge abutments and piers, the columns for the viaduct, and installation of the temporary falsework supports. The exact number and size of the piles for each of the structures have not been determined. However, there will be no permanent or temporary piles in any stream channel below ordinary high water. For the proposed viaduct, piles could be as large as 2 meters in diameter. Falsework supports may be piles approximately 61 centimeters to 76 centimeters 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 may require approximately 20, 36-centimeter to 51-centimeter "H" piles. All permanent bridge abutments would be located above the top-of-bank. The approximate number of piers and columns within 15 meters of the stream channels are summarized below:

- Upper Haehl Creek: 455, 30-centimeter "H" piles would be driven within 15 meters of the top-of-banks for the upper Haehl Creek crossings for the bridge abutments and retaining walls; and 69, 61 to 76 centimeter falsework piles would be driven, with 12 of these piles, within 15 meters of the top-of-banks and 28 below the top-of-banks (but above the ordinary high water mark).

- Middle Haehl Creek: 186, 30-centimeter "H", piles would be driven within 15 meters of the top-of-banks for the middle Haehl Creek crossing for the bridge abutments; one 2-meter diameter cast in steel shell (CISS) pile would be located below the top-of-bank; and 50, 61- to 76-centimeter diameter falsework piles would be driven, with 20 of these piles within 15 meters of the top-of-banks and 30 piles below the top-of-banks.

- Lower Haehl Creek: 4, 2-meter diameter CISS piles would be driven within 15 meters above the top-of-banks at Haehl Creek, near it's confluence with Baechtel Creek; and 25, 61 to 76-centimeter falsework piles would be driven, with 20 of these piles within 15 meters of the top-of-banks, and 5 piles below the top-of-banks.

- Baechtel Creek: 12, 2-meter diameter, CISS piles would be driven, with 6 of these piles within 15 meters of the top-of-banks, and 6 piles below the top-of-banks; and 70, 61- to 76-centimeter falsework piles would be driven, with 25 of these piles within 15 meters of the top-of-banks and 45 piles below the top-of-banks.

- Broaddus Creek: 6, 2-meter diameter, CISS piles would be driven within 15 meters of the top-of-banks, with no large piles being driven below the top-of-banks; 30, 61 to 76-centimeter falsework piles would be driven, with 20 of these piles located within 15 meters of the top-of-banks, and 10 piles located below the top-of-banks.

- Mill Creek: 6, 2-meter diameter, CISS piles would be driven within 15 meters above the banks at Mill Creek; and 20, 61 to 76-centimeter falsework piles would be driven, with 10 of these piles within 15 meters of the top-of-banks and 10 piles below the top-of-banks.

All temporary and permanent piles will be installed with an impact or vibratory hammer. It is anticipated that the time required to drive each 2-meter diameter pile could be approximately 10 to 20 hours, but may take longer. The time required to drive typical small diameter piles may be one hour. Pile driving activities within 15 meters of the top-of-bank may require up to a week, or more, at each crossing.

Prior to the driving of piles in or near the stream banks of Haehl, Baechtel, Broaddus, or Upp creek, Caltrans proposes to dewater the adjacent reach of wetted streams for a distance up to 150 meters. Fish including anadromous salmonids will be collected prior to and during dewatering for relocation to suitable and unaffected aquatic habitat nearby. Cofferdams will be constructed and water diverted through appropriately sized pipes. The cofferdams will likely be constructed with impermeable liners placed over clean, washed, commercially available river gravel, ranging in size from approximately 2.5 centimeters to 7.5 centimeters, or by use of sand bags or rubber bladders. No native streambed material or angular rock material would be used. Water 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 would relocate fish to suitable habitat outside of the construction area. The methods of fish removal will be selected in coordination with NMFS and California Department of Fish and Game (CDFG). 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 would 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.

10. Stream Realignment

The project will require the realignment of approximately 915 meters of an unnamed ephemeral watercourse, located east of the existing roadbed fill near the Schmidbauer Ranch, north the proposed southern freeway interchange. The 915-meter reach affected occurs south of East Hill Road, and averages approximately 3 meters wide. This watercourse has a small watershed, consisting of a small portion of the Schmidbauer Ranch. A new channel may be constructed east of the existing watercourse, and would be completed in one construction season while the watercourse is dry.

11. Culvert Construction, Removal, and Replacement

An existing culvert on Upp creek, under existing Highway 101, will be replaced to improve fish passage. The culvert will be either a steel arch design or a cast-in-place box culvert with a natural bottom. The culvert that spans the creek will be constructed in a manner that maintains the original channel configuration and gradient. If a cast-in-place design is used, temporary construction formwork will require supports in multiple locations within the creek channel. If a steel arch design is selected, no temporary false work will be used in the creek. Removal of vegetation up to a distance of 23 meters above and below the Upp Creek culvert site may be required for construction. The new culvert site may also require placement of rock slope protection on the banks for a maximum distance of 8 meters above and below the culvert

An existing culvert in upper Haehl Creek will be replaced during the improvement of the Schmidbauer Ranch access road. The existing culvert will be replaced with a natural bottom arch or box culvert. Construction will occur during the summer months when this reach of Haehl Creek is normally dry. However, flows through the existing culvert have created 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 would be removed prior to removal and replacement of the culvert.

A second culvert located in upper Haehl Creek under the proposed freeway bridge will be removed to improve fish passage. Stabilization of the creek channel following removal of the culvert may consist of grade control structures located downstream of the culvert, at appropriate heights and intervals, for the distance necessary to stabilize the natural stream gradient. Stream channel stabilization would follow guidelines provided in the *California Salmonid Stream Habitat Restoration* Manual (CDFG 1998). Guidance from NMFS and CDFG will be used in development of appropriate stream stabilization structures at this site.

