(c) Special flight permits may be issued in accordance with sections 21.197 and 21.199 of the Federal Aviation Regulations (14 CFR 21.197 and 21.199) to operate the airplane to a location where the requirements of this AD can be accomplished.

Issued in Renton, Washington, on August 2, 1996.

Gary L. Killion,

Acting Manager, Transport Airplane Directorate, Aircraft Certification Service.

[FR Doc. 96–20290 Filed 8–8–96; 8:45 am]

BILLING CODE 4910–13–P

DEPARTMENT OF THE INTERIOR

Minerals Management Service

30 CFR Part 250

RIN 1010–AC19

Proposed Rule to Clarify Unitization

AGENCY: Minerals Management Service (MMS), Interior.

ACTION: Extension of comment period for proposed rule.

SUMMARY: This document extends to August 19, 1996, the deadline for the submission of comments on the proposed rule governing unitization of Outer Continental Shelf oil and gas leases, which was published on June 5, 1996. The proposed rule amends the unitization regulations by removing the model unit agreements, making them available from the Regional Supervisor as needed.

DATES: We will consider all comments that are received by August 19, 1996. We will begin our review of those comments at that time and may not fully consider comments we receive after August 19, 1996.

ADDRESSES: Mail or hand-carry comments to the Department of the Interior; Minerals Management Service; 381 Elden Street; Mail Stop 4700; Herndon, Virginia 20170–4817; Attention: Chief, Engineering and Standards Branch.

FOR FURTHER INFORMATION CONTACT:

Judy Wilson, Engineering and Standards Branch, Telephone (703) 787–1600.

SUPPLEMENTARY INFORMATION: The MMS has been asked to extend the deadline for respondents to submit comments on the proposed rule published on June 5, 1996 (61 FR 28525). The requests explain that more time is needed to allow respondents time to prepare comments on omissions in the proposed rule.

Dated: August 5, 1996.

Lucy R. Querques,

Acting Associate Director for Offshore Minerals Management.

[FR Doc. 96–20354 Filed 8–8–96; 8:45 am]

BILLING CODE 4310–MR–M

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

50 CFR Parts 222 and 227

[Docket No. 960730210–6210–01; I.D. 050294D]

Endangered and Threatened Species: Proposed Endangered Status for Five ESUs of Steelhead and Proposed Threatened Status for Five ESUs of Steelhead in Washington, Oregon, Idaho, and California

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION: Proposed rule; request for comments.

SUMMARY: NMFS has completed a comprehensive status review of West Coast steelhead (*Oncorhynchus mykiss*, or *O. mykiss*) populations in Washington, Oregon, Idaho, and California, and has identified 15 Evolutionarily Significant Units (ESUs) within this range. NMFS is now issuing a proposed rule to list five ESUs as endangered and five ESUs as threatened under the Endangered Species Act (ESA). The endangered steelhead ESUs are located in California (Central California Coast, South/Central California Coast, Southern California, and Central Valley ESUs) and Washington (Upper Columbia River ESU). The threatened steelhead ESUs are dispersed throughout all four states and include the Snake River Basin, Lower Columbia River, Oregon Coast, Klamath Mountains Province, and Northern California ESUs. NMFS is also designating the Middle Columbia River ESU as a candidate species.

NMFS is requesting public comments on the biological issues pertaining to this proposed rule and suggestions on integrated local/state/Federal conservation measures that might best achieve the purposes of the ESA relative to recovering the health of steelhead populations and the ecosystems upon which they depend. Should the proposed listings be made final, protective regulations under the ESA would be put into effect and a recovery program would be implemented.

DATES: Comments must be received by November 7, 1996. NMFS will announce the dates and locations of public hearings in Washington, Oregon, Idaho, and California in a separate Federal Register document. Requests for additional public hearings must be received by September 23, 1996.

ADDRESSES: Comments on this proposed rule and requests for public hearings or reference materials should be sent to the Protected Species Branch, Environmental and Technical Services Division, NMFS, Northwest Region, 525 NE Oregon Street, Suite 500, Portland, OR 97232–2737.

FOR FURTHER INFORMATION CONTACT: Garth Griffin, 503–231–2005, Craig Wingert, 310–980–4021, or Marta Nammack, 301–713–1401.