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 and FHWA to further minimize impacts to salmonids during implementation of the project:

- Construction at each of creek crossings will be limited to the period between June 15 and October 15 of each year, unless earlier and/or later dates for construction activities at the creek crossings are approved by NMFS. This work window is intended to minimize the impacts to migrating salmon and steelhead that utilize Haehl, Baechtel, Broaddus, 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 Storm Water pollution Prevention Plan (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.

- BMPs will be used to prevent the discharge of equipment fluids to the stream channel.

- 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.

- 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 dB_{SEL} or 208 dB peak (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 meters upstream and downstream of the piles/columns, such that no cofferdams or dewatering is required, no underwater sound monitoring is proposed by Caltrans.

- 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/FHWA 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.

D. Proposed Willits Bypass Conceptual Mitigation Plan

Pursuant to the NEPA/404 MOU, Caltrans has prepared a conceptual mitigation plan to serve as a guide in the preparation of the final mitigation and monitoring plan and as a basis for further negotiations with resource agencies. Mitigation for impacts to riparian vegetation would occur both on-site and off-site. Appropriate, local native plant species would be used for the revegetation of impacted riparian areas within the project limits as well as in off-site mitigation areas. 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 the 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. Installation of container grown or bare rootstock plants, such as alder, Oregon ash, valley oak, or box elder would also be utilized in areas at or above ordinary high water. Selected sensitive plants growing in areas impacted by the project could be relocated.

Mitigation for permanently impacted project area riparian habitats would be implemented as creation/restoration, enhancement, and preservation of stream bank. All temporarily impacted riparian areas would be restored to their original condition in addition to compensatory mitigation elsewhere in Little Lake Valley. The purpose of the compensatory mitigation in addition to restoration of impacted project areas is to offset the temporal loss of the riparian habitat functions in the impacted areas.

In addition to re-planting of native vegetation, Caltrans may pursue a program to remove invasive exotic vegetation. Invasive exotic vegetation would be removed in compliance with the California Invasive Plant Council's *Invasive Plants of California's Wildlands* manual. Areas where invasive exotic plants are removed would be closely monitored for several years for the plant's re-emergence.

For compensation of impacts to anadromous salmonid habitat, Caltrans may construct instream structures such as opposing wing deflectors, anchored large woody debris, or stepped pool systems in project streams or elsewhere in the Willits Valley. Another possible mitigation activity could be the removal of fish passage barriers on primary salmonid streams in Little Lake Valley. Fish passage barriers within Caltrans right-of-way areas would be prioritized. These projects have not been designed and were not analyzed in this biological opinion. Reinitiation of consultation with NMFS may be necessary for these projects if one or more of them may affect listed salmonids or their critical habitat.

In coordination with state and federal agencies, Caltrans will develop a final mitigation and monitoring plan prior to project construction to ensure project impacts to listed species will be fully mitigated. By separate memorandum with the CDFG, Caltrans will ensure adequate funding to implement mitigation and monitoring measures for purposes of obtaining a consistency determination pursuant to CDFG Code Section 2080.1.

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 of the action area stream reaches eventually flow to Outlet Creek, which flows north out of the Little Lake Valley.

Impacts from direct, indirect, and beneficial effects by 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 of the freeway construction project. Table 1 summarizes the length of each stream that is included as in the action area for this biological opinion.

Table 1. Streams and expected lengths of impacted areas for the Willits Bypass Project.

Stream Name	Number of Crossings	Type of Crossings	Action Area Length
Haehl Creek	6	6 bridges, 1 culvert, 1 culvert removal, 2 viaduct crossings	5 kilometers
Baechtel Creek	1	2 viaduct crossings	1250 meters
Broaddus Creek	1	2 viaduct crossings	150 meters
Mill Creek	1	2 viaduct crossing	2 kilometers
Upp Creek	1	1 culvert	400 meters
Outlet Creek	None		5 kilometers
			Total = 13.8 kilometers

* All action area lengths are approximate.

III. 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 (*Oncorhynchus tshawytscha*)
Listing determination (70 FR 37160; June 28, 2005)
Critical habitat designation (70 FR 52488; September 2, 2005);

Threatened Northern California steelhead (*Oncorhynchus 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. Coho Salmon

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 meter 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 (reviewed in Myers *et al.* 1998 – Appendix B). 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 centimeters (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

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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 millimeters (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 and Critical Habitat

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). Recently NMFS evaluated the listing status of SONCC coho salmon and maintained the threatened status of SONCC coho salmon (70 FR 37160).

2. CC Chinook Salmon

Rigorous population estimates for the CC Chinook salmon are lacking. Myers *et al.* (1998) reviewed early estimates and reported estimated historic (prior to 1965) Chinook salmon escapement for the Eel River as 55,500. Recent estimates of abundance within the Eel River exceeds 4,000 Chinook salmon and show a -29.7 percent trend in abundance from 1987-1997 (Myers *et al.* 1998). Evidence suggests that CC Chinook salmon populations have been extirpated or nearly extirpated in the southern part of the ESU, or are extremely low in abundance – Chinook salmon in the Russian River are an exception. In addition, an apparent loss of the spring-run Chinook life history in the Eel River Basin and elsewhere in the ESU indicates risks to the diversity of the ESU. Although there are few data available, recent status reviews for CC Chinook salmon conclude that population abundance levels remain depressed relative to historical levels and that this ESU is presently "likely to become endangered" (NMFS 2001, Good *et al.* 2005). Recently NMFS evaluated the listing status of CC Chinook salmon and maintained the threatened status of SONCC coho salmon (70 FR 37160). Chinook salmon runs observed in the South Fork Eel River and the Van Duzen River in 1992/93 through 1994/95 indicated a slight increase in numbers (CDFG 1997).

3. NC Steelhead

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 of 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 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. Recently, NMFS evaluated the listing status of NC steelhead and proposed maintaining the threatened listing determination (71 FR 834). NMFS is unaware of recent population status information specific to steelhead in the mainstem Eel River, or more specific to the Outlet Creek subbasin.

4. Critical Habitat

Critical habitat is defined in section 3(5)(A) of the Endangered Species Act (ESA) as "(i) the specific areas within the geographical area occupied by the species . . . on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protection; and (ii) specific areas outside the geographical area occupied by the species . . . upon a determination by the Secretary of Commerce (Secretary) that such areas are essential for the conservation of the species" (see 16 U.S.C. 1532(5)(A)). The term 'conservation', as defined in section 3(3) of the ESA, means ". . . to use and the use of all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided pursuant to this Act are no longer necessary" (see 16 U.S.C. 1532(3)). Therefore, critical habitat is the geographic area and habitat functions necessary for the recovery of the species.

The condition of critical habitat, for all the Chinook and coho salmon ESUs and the steelhead DPS, has been degraded from conditions known to support viable salmonid populations. These conditions are, in part, the result of the following human-induced factors affecting critical habitat[1]: logging, agricultural and mining activities, urbanization, stream channelization, dams, wetland loss, and water withdrawals, including unscreened diversions for irrigation (reviewed in Good *et al.* 2005). Impacts of concern include alteration of stream bank and channel morphology, reduced surface flow, alteration of water temperatures, loss of spawning and rearing habitat, fragmentation of habitat, loss of downstream recruitment of spawning gravels and large woody debris, degradation of water quality, removal of riparian vegetation resulting in increased stream bank erosion, increases in erosion entry to streams from upland areas, loss of shade (higher water temperatures), and loss of nutrient inputs. Depletion and storage of natural river and stream flows have drastically altered natural hydrologic cycles in many of the streams in the ESUs and the DPS.

[1]Other factors, such as over fishing and artificial propagation have also contributed to the current population status of these species. All these human induced factors have exacerbated the adverse effects of natural environmental variability from such factors as drought and poor ocean conditions.

Assessment of the CC Chinook and NC steelhead designated critical habitat is included in NMFS (2005), which addresses critical habitat for seven salmon and steelhead ESUs/DPSs. The NMFS Southwest Region established Critical Habitat Analytical Review Teams (CHARTs) consisting of NMFS fishery biologists that assessed the habitat conservation value of Hydrologic Subareas (HSAs) within the ESUs/DPSs. Conservation values of "high", "medium", and "low", were determined from a variety of data sources on quality, quantity, and distribution of physical or biological features associated with spawning, rearing, and migration in each HSA.

For CC Chinook salmon, the CHART identified 45 occupied HSAs within the freshwater and estuarine range of the ESU. Eight HSAs were rated low in conservation value, 14 were rated medium, and 27 were rated high in conservation value (NMFS 2005). Essential features for spawning, rearing and migration are contained in approximately 5,036 km of occupied habitat within these HSAs. The proposed project is located within the Outlet Creek HSA, which contains 96 km of spawning, 65 km of rearing, and 72 miles of migration habitat for Chinook salmon. The Outlet Creek HSA was considered by the CHART to have high conservation value for CC Chinook critical habitat (NMFS 2005).

The CHART identified 50 occupied HSAs within the freshwater and estuarine range for the NC steelhead DPS. Nine HSAs were rated as low conservation value, 10 were rated medium, and 27 were rated high in conservation value (NMFS 2005). Essential features for spawning, rearing, and migration are contained in approximately 2,931 km of occupied stream habitat within the HSAs. The Outlet Creek HSA contains 133 km of spawning, rearing and migration habitat, which represents 4.5 percent of the total habitat of the DPS occupied habitat. A high conservation value was given to the Outlet Creek HSA for NC steelhead critical habitat (NMFS 2005).

IV. ENVIRONMENTAL BASELINE

This biological opinion analyses the areas affected directly and indirectly by the proposed Willits Bypass construction project. The action area evaluated in this biological opinion includes stream segments of Haehl, Baechtel, Broaddus, Mill, Outlet and Upp creeks identified above.

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, Upp, or Outlet creeks. There is some potential for straying of adult coho salmon into these streams (S. Harris,

CDFG, personal communication, 2006). Some Chinook salmon spawning does occur in reaches of Outlet, and Haehl creeks. Juvenile Chinook and coho may rear for short periods of time during their outmigration during the spring, but are not expected to utilize any stream reaches identified in 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 of the Willits Valley that 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. Baechtel Creek

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 characterized by an F3 channel type which are characterized by low gradients (< 2%), are well entrenched, and have 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. 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% 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.

3. 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). Elevated percentages (estimated > 90%) 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).

4. 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*).

5. 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).

6. Upp Creek

The segment of stream that makes up the Upp Creek action area is considered to be very degraded habitat for salmonids, and is typically dry during the summer months. Migration conditions at the existing Highway 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, 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 the CHARTs by evaluating the quantity and quality of habitat features, the relationship of the 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 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 (MWATs) 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 as primarily as migration corridor for adult salmon and steelhead during the fall and winter months, as well as 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 meters) 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 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 Highway 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, this is what is currently know 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 are affected by cattle grazing, which occurs 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, and predation, elimination of natives, reduced growth and survival, and changes in community structure (Spence *et al.* 1996).