SUPPLEMENTARY INFORMATION:

Background

On May 5, 1992, NMFS received a petition to list Illinois River winter steelhead from the Oregon Natural Resources Council, the Siskiyou Regional Education Project, Federation of Fly Fishers, Kalmiopsis Audubon Society, Siskiyou Audubon Society, Klamath/Siskiyou Coalition, Headwaters, The Wilderness Society, North Coast Environmental Center, The Sierra Club—Oregon Chapter, and the National Wildlife Federation. On July 31, 1992, NMFS published a notice stating that the petition presented substantial information indicating that a listing might be warranted (57 FR 33939) and concurrently solicited information about the status of this population. NMFS completed a status review (Busby et al. 1993) that was summarized in a May 20, 1993, determination (58 FR 29390). NMFS concluded that Illinois River winter steelhead did not represent a ''species'' under the ESA and therefore, a proposal to list this population was not warranted. However, NMFS recognized that this population was part of a larger ESU whose extent had not yet been determined, but whose status might warrant listing because of declining trends in steelhead abundance observed in several southern Oregon streams.

In its May 20, 1993, finding regarding Illinois River winter steelhead, NMFS announced that it would conduct an expanded status review to identify all coastal steelhead ESU(s) within California, Oregon, and Washington, and to determine whether any identified ESU(s) warrant listing under the ESA. Subsequently, on February 16, 1994, NMFS received a petition from the Oregon Natural Resources Council and 15 co-petitioners to list all steelhead (or

specific ESUs, races, or stocks) within the states of California, Oregon, Washington, and Idaho. In response to this petition, NMFS announced the expansion of its status review of steelhead to include inland steelhead populations occurring in eastern Washington and Oregon and the State of Idaho (59 FR 27527, May 27, 1994).

On September 21, 1993, NMFS received a petition from Washington Trout to list Deer Creek summer steelhead. On December 23, 1993, NMFS concluded that the petition presented substantial information indicating that listing may be warranted (58 FR 68108). NMFS completed a status review which concluded that Deer Creek summer steelhead did not represent a ''species'' under the ESA (59 FR 59981, November 21, 1994), and, therefore, a proposal to list this population under the ESA was not warranted. However, NMFS further concluded that Deer Creek summer steelhead were part of a larger ESU that may warrant listing under the ESA and for which a status review was currently underway.

On March 16, 1995, NMFS published a proposed rule to list Klamath Mountains Province steelhead as threatened (60 FR 14253). This proposal included steelhead populations occurring in coastal streams between Cape Blanco, OR, and the Klamath River Basin in Oregon and California, inclusive. A brief summary of this ESU is included in the current proposed rule. Public comments were received on this earlier proposal.

During the coastwide steelhead status review, NMFS assessed the best available scientific and commercial data, including technical information from Pacific Salmon Biological Technical Committees (PSBTCs) and interested parties in Washington, Oregon, Idaho, and California. The PSBTCs consisted primarily of scientists (from Federal, state, and local resource agencies, Indian tribes, industries, universities, professional societies, and public interest groups) possessing technical expertise relevant to steelhead and their habitats.

A NMFS Biological Review Team, composed of staff from NMFS' Northwest Fisheries Science Center and Southwest Regional Office, as well as a representative of the National Biological Service, has completed a coastwide status review for steelhead [Memorandum to William Stelle and Hilda Diaz-Soltero from M. Schiewe, July 17, 1995, Review of the Status of Steelhead (*O. mykiss*) from Washington, Idaho, Oregon, and California under the U.S. Endangered Species Act]. Copies of the memorandum are available upon request (see **ADDRESSES** section). The review, summarized below, identifies 15 ESUs of steelhead in the four states. NMFS is proposing to list five ESUs as endangered and five ESUs as threatened under the ESA. In addition, NMFS is proposing to add the Middle Columbia River ESU to the candidate species list. The complete results of NMFS' status review of steelhead populations will be published in a forthcoming NOAA Technical Memorandum (Busby et al., in press).

Steelhead Life History

Steelhead exhibit one of the most complex suite of life history traits of any salmonid species. Steelhead may exhibit anadromy (meaning that they migrate as juveniles from fresh water to the ocean, and then return to spawn in fresh water) or freshwater residency (meaning that they reside their entire life in fresh water). Resident forms are usually referred to as ''rainbow'' or ''redband'' trout, while anadromous life forms are termed ''steelhead.'' Few detailed studies have been conducted regarding the relationship between resident and anadromous *O. mykiss* and as a result, the relationship between these two life forms is poorly understood. Recently however, the scientific name for the biological species that includes both steelhead and rainbow trout was changed from *Salmo gairdneri* to *O. mykiss.* This change reflects the premise that all trouts from western North America share a common lineage with Pacific salmon.

Steelhead typically migrate to marine waters after spending 2 years in fresh water. They then reside in marine waters for typically 2 or 3 years prior to returning to their natal stream to spawn as 4- or 5-year-olds. Unlike Pacific salmon, steelhead are iteroparous, meaning that they are capable of spawning more than once before they die. However, it is rare for steelhead to spawn more than twice before dying; most that do so are females. Steelhead adults typically spawn between December and June (Bell, 1990). Depending on water temperature, steelhead eggs may incubate in ''redds'' (nesting gravels) for 1.5 to 4 months before hatching as ''alevins'' (a larval life stage dependent on food stored in a yolk sac). Following yolk sac absorption, alevins emerge from the gravel as young juveniles or ''fry'' and begin actively feeding. Juveniles rear in fresh water from 1 to 4 years, then migrate to the ocean as ''smolts.''