V. EFFECTS OF THE ACTION

Pursuant to section 7(a)(2) of the ESA (16 U.S.C. § 1536), Federal agencies are directed to ensure that their activities are not likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of designated critical habitat. This biological opinion assesses the effects of the proposed Willits Bypass Project on listed salmonids, and the designated critical habitats for SONCC coho salmon, CC Chinook salmon, and NC steelhead. The proposed freeway construction project is likely to adversely affect listed salmonids and critical habitats. An overview of the action is provided in the *Description of the Proposed Action* section of this opinion. In the *Status of the Species and Critical Habitat* and *Environmental Baseline* sections of this Opinion, NMFS provided an overview of the threatened and endangered species and critical habitat that are likely to be affected by the activity under consultation.

Regulations that implement section 7(a)(2) of the ESA require NMFS to evaluate the direct and indirect effects of Federal actions and actions that are interrelated with or interdependent to the Federal action to determine if these actions appreciably reduce listed species' likelihood of surviving and recovering in the wild by reducing their reproduction, numbers, or distribution (16 U.S.C. §1536, 50 CFR 402). Section 7 of the ESA also requires NMFS to determine if Federal actions would destroy or adversely modify critical habitat (16 U.S.C. §1536). This biological opinion does not rely on the regulatory definition of "destruction or adverse modification" of critical habitat at 50 CFR §402.2. Instead, we have relied upon the statutory provisions of the ESA to complete the following analysis with respect to critical habitat.

The purpose of this consultation is to examine the total range of potential beneficial and detrimental effects to the ESA listed salmonids and their critical habitats that may occur as a result of constructing the proposed Willits Bypass over a four-year period, and to ascertain the likelihood that construction activities and proposed mitigations would jeopardize the survival and recovery of the subject species and or destroy or adversely modify their critical habitats.

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

To date, Caltrans proposed plans for the construction of the Willits Bypass are at a 30 percent design level. SWPPP BMPs will be developed once the contractor(s) have acquired contracts from Caltrans. In addition, the mitigation plan is at a "Conceptual" level and few specific mitigation areas or plans have been developed to date. In order to facilitate the development of this biological opinion, NMFS has had to make certain assumptions regarding the effectiveness of the conceptual BMPs and the mitigation plans. NMFS assumes that the BMPs, SWPPP, and mitigation actions will be effective with regard to minimizing impacts of the proposed construction and mitigating and improving habitat over time. NMFS expects that Caltrans will provide proposed plans for the SWPPP, mitigation, and final project design 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.

B. Direct and Indirect Effects to Salmon and Steelhead or Their Critical Habitats

1. Effects of Dewatering the Project Areas

Construction of bridges at four locations (six bridges), construction of viaduct crossings at four locations (eight viaduct bridges), two culvert crossings, and one culvert removal 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 streams 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, 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 dependant on precipitation levels during the winter and spring preceding construction. Haehl Creek has five stream 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). Upp Creek is expected to be dry by June 15 of each year at this location.

Nine stream crossings will have up to 150 meters dewatered at each site 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, 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, 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 equipment (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 expected to not 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.

2. Effects of Pile Driving During Project Construction

Pile driving will be required at eight of the ten proposed stream crossings, requiring combinations of smaller piles ("H" piles) and large CISS piles. All piles are proposed to be driven above ordinary high water levels of each stream channel. The majority of the piles at stream crossings will be located outside of the stream channel all together, but will be within 15 meters of the top-of-bank. Piles that will be located within the channel, yet above ordinary high water will be smaller, measuring from 61 to 76 centimeters. Caltrans has not specified whether pile driving will be performed with an impact hammer or vibratory hammer. The analysis below assumes either hammer type could be used to install the project's temporary and permanent piles. As described above, Caltrans has proposed to dewater construction areas and relocate fish to minimize the potential impacts of high sound pressure waves from the pile driving.

Available information indicates that fish may be injured or killed when exposed to elevated underwater sound pressure waves generated from driving steel piles with impact hammers (Abbott and Bing-Sawyer 2002, Abbott and Reyff 2004, Abbott *et al* 2005, Caltrans 2001, Caltrans 2003, Caltrans 2004, Nedwell *et al.* 2003, Vagle 2003). 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).

Based on data collected during the installation of piles with a vibratory hammer in Richmond Inner Harbor (Reyff 2003), the adverse effects described above are not expected with the use of a vibratory hammer. Sound levels produced by pile driving with a vibratory hammers are not only lower, but generate different sound wave forms and lower sound frequencies that are less injurious than those produced by an impact hammer. Therefore, it is expected that underwater sound produced during the driving of the project's permanent piles and temporary piles with a vibratory hammer will not exceed levels that result in injury or mortality of listed anadromous salmonids.

If an impact hammer is used for construction in combination with timber piles, no physical injuries or mortality of salmonids are expected. Similar to a vibratory hammer, the driving of wooden and concrete piles with an impact hammer generates sound wave forms that are less injurious to fish (Reyff and Anderson 2005).

Alternatively, when steel piles are used in combination with an impact hammer at the stream crossing locations, high sound levels are likely to be generated during construction. However, all pile driving will be performed on the stream bank or further upland with adjacent stream areas either naturally dry or dewatered by a constructed flow diversion. Elevated sound levels generated by pile driving are expected to travel through the ground and streambed. Although below the level of physical injury, juvenile steelhead could be exposed to high sound pressure waves traveling through the streambed. Juvenile steelhead, coho, and Chinook salmon will be present in wetted habitats immediately upstream and downstream of the dewatered stream reaches. The degree to which an individual salmonid may be affected by high sound pressure

waves is dependent on many variables including size of fish, peak sound pressure, frequency, *etc.* Depending on these factors, effects on juvenile salmonids during the driving of steel piles with an impact hammer will range from a stress response to no response.

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 150 meters) will be a sufficient distance to reduce sound exposure in nearby wetted habitats to safe levels. Since fish will likely be at least 75 meters from the sound source, decibel 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.

In the event that hydroacoustic monitoring in areas above and below the dewatered stream reach reveals excessively high sound levels, Caltrans can dewater additional areas and relocate fish to increase the distance between listed salmonids and the pile driving sound source. Based on the results of the hydroacoustic monitoring program, NMFS may recommend additional areas be dewatered. If additional dewatering is performed, numbers of juvenile salmonids collected and handled would increase, but the numbers will likely be small.

3. 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 *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.

Table 2. Permanent and temporary (replanted) riparian removal at proposed stream crossings and construction sites along the Willits Bypass.

Stream Name	Permanent Removal in meters	Temporary Removal in meters	Total Bank Length Affected in meters	Total Stream Reach Length Affected in meters
Upper Haehl Creek	772	12	784	392
Middle Haehl Creek	105	92	197	98.5
Lower Haehl Creek	34	161	195	97.5
Baechtel Creek	300	370	670	335
Broaddus Creek	33	157	190	95
Mill Creek	37	170	207	103.5
Upp Creek	179	4.6	184	92

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 meters 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.

a. 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 severe consequences 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 smolts 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 due to the effects of 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 meters 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.

Approximately 92 meters 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.

b. Removal of Riparian Vegetation on Non-Salmonid Streams

Non-salmonid bearing streams located within 305 meters of salmonid streams were designated at Category II streams due to their potential influence to fish bearing streams. Other stream courses which are located beyond 305 meters 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 meters of riparian vegetation along five Category II stream reaches. Temporary riparian removal is proposed on 726 meters of Category II streams.

Category III streams are small ephemeral streams, which are more than 305 meters (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 meters and 21 meters, respectively.

Riparian vegetation removal is expected to create increased in 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 less than 500 meters 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.

4. 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, 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 meters 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). In addition to road and bridge construction activities, Caltrans construction of fish enhancement/mitigation projects could result in short-term increases in turbidity during the placement of instream structures.

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 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 expect 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 kilometer reach Outlet Creek downstream of the construction sites was included in the action 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.

a. Effects on Salmonid Spawning Habitat

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 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.

b. 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.

5. Mobilization of Sediment from Oil Well Hill

Oil Well Hill is the proposed borrow site identified by Caltrans. Project construction could result in the excavation of 1.9 million cubic meters of material from this location. The borrow area will likely encompasses 12 to 16 hectares. This site is east of Highway 101 and approximately 425 meters 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.

6. Effects of Rock Slope Protection

Rock slope protection or riprap is proposed in at several stream crossings in combination with retaining walls for protection of bridge columns and banks. A total of 140 meters 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 meters 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 month due to unsuitable stream temperature conditions.

7. 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 be 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.

8. 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 and avoid any sediment and turbidity entering 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 2003b), 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 not expected.

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.

C. Interdependent and Interrelated Actions

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

D. Actions with Beneficial Effects to Salmonids or their Habitat

1. Haehl Creek and Upp Creek Culvert Replacements

Existing culverts on Haehl and Upp creeks are impediments to fish anadromous passage (Caltrans 2005a). The Willits Bypass Project proposes to replace both these culverts with new structures that improve passage for both adult and juvenile lifestages of salmonids. At Upp Creek the existing culvert will be replaced with a new culvert. On upper Haehl Creek, the existing culvert under the new propoposed Highway 101 alignment will be removed and not replaced. A second culvert on Haehl Creek will be replaced for improvement of the new Schmidbauer Ranch access road.

These culvert removals and replacements are expected to improve adult anadromous fish passage on Upp and Haehl creeks. Recent assessments of the existing culvert on upper Haehl Creek by CDFG 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 meters of available anadromous habitat. Replacement of the Upp Creek culvert on existing Highway 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 salmonid productivity. The habitat may provide for some additional spawning of Chinook salmon and steelhead adults, and some use during the winter by juvenile Chinook and steelhead. 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.

2. Riparian Vegetation Mitigation

Caltrans proposes to restore and mitigate temporary and permanent impacts to riparian vegetation on anadromous streams, Category II streams, and Category III streams. The general extent and nature of the project's mitigation plantings are described in the "*Conceptual Mitigation Plan for the Willits Bypass Project*", dated August 19, 2006. The riparian mitigation plan is "conceptual", because it is based on early and limited level of project design. Therefore, Caltrans and FHWA have not ascertained the specific compensatory mitigation sites for this project.

The Conceptual Plan proposes replanting of riparian vegetation on anadromous stream at a 3:1 ratio. Based on the existing project design, this ratio will result in the creation/restoration of 22.2 acres of riparian area mitigation for permanent and temporary impacts. Mitigation of Category II and III stream types will result in riparian creation/enhancement of 13.6 and 1.95 acres of riparian revegetation, respectively.

Riparian vegetation mitigation by Caltrans will be 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-meter riparian zone, Category II streams will be re-vegetated to achieve a 15-meter riparian zone, and Category III stream will be re-vegetated to create an 8-meter riparian zone. In addition, native shrubs and herbaceous perennial plants are proposed to be planted along with riparian trees.