Biologically, steelhead can be divided into two reproductive ecotypes, based on their state of sexual maturity at the time of river entry and the duration of their spawning migration. These two ecotypes are termed ''stream maturing'' and ''ocean maturing.'' Stream maturing steelhead enter fresh water in a sexually immature condition and require several months to mature and spawn. Ocean maturing steelhead enter fresh water 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 (e.g., summer and winter steelhead).

Two major genetic groups or ''subspecies'' of steelhead occur on the west coast of the United States: a coastal group and an inland group, separated in the Fraser and Columbia River Basins by the Cascade crest approximately (Huzyk & Tsuyuki, 1974: Allendorf, 1975; Utter & Allendorf, 1977; Okazaki, 1984; Parkinson, 1984; Schreck et al., 1986; Reisenbichler et al., 1992). Behnke (1992) proposed to classify the coastal subspecies as *O. m. irideus* and the inland subspecies as *O. m. gairdneri.* These genetic groupings apply to both anadromous and nonanadromous forms of *O. mykiss.* Both coastal and inland steelhead occur in Washington and Oregon. California is thought to have only coastal steelhead while Idaho has only inland steelhead.

Historically, steelhead were distributed throughout the North Pacific Ocean from the Kamchatka Peninsula in Asia to the northern Baja Peninsula. Presently, the species distribution extends from the Kamchatka Peninsula, east and south along the Pacific coast of North America, to at least Malibu Creek in southern California. There are infrequent anecdotal reports of steelhead continuing to occur as far south as the Santa Margarita River in San Diego County (McEwan & Jackson, 1996). Historically, steelhead likely inhabited most coastal streams in Washington, Oregon, and California as well as many inland streams in these states and Idaho. However, during this century, over 23 indigenous, naturally-reproducing stocks of steelhead are believed to have been extirpated, and many more are thought to be in decline in numerous coastal and inland streams in Washington, Oregon, Idaho, and California. Forty-three stocks have been identified by Nehlsen et al. (1991) as being at moderate or high risk of extinction.

Consideration as a ''Species'' Under the ESA

To qualify for listing as a threatened or endangered species, the identified populations of steelhead must be considered ''species'' under the ESA.

The ESA defines a ''species'' to include ''any subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate fish or wildlife which interbreeds when mature.'' NMFS published a policy (56 FR 58612, November 20, 1991) describing the agencies application of the ESA definition of ''species'' to anadromous Pacific salmonid species. NMFS's policy provides that a Pacific salmonid population will be considered distinct and, hence, a species under the ESA if it represents an ESU of the biological species. A population must satisfy two criteria to be considered an ESU: (1) It must be reproductively isolated from other conspecific population units, and (2) it must represent an important component in the evolutionary legacy of the biological species. The first criterion, reproductive isolation, need not be absolute, but must be strong enough to permit evolutionarily important differences to accrue in different population units. The second criterion is met if the population contributes substantially to the ecological/genetic diversity of the species as a whole. Guidance on the application of this policy is contained in a scientific paper ''Pacific Salmon (*Oncorhynchus* spp.) and the Definition of 'Species' under the Endangered Species Act'' and a NOAA Technical Memorandum ''Definition of 'Species' Under the Endangered Species Act: Application to Pacific Salmon,'' which are available upon request (see **ADDRESSES**). The following sections describe the genetic, ecological, and life history characteristics, as well as human-induced genetic changes that NMFS assessed to determine the number and geographic extent of steelhead ESUs.

Reproductive Isolation

Genetic data provide useful indirect information on reproductive isolation because they integrate information about migration and gene flow over evolutionarily important time frames. During the status review, NMFS worked in cooperation with the States of California, Oregon, Idaho, and Washington to develop a genetic stock identification data base for steelhead. Natural and hatchery steelhead were collected by NMFS, California Department of Fish and Game (CDFG), Oregon Department of Fish and Wildlife (ODFW), Idaho Department of Fish and Game (IDFG), Washington Department of Fish and Wildlife (WDFW), and U.S. Fish and Wildlife Service (USFWS) for protein electrophoretic analysis by NMFS and WDFW. Existing NMFS data for Columbia and Snake River Basin steelhead were also included in the data base.