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 conditions. 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 be due to one or more reasons, including 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. Other success criteria such as absolute vegetative cover, woody plant survival, and floristic composition, *etc.*, are proposed per the Conceptual Mitigation Plan.

Success of 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 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).

3. Instream Habitat Mitigation

Caltrans may propose to construct instream structures (such as opposing wing deflectors), anchor LWD, or contract to have other stream enhancement/restoration structures placed in stream mitigation reaches. As described previously, these projects are uncertain to occur and are not analyzed in this biological opinion. If these projects are designed and proposed, and may adversely affect listed salmonids or their critical habitats, reinitiation of consultation with NMFS will be needed.

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 are occurring to salmonid fisheries resources 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 in the future:

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. Since the Outlet

Creek watershed is 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 are 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 in Baechtel and Broaddus 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 five salmonid-bearing streams in the Outlet Creek sub-basin of the Eel River watershed over a four-year period. 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

kilometers south of Willits to 2.2 kilometers north of Willits. New freeway stream crossings will be construction over Haehl Creek at three locations, and one crossing each at Baechtel, Broaddus, Mill, and Upp creeks. Construction is expected to adversely affect threatened NC steelhead, threatened CC Chinook salmon and threatened SONCC coho salmon by dewatering/fish relocation, temporary and permanent riparian vegetation removal, mobilization of sediment, and placement of rock slope protection. Maintenance and use of the bypass is not expected to adversely affect salmonids or their critical habitats, as described above.

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. CC Chinook are unlikely to be present during construction, because juveniles will have emigrated from the watershed as smolts during the spring months. Juvenile SONCC coho salmon are unlikely to be present in the action area 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 steelhead residing at the stream crossings.

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 are expected to improve fish passage conditions for both adult and juvenile salmonids in Upp and Haehl creeks.

The 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 and short term, and therefore unlikely to adversely affect the conservation of salmonid species in the Haehl Creek HSA. 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 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 to 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[2]. 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. 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 4-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

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

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 small impact to coho salmon associated with this project is unlikely to affect the SONCC coho ESU population trend.

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. Habitat impacts from the project in the action area are mostly temporary and/or minor. 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 riparian mitigation, as well as fish passage improvements in Haehl and Upp 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.

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 FHWA and 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 FHWA and 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 FHWA, Caltrans, and their designees for the exemption in section 7(o)(2) to apply. The FHWA and Caltrans have a continuing duty to regulate the activity covered by this incidental take statement. If the FHWA and Caltrans: (1) fail to assume and implement the terms and conditions, or (2) fail 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, the FHWA and 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 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 to 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 meters) at each stream crossing. 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 during 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,

the loss is unquantifiable.

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 cannot be precisely quantified but 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 streams.

Anticipated take will have been exceeded if construction activities, construction of stream crossings, culvert removal, and replacement, or related construction activities are conducted in a manner inconsistent with the proposed project description (including project minimization and avoidance measures) or do not adhere to the terms and conditions of this biological opinion.

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 effects 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 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 adequately compensates for project impacts.

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

D. Terms and Conditions

FHWA and 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 effects to federally listed salmonids:

1. FHWA and 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 shall receive written approval for this plan from NMFS prior to beginning any dewatering for fish relocation in streams where federally listed salmonids are present. This plan shall outline cofferdam construction, dewatering methods, and fish relocation methods. If the plan meets NMFS' approval, NMFS shall provide approval and any comments within 30 days of plan submittal. If the plan does not meet NMFS' approval, NMFS shall provide a list of changes needed within 30 days of plan submittal.

2. The FHWA and 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. The FHWA and 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 biologist Thomas Daugherty at (707) 468-4057 or tom.daugherty@noaa.gov, or other NMFS staff at (707) 575-6062 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 Thomas Daugherty (or other NMFS staff) at the above numbers, if mortality of federally listed salmonids exceeds 3 percent, 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.

The following terms and conditions implement **Reasonable and Prudent Measure 2** to minimize impacts of bridge and roadway construction.

7. The FHWA or 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.

8. The FHWA or 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.

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

10. Prior to commencement of work on the Upp Creek and Haehl Creek fish passage improvement components, FHWA or Caltrans shall submit the engineering design for the structures related to fish passage to NMFS for evaluation and concurrence prior to implementation. Fish passage design at these two structures shall follow the March 2000, *NMFS Guidelines for Salmonid Passage at Stream Crossings*. NMFS shall provide evaluation within 30 days of design submittal. If passage design meets the NMFS guidelines above, NMFS shall provide evaluation and concurrence within 30 days of design submittal. The designs should 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.

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

11. 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.

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

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

14. 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.

15. 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 run-off does occur, work activities that are the cause of the sediment shall be halted and corrective measures implemented until the sediment source is eliminated.

16. When updates to the SWPPP occur, Caltrans shall notify NMFS of these changes. Caltrans will submit a re-certified SWPPP annually to NMFS, and indicate any substantial changes within the SWPPP.

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

18. FHWA and 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.

19. 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.

20. FHWA and 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.

21. Prior to the completion of Willits Bypass construction, FHWA and 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 4** to reduce effects of pile driving on listed species.

22. 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. If the plan meets NMFS' approval, NMFS shall provide written approval and any comments within 30 days of plan submittal. If the plan does not meet NMFS' approval, NMFS shall provide a list of changes needed within 30 days of plan submittal.

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

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

24. FHWA and Caltrans shall provide the NMFS with a final mitigation plan. This plan shall include specific mitigation work that Caltrans proposes to conduct. For those mitigation efforts that Caltrans is unable to propose at this time, the plan shall provide a mechanism (such as a review committee, *etc.*) for developing and approving final mitigation efforts.