In addition to the new studies, published results from numerous studies of genetic characteristics of steelhead populations were considered. These included studies based on protein electrophoresis (Huzyk & Tsuyuki, 1974; Allendorf, 1975; Utter & Allendorf, 1977; Okazaki, 1984; Parkinson, 1984; Campton & Johnson, 1985; Milner & Teel, 1985; Schreck et al., 1986; Hershberger & Dole, 1987; Berg & Gall, 1988; Reisenbichler & Phelps, 1989; Reisenbichler et al., 1992; Currens & Schreck, 1993; Waples et al., 1993; Phelps et al., 1994; Leider et al., 1995). Supplementing these protein electrophoretic studies were two studies based on mitochondrial DNA (Buroker, unpublished; Nielsen, 1994) and chromosomal karyotyping studies conducted by Thorgard (1977, 1983) and Ostberg and Thorgard (1994).

Genetic information obtained from allozyme, DNA, and chromosomal sampling indicate a strong differentiation between coastal and inland subspecies of steelhead. Several studies have identified coastal and inland forms of *O. mykiss* as distinct genetic life forms. Allendorf (1975) first identified coastal and inland steelhead life forms in Washington, Oregon, and Idaho based on large and consistent allele frequency differences which applied to both anadromous and resident *O. mykiss*. In the Columbia River, it was determined that the geographic boundary of these life forms occurs at about the Cascade crest. Subsequent studies have supported this finding (Utter & Allendorf, 1977; Okazaki, 1984; Schreck et al., 1986; Reisenbichler et al., 1992). Recent genetic data from WDFW further supports the major differentiation between coastal and inland steelhead forms.

Few detailed studies have explored the relationship between resident and anadromous *O. mykiss* residing in the same location. Genetic studies generally show that, in the same geographic area, resident and anadromous life forms are more similar to each other than either is to the same form from a different geographic area. Recently, Leider et al. (1995) found that results from comparisons of rainbow trout in the Elwha and Cedar Rivers and Washington steelhead indicate that the two forms are not reproductively isolated. Further, Leider et al. (1995) also concluded that, based on preliminary analyses of data from the Yakima and Big White Salmon Rivers, resident trout would be genetically indistinguishable from steelhead. Based on these studies, it appears that resident and anadromous *O. mykiss* from the same geographic area may share a common gene pool, at least over evolutionary time periods.

Based on the available genetic information, it was the consensus of NMFS scientists, as well as regional fishery biologists, that resident fish should generally be considered part of the steelhead ESUs. However, even though NMFS requested data regarding resident rainbow trout abundance during its west coast steelhead status review, very little was received, making status determinations with respect to resident rainbow trout problematic. Because available information does not clearly define the relationship between resident rainbow trout and steelhead, NMFS is not proposing to list resident rainbow trout at this time. However, through this proposed rule, NMFS is requesting public comment regarding the inclusion of resident rainbow trout in proposed steelhead ESUs. Prior to the final listing determination, NMFS will work with the U.S. Fish and Wildlife Service (USFWS) and other fisheries comanagers to examine the relationship between resident and anadromous *O. mykiss* in the ESUs proposed for listing.

Genetic Changes Due to Human Activities

The effects of artificial propagation and other human activities can be relevant to ESA listing determinations in two ways. First, such activities can genetically change natural populations so much that they no longer represent an evolutionarily significant component of the biological species (Waples, 1991). For example, in 1991, NMFS concluded that, as a result of massive and prolonged effects of artificial propagation, harvest, and habitat degradation, the agency could not identify natural populations of coho salmon (*O. kisutch*) in the lower Columbia River that qualified for ESA listing consideration (56 FR 29553, June 27, 1991). Second, risks to the viability and genetic integrity of native salmon populations posed by human activities may contribute to their threatened or endangered status (Goodman, 1990; Hard et al., 1992). The severity of these effects on natural populations depends both on the nature of the effects (e.g., harvest rate, gear size, or type of hatchery practice) and their magnitude (e.g., duration of a hatchery program and number and life-history stage of hatchery fish involved).

In the case of west coast steelhead, artificial propagation is a common practice to supplement stocks for recreational fisheries. However, in many

areas, a significant portion of the naturally spawning population consists of hatchery-produced steelhead. In several of the steelhead ESUs, over 50 percent of the naturally spawning fish are from hatcheries. Many of these hatchery-produced fish are derived from a few stocks which may or may not have originated from the geographic area where they are released. Artificial propagation of steelhead has been, and continues to be, a common occurrence throughout the range of west coast steelhead. However, in several of the ESUs analyzed, insufficient or uncertain information exists regarding the interactions between hatchery and natural fish, and the relative abundance of hatchery and natural stocks. The impacts of hatchery activities in specific ESUs is discussed below under Status of Steelhead ESUs.

Ecological/Genetic Diversity

Several types of physical and biological evidence were considered in evaluating the contribution of steelhead from Washington, Oregon, Idaho, and California to the ecological/genetic diversity of the biological species throughout its range. Factors examined included: (1) The physical environment—geology, soil type, air temperature, precipitation, river flow patterns, water temperature, and vegetation; (2) biogeography—marine, estuarine, and freshwater fish distributions; and (3) life history traits—age at smolting, age at spawning, river entry timing, and spawning timing. An analysis of the physical environment and life history traits provides important insight into the ecological/genetic diversity of the species and can reflect unusual or distinctive adaptations that promote evolutionary processes. Following is a brief summary of the relevance of these factors for each ESU.

ESU Determinations

The ESU determinations described here represent a synthesis of a large amount of diverse information. In general, the proposed geographic boundaries for each ESU (i.e., the watersheds within which the members of the ESU are typically found) are supported by several lines of evidence that show similar patterns. However, the diverse data sets are not always entirely congruent (nor would they be expected to be), and the proposed boundaries are not necessarily the only ones possible. For example, in some cases (e.g., in the Middle Columbia River near the Cascade Crest), environmental changes occur over a transition zone rather than abruptly.

Based on the best available scientific and commercial information, including the biological effects of human activities, NMFS has identified 15 ESUs that include steelhead populations from Washington, Oregon, Idaho, and California. The 15 ESUs are briefly described and characterized below. Genetic data (from studies of protein electrophoresis and DNA) were the primary evidence considered for the reproductive isolation criterion, supplemented by inferences about barriers to migration created by natural geographic features and human-induced changes resulting from artificial propagation and harvest. Factors considered to be most informative in evaluating ecological/genetic diversity include data pertaining to the physical environment, ocean conditions/upwelling, vegetation, estuarine and freshwater fish distributions, river entry, and spawning timing.

(1) Puget Sound

The geographic boundaries of this coastal steelhead ESU extend from the United States/Canada border and include steelhead in river basins of the Strait of Juan de Fuca, Puget Sound, and Hood Canal, WA. Included are river basins east of and including the Elwha River and north to include the Nooksack River. This region is in the rain shadow of the Olympic Mountains, is therefore drier than the rainforest area of the western Olympic Peninsula, and is dominated by western hemlock forests. Streams are characterized by cold water, high average flows, and a relatively long duration of peak flows that occur twice each year.

Recent genetic data provided by WDFW show that steelhead in the Puget Sound area generally form a coherent group distinct from populations elsewhere in Washington. Chromosomal studies show that steelhead from the Puget Sound area have a distinctive karyotype not found in other regions. No recent genetic comparisons have been made between Puget Sound and British Columbia steelhead; however, Nooksack River steelhead tend to differ genetically from other Puget Sound stocks, indicating a genetic transition zone in northern Puget Sound.

In life history traits, there appears to be a sharp transition between steelhead populations from Washington, which smolt primarily at age 2, and those in British Columbia, which most commonly smolt at age 3. This pattern holds for comparisons across the Strait of Juan de Fuca as well as for comparisons of Puget Sound and Strait of Georgia populations. At the present time, therefore, evidence suggests that the northern boundary for this ESU coincides approximately with the United States/Canada border. This ESU is primarily composed of winter steelhead but includes several stocks of summer steelhead, usually in subbasins of large river systems and above seasonal hydrologic barriers.

(2) Olympic Peninsula

This coastal steelhead ESU occupies river basins of the Olympic Peninsula, WA, west of the Elwha River and south to, but not including, the rivers that flow into Grays Harbor, WA. Streams in the Olympic Peninsula are similar to those in Puget Sound and are characterized by high levels of precipitation and cold water, high average flows, and a relatively long duration of peak flows that occur twice a year. In contrast to the more inland areas of Puget Sound where western hemlock is the dominant forest cover at sea level, lowland vegetation in this region is dominated by Sitka spruce.

Genetic data collected by WDFW indicate that steelhead in this region are substantially isolated from other regions in western Washington. Only limited life history information is available for Olympic Peninsula steelhead, and the information that does exist is primarily from winter-run fish. As with the Puget Sound ESU, known life history attributes of Olympic Peninsula steelhead are similar to those for other west coast steelhead, the notable exception being the difference between United States and Canadian populations in age at smolting. This ESU is primarily composed of winter steelhead but includes several stocks of summer steelhead in the larger rivers.

(3) Southwest Washington

This coastal steelhead ESU occupies the river basins of, and tributaries to, Grays Harbor, Willapa Bay, and the Columbia River below the Cowlitz River in Washington and below the Willamette River in Oregon. Willapa Bay and Grays Harbor in southwest Washington have extensive intertidal mud and sand flats and differ substantially from estuaries to the north and south. This similarity between the Willapa Bay and Grays Harbor estuaries results from the shared geology of the area and the transportation of Columbia River sediments northward along the Washington coast. Rivers draining into the Columbia River have their headwaters in increasingly drier areas, moving from west to east. Columbia River tributaries that drain the Cascade Mountains have proportionally higher flows in late summer and early fall than rivers on the Oregon coast.