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

25. FHWA and 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.

26. FHWA and Caltrans shall monitor stream temperatures associated with riparian vegetation removal, and provide the data to NMFS no later than 120 days after the last day of data collection.

27. All reports or plans 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, FHWA and Caltrans should plant riparian vegetation along the banks of on 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 FHWA and Caltrans Highway 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

Highway 101 Willits Bypass Project

DRAFT

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) and Federal Highway Administration (FHWA) propose the Highway 101 Willits Bypass to reduce delays on U.S. Route 101. Currently Highway 101 runs through the City of Willits, California. The bypass project will re-route Highway 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 Highway 101 becomes a two-lane road, and extend to about 0.6 km north of the Willits, where the new alignment would merge with the existing two-lane Highway 101. Construction would begin in 2009 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 directly or cumulatively, temporarily or permanently may 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 opinion's 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. The Federal action agency included in this consultation is the Federal Highway Administration. 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.

U.S. Fish & Wildlife Service
Species List

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Arcata Fish and Wildlife Office
1655 Heindon Road
Arcata, CA 95521
(707) 822-7201
FAX (707) 822-8136

IN REPLY REFER TO:

1-14-1998-95.4

December 12, 2001

Mr. Chris Collison
Department of Transportation
2800 Gateway Oaks, Suite 130
Sacramento, CA 95833

Subject: Species Lists for Proposed SR 101 Willits Bypass Project, Mendocino County, California

Dear Mr. Collison:

As requested by letter from your agency dated November 26, 2001, you will find enclosed list(s) of endangered and threatened species that may be present in *or may be affected by* projects in the subject project area (see Enclosure A). This list fulfills the requirement of the Fish and Wildlife Service (Service) to provide species lists pursuant to section 7(c) of the Endangered Species Act of 1973, as amended (Act).

The Service used your map(s) and/or other information to determine the U.S.G.S. 7.5' quadrangle(s) containing the proposed project. The species listed in Enclosure A are those species we believe may occur within, *or be affected by projects within* the Willits, Burbeck, and Laughlin Range quads, where your project is planned.

Some of the species listed in Enclosure A may not be affected by the proposed action. A trained biologist or botanist, familiar with the habitat requirements of the listed species, should determine whether these species or habitats suitable for these species may be affected by the proposed action.

Some pertinent information concerning the distribution, life history, habitat requirements, and published references for the listed species is available upon request. This information may be helpful in preparing the biological assessment for this project, if one is required. Please see Enclosure B for a discussion of the responsibilities Federal agencies have under section 7(c) of the Act and the conditions under which a biological assessment must be prepared by the lead Federal agency or its designated non-Federal representative.

Formal consultation, pursuant to 50 CFR § 402.14, should be initiated if you determine that a listed species may be affected by the proposed project. If you determine that a proposed species

may be adversely affected, you should consider requesting a conference with our office pursuant to 50 CFR § 402.10. Informal consultation may be utilized prior to a written request for formal consultation to exchange information and resolve conflicts with respect to a listed species. If a biological assessment is required, and it is not initiated within 90 days of your receipt of this letter, you should informally verify the accuracy of these lists with our office.

Candidate species are currently being reviewed by the Service and are under consideration for possible listing as endangered or threatened. The term *candidate* now strictly refers to species for which the Service has on file enough information to propose listing. Candidate species have no protection under the Endangered Species Act, but are included for your consideration as it is possible that one or more of these candidates could be proposed and listed before the subject project is completed. Should the biological assessment reveal that candidate species may be adversely affected, you may wish to contact our office for technical assistance. One of the potential benefits from such technical assistance is that by exploring alternatives early in the planning process, it may be possible to avoid conflicts that could otherwise develop, should a candidate species become listed before the project is completed.

If the proposed project will impact wetlands, riparian habitat, or other jurisdictional waters as defined by the U.S. Army Corps of Engineers (Corps), a Corps permit shall be required, pursuant to section 404 of the Clean Water Act and/or section 10 of the Rivers and Harbors Act. Impacts to wetland habitats require site specific mitigation and monitoring. You may request a copy of the Service's General Mitigation and Monitoring Guidelines or submit a detailed description of the proposed impacts for specific comments and recommendations.

Please contact Mr. Greg Goldsmith at (707) 822-7201 if you have any questions regarding the attached lists or your responsibilities under the Endangered Species Act. For the fastest response to species list requests, address them to the attention of the species list coordinator at this address. For questions regarding wetlands, please contact Mr. Randy Brown of this office at (707) 822-7201.

Sincerely,

(FOR) Bruce G. Halstead
Project Leader

Enclosures

Enclosure A

Listed/Proposed Threatened and Endangered Species for WILLITS Quad (Candidates Included)

December 12,2001

TYPE	SCIENTIFIC NAME	COMMON NAME	CATEGORY	CRITICAL HABITAT
Fish				
*	*Oncorhynchus mykiss*	Northern California steelhead	T	N
*	*Oncorhynchus kisutch*	S. OR/N. CA coho salmon	T	Y
*	*Oncorhynchus tshawytscha*	CA coastal chinook salmon	T	Y
Birds				
	Coccyzus americanus	yellow-billed cuckoo	C	N
	Strix occidentalis caurina	northern spotted owl	T	Y
	Brachyramphus marmoratus	marbled murrelet	T	Y
	Haliaeetus leucocephalus	bald eagle	T	N

KEY:

(PE) Proposed Endangered	Proposed (in the Federal Register as being in danger of extinction
(PT) Proposed Threatened	Proposed as likely to become endangered within the foreseeable future.
(E) Endangered	Listed in the Federal Register as being in danger of extinction
(T) Threatened	Listed as likely to become endangered within the foreseeable future.
(C) Candidate	Candidate which may become a proposed species
Critical Habitat	Y = Designated, P = Proposed, N = None Designated

* Denotes a species listed by the National Marine Fisheries Service

Enclosure A

Listed/Proposed Threatened and Endangered Species for BURBECK Quad (Candidates Included)

December 12,2001

TYPE	SCIENTIFIC NAME	COMMON NAME	CATEGORY	CRITICAL HABITAT
Plants				
	Trifolium amoenum	showy Indian clover	E	N
Fish				
	Eucyclogobius newberryi	tidewater goby	E	Y
*	*Oncorhynchus mykiss*	Northern California steelhead	T	N
*	*Oncorhynchus kisutch*	S. OR/N. CA coho salmon	T	Y
*	*Oncorhynchus kisutch*	central CA coast coho salmon	T	Y
*	*Oncorhynchus tshawytscha*	CA coastal chinook salmon	T	Y
Birds				
	Coccyzus americanus	yellow-billed cuckoo	C	N
	Strix occidentalis caurina	northern spotted owl	T	Y
	Brachyramphus marmoratus	marbled murrelet	T	Y
	Haliaeetus leucocephalus	bald eagle	T	N

KEY:

(PE) Proposed Endangered	Proposed (in the Federal Register as being in danger of extinction
(PT) Proposed Threatened	Proposed as likely to become endangered within the foreseeable future.
(E) Endangered	Listed in the Federal Register as being in danger of extinction
(T) Threatened	Listed as likely to become endangered within the foreseeable future.
(C) Candidate	Candidate which may become a proposed species
Critical Habitat	Y = Designated, P = Proposed, N = None Designated

* Denotes a species listed by the National Marine Fisheries Service

Enclosure A

Listed/Proposed Threatened and Endangered Species for LAUGHLIN RANGE Quad (Candidates Included)

December 12,2001

TYPE	SCIENTIFIC NAME	COMMON NAME	CATEGORY	CRITICAL HABITAT
Plants				
	Trifolium amoenum	showy Indian clover	E	N
Fish				
*	*Oncorhynchus kisutch*	central CA coast coho salmon	T	Y
*	*Oncorhynchus tshawytscha*	CA coastal chinook salmon	T	Y
*	*Oncorhynchus mykiss*	Central California steelhead	T	Y
Birds				
	Coccyzus americanus	yellow-billed cuckoo	C	N
	Strix occidentalis caurina	northern spotted owl	T	Y
	Brachyramphus marmoratus	marbled murrelet	T	Y
	Haliaeetus leucocephalus	bald eagle	T	N

KEY:

(PE) Proposed Endangered	Proposed (in the Federal Register as being in danger of extinction
(PT) Proposed Threatened	Proposed as likely to become endangered within the foreseeable future.
(E) Endangered	Listed in the Federal Register as being in danger of extinction
(T) Threatened	Listed as likely to become endangered within the foreseeable future.
(C) Candidate	Candidate which may become a proposed species
Critical Habitat	Y = Designated, P = Proposed, N = None Designated

* Denotes a species listed by the National Marine Fisheries Service

Enclosure B

FEDERAL AGENCIES' RESPONSIBILITIES UNDER SECTIONS 7(a) and (c) OF THE ENDANGERED SPECIES ACT

SECTION 7(a) Consultation/Conference

Requires: (1) federal agencies to utilize their authorities to carry out programs to conserve endangered and threatened species; (2) Consultation with FWS when a federal action may affect a listed endangered or threatened species to insure that any action authorized, funded, or carried out by a federal agency is not likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of critical habitat. The process is initiated by the federal agency after determining the action may affect a listed species; and (3) Conference with FWS when a Federal action is likely to jeopardize the continued existence of a proposed species or result in destruction or adverse modification of proposed critical habitat.

SECTION 7(c) Biological Assessment-Major Construction Activity[1]

Requires federal agencies or their designees to prepare a Biological Assessment (BA) for major construction activities. The BA analyzes the effects of the action[2] on listed and proposed species. The process begins with a Federal agency requesting from FWS a list of proposed and listed threatened and endangered species. The BA should be completed within 180 days after its initiation (or within such a time period as is mutually agreeable). If the BA is not initiated within 90 days of receipt of the list, the accuracy of the species list should be informally verified with our Service. No irreversible commitments of resources is to be made during the BA process which would foreclose reasonable and prudent alternatives to protect endangered species. Planning, design, and administrative actions may proceed; however, no construction may begin.

We recommend the following for inclusion in the BA: an on-site inspection of the area affected by the proposal which may include a detailed survey of the area to determine if the species or suitable habitat are present; a review of literature and scientific date to determine species' distribution, habitat needs, and other biological requirement; interviews with experts, including those within FWS, State conservation departments, universities and others who may have data not yet published in scientific literature; an analysis of the effects of the proposal on the species in terms of individuals and populations, including consideration of indirect effects of the proposal on the species and its habitat; an analysis of alternative actions considered. The BA should document the results, including a discussion of study methods used, and problems encountered, and other relevant information. The BA should conclude whether or not a listed or proposed species will be affected. Upon completion, the BA should be forwarded to our office.

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[1] A construction project (or other undertaking having similar physical impacts) which is a major federal action significantly affecting the quality of the human environment as referred to in NEPA (42 U.S.C. 4332(2)C).

[2] "Effects of the action" refers to the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action.