Recent genetic data (Leider et al., 1995) show consistent differences between steelhead populations from the southwest Washington coast and coastal areas to the north, as well as Columbia River drainages east of the Cowlitz River. Genetic data do not clearly define the relationship between southwest Washington steelhead and lower Columbia River steelhead. This ESU is primarily composed of winter steelhead but includes summer steelhead in the Humptulips and Chehalis River Basins.

(4) Lower Columbia River

This coastal steelhead ESU occupies tributaries to the Columbia River between the Cowlitz and Wind Rivers in Washington and the Willamette and Hood Rivers in Oregon. Excluded are steelhead in the upper Willamette River Basin above Willamette Falls, and steelhead from the Little and Big White Salmon Rivers in Washington. Similar to Willapa Bay and Grays Harbor in southwest Washington, the lower Columbia River has extensive intertidal mud and sand flats and differs substantially from estuaries to the north and south. This similarity results from the shared geology of the area and the transportation of Columbia River sediments northward along the Washington coast. Rivers draining into the Columbia River have their headwaters in increasingly drier areas, moving from west to east. Columbia River tributaries that drain the Cascade Mountains have proportionally higher flows in late summer and early fall than rivers on the Oregon coast.

Steelhead populations in this ESU are of the coastal genetic group (Schreck et al., 1986; Reisenbichler et al., 1992; Chapman et al., 1994), and a number of genetic studies have shown that they are part of a different ancestral lineage than inland steelhead from the Columbia River Basin. Genetic data also show steelhead from this ESU to be distinct from steelhead from the upper Willamette River and coastal streams in Oregon and Washington. WDFW data showed genetic affinity between the Kalama, Wind, and Washougal River steelhead. The data show differentiation between the Lower Columbia River ESU and the Southwest Washington and Middle Columbia River Basin ESUs. This ESU is composed of winter steelhead and summer steelhead.

(5) Upper Willamette River

This coastal steelhead ESU occupies the Willamette River and its tributaries, upstream from Willamette Falls. The Willamette River Basin is zoogeographically complex. In addition to its connection to the Columbia River, the Willamette has had connections with coastal basins through stream capture and headwater transfer events (Minckley et al., 1986).

Steelhead from the upper Willamette River are genetically distinct from those in the lower river. Reproductive isolation from lower river populations may have been facilitated by Willamette Falls, which is known to be a migration barrier to some anadromous salmonids. For example, winter steelhead and spring chinook salmon (*O. tshawytscha*) occurred historically above the falls, but summer steelhead, fall chinook salmon, and coho salmon did not (PGE, 1994).

The native steelhead of this basin are late-migrating winter steelhead, entering fresh water primarily in March and April (Howell et al., 1985), whereas most other populations of west coast winter steelhead enter fresh water beginning in November or December. As early as 1885, fish ladders were constructed at Willamette Falls to aid the passage of anadromous fish. The ladders have been modified and rebuilt, most recently in 1971, as technology has improved (Bennett, 1987; PGE, 1994). These fishways facilitated successful introduction of Skamania stock summer steelhead and early-migrating Big Creek stock winter steelhead to the upper basin. Another effort to expand the steelhead production in the upper Willamette River was the stocking of native steelhead in tributaries not historically used by that species. Native steelhead primarily used tributaries on the east side of the basin, with cutthroat trout predominating in streams draining the west side of the basin.

Nonanadromous *O. mykiss* are known to occupy the Upper Willamette River Basin; however, most of these nonanadromous populations occur above natural and manmade barriers (Kostow, 1995). Historically, spawning by Upper Willamette River steelhead was concentrated in the North and Middle Santiam River Basins (Fulton, 1970). These areas are now largely blocked to fish passage by dams, and steelhead spawning is now distributed throughout more of the Upper Willamette River Basin than in the past (Fulton, 1970). Due to introductions of nonnative steelhead stocks and transplantation of native stocks within the basin, it is difficult to formulate a clear picture of the present distribution of native Upper Willamette River Basin steelhead, and their relationship to nonanadromous and possibly residualized *O. mykiss* within the basin.

(6) Oregon Coast

This coastal steelhead ESU occupies river basins on the Oregon coast north of Cape Blanco, excluding rivers and streams that are tributaries of the Columbia River. Most rivers in this area drain the Coast Range Mountains, have a single peak in flow in December or January, and have relatively low flow during summer and early fall. The coastal region receives fairly high precipitation levels, and the vegetation is dominated by Sitka spruce and western hemlock. Upwelling off the Oregon coast is much more variable and generally weaker than areas south of Cape Blanco. While marine conditions off the Oregon and Washington coasts are similar, the Columbia River has greater influence north of its mouth, and the continental shelf becomes broader off the Washington coast.

Recent genetic data from steelhead in this ESU are limited, but they show a level of differentiation from populations from Washington, the Columbia River Basin, and coastal areas south of Cape Blanco. Ocean migration patterns also suggest a distinction between steelhead populations north and south of Cape Blanco. Steelhead (as well as chinook and coho salmon) from streams south of Cape Blanco tend to be south-migrating rather than north-migrating (Everest, 1973; Nicholas & Hankin, 1988; Pearcy et al., 1990; Pearcy, 1992).

The Oregon Coast ESU primarily contains winter steelhead; there are only two native stocks of summer steelhead. Summer steelhead occur only in the Siletz River, above a waterfall, and in the North Umpqua River, where migration distance may prevent full utilization of available habitat by winter steelhead. Alsea River winter steelhead have been widely used for steelhead broodstock in coastal rivers. Populations of nonanadromous *O. mykiss* are relatively uncommon on the Oregon coast, as compared with other areas, occurring primarily above migration barriers and in the Umpqua River Basin (Kostow, 1995).

Little information is available regarding migration and spawn timing of natural steelhead populations within this ESU. Age structure appears to be similar to other west coast steelhead, dominated by 4-year-old spawners. Iteroparity is more common among Oregon coast steelhead than populations to the north.

(7) Klamath Mountains Province

This coastal steelhead ESU occupies river basins from the Elk River in Oregon to the Klamath and Trinity Rivers in California, inclusive. A detailed discussion of this ESU is presented in a previous NMFS status review (Busby et al., 1994). Geologically, this region includes the

Klamath Mountains Province, which is not as erosive as the Franciscan formation terrains south of the Klamath River Basin. Dominant vegetation along the coast is redwood forest, while some interior basins are much drier than surrounding areas and are characterized by many endemic species. Elevated stream temperatures are a factor affecting steelhead and other species in some of the larger river basins. With the exception of major river basins such as the Rogue and Klamath, most rivers in this region have a short duration of peak flows. Strong and consistent coastal upwelling begins at about Cape Blanco and continues south into central California, resulting in a relatively productive nearshore marine environment.

Protein electrophoretic analyses of coastal steelhead have indicated genetic discontinuities between the steelhead of this region and those to the north and south (Hatch, 1990; Busby et al., 1993, 1994). Chromosomal studies have also identified a distinctive karyotype that has been reported only from populations within this ESU. Steelhead within this ESU include both winter and summer steelhead as well as the unusual ''half-pounder'' life history (characterized by immature steelhead that return to fresh water after only 2 to 4 months in salt water, overwinter in rivers without spawning, then return to salt water the following spring).

Among the remaining questions regarding this ESU is the relationship between *O. mykiss* below and above Klamath Falls, OR. Behnke (1992) has proposed that the two groups are in different subspecies, and that the upper group, a redband trout (*O. m. newberrii*), exhibited anadromy until blocked by the Copco dams in the early 1900's. However, Moyle (1976) stated that Klamath Falls was the upstream barrier to anadromous fish prior to construction of the dams.

(8) Northern California

This coastal steelhead ESU occupies river basins from Redwood Creek in Humboldt County, CA to the Gualala River, inclusive. Dominant vegetation along the coast is redwood forest, while some interior basins are much drier than surrounding areas and are characterized by many endemic species. This area includes the extreme southern end of the contiguous portion of the Coast Range Ecoregion (Omernick, 1987). Elevated stream temperatures are a factor in some of the larger river basins (greater than 20°C), but not to the extent that they are in river basins farther south. Precipitation is generally higher in this geographic area than in regions to the south, averaging 100–200 cm of rainfall annually (Donley et al., 1979). With the exception of major river basins such as the Eel, most rivers in this region have peak flows of short duration. Strong and consistent coastal upwelling begins at about Cape Blanco and continues south into central California, resulting in a relatively productive nearshore marine environment.

There are life history similarities between steelhead of the Northern California ESU and the Klamath Mountains Province ESU. This ESU includes both winter and summer steelhead, including what is presently considered to be the southernmost population of summer steelhead, in the Middle Fork Eel River. Half-pounder juveniles also occur in this geographic area, specifically in the Mad and Eel Rivers. Snyder (1925) first described the half-pounder from the Eel River; however, Cramer et al. (1995) suggested that adults with the half-pounder juvenile life history may not spawn south of the Klamath River Basin. As with the Rogue and Klamath Rivers, some of the larger rivers in this area have migrating steelhead year-round, and seasonal runs have been named. River entry ranges from August through June and spawning from December through April, with peak spawning in January in the larger basins and late February and March in the smaller coastal basins.

(9) Central California Coast

This coastal steelhead ESU occupies river basins from the Russian River to Soquel Creek, Santa Cruz County (inclusive), and the drainages of San Francisco and San Pablo Bays; excluded is the Sacramento-San Joaquin River Basin of the Central Valley of California. This area is characterized by very erosive soils in the coast range mountains; redwood forest is the dominant coastal vegetation for these drainages. Precipitation is lower here than in areas to the north, and elevated stream temperatures (greater than 20°C) are common in the summer. Coastal upwelling in this region is strong and consistent, resulting in a relatively productive nearshore marine environment.

Analysis of mitochondrial DNA (mtDNA) data suggests that genetic transitions occur north of the Russian River and north of Monterey, California. Allozyme data show large genetic differences between steelhead populations from the Eel and Mad Rivers and those to the south. Only winter steelhead are found in this ESU and those to the south. River entry ranges from October in the larger basins, late November in the smaller coastal basins, and continues through June. Steelhead spawning begins in November in the larger basins, December in the smaller coastal basins, and can continue through April with peak spawning generally in February and March. Little other life history information exists for steelhead in this ESU.

(10) South/Central California Coast

This coastal steelhead ESU occupies rivers from the Pajaro River, located in Santa Cruz County, CA, to (but not including) the Santa Maria River. Most rivers in this ESU drain the Santa Lucia Range, the southernmost unit of the California Coast Ranges. The climate is drier and warmer than in the north, which is reflected in the vegetational change from coniferous forest to chaparral and coastal scrub. Another biological transition at the north of this area is the southern limit of the distribution of coho salmon (*O. kisutch*). The mouths of many of the rivers and streams in this area are seasonally closed by sand berms that form during periods of low flow in the summer. The southern boundary of this ESU is near Point Conception, a well-known transition area for the distribution and abundance of marine flora and fauna.

Mitochondrial DNA data provide evidence for a genetic transition in the vicinity of Monterey Bay. Both mtDNA and allozyme data show large genetic differences between populations in this area, but do not provide a clear picture of population structure. Only winter steelhead are found in this ESU. River entry ranges from late November through March, with spawning from January through April. Little other life history information exists for steelhead in this ESU. The relationship between anadromous and nonanadromous *O. mykiss*, including possibly residualized fish upstream from dams, is unclear, but likely to be important.

(11) Southern California

This coastal steelhead ESU occupies rivers from (and including) the Santa Maria River to the southern extent of the species range which is presently considered to be Malibu Creek, in Los Angeles County (McEwan & Jackson, 1996). Migration and life history patterns of southern California steelhead depend more strongly on rainfall and streamflow than is the case for steelhead populations farther north (Moore, 1980; Titus et al., in press). River entry ranges from early November through June, with peaks in January and February. Spawning primarily begins in January and continues through early June, with

peak spawning in February and March. Average rainfall is substantially lower and more variable in this ESU than regions to the north, resulting in increased duration of sand berms across the mouths of streams and rivers and, in some cases, complete dewatering of the marginal habitats. Environmental conditions in marginal habitats may be extreme (e.g., elevated water temperatures, droughts, floods, and fires) and presumably impose selective pressures on steelhead populations. The use of southern California streams and rivers with elevated temperatures by steelhead suggests that populations within this ESU are able to withstand higher temperatures than those to the north. The relatively warm and productive waters of the Ventura River resulted in more rapid growth of juvenile steelhead than occurred in northerly populations. However, relatively little life history information exists for steelhead from this ESU.

Genetic data show large differences between steelhead populations within this ESU as well as between these and populations to the north. Steelhead populations between the Santa Ynez River and Malibu Creek show a predominance of a mtDNA type that is rare in populations to the north. Allozyme data indicate that two samples from Santa Barbara County are genetically among the most distinctive of any natural populations of coastal steelhead yet examined.

Among the remaining questions regarding this ESU are the distribution and abundance of steelhead south of Malibu Creek. For example, in years of substantial rainfall there have been reports of steelhead in some coastal streams as far south as the Santa Margarita River, San Diego County (Hubbs, 1946; Barnhart, 1986; Higgins, 1991; McEwan & Jackson, 1996; Titus et al., in press).

(12) Central Valley

This coastal steelhead ESU occupies the Sacramento and San Joaquin Rivers and their tributaries. In the San Joaquin Basin, however, the best available information suggests that the current range of steelhead has been limited to the Stanislaus, Tuolumne, and Merced Rivers (tributaries), and the mainstem San Joaquin River to its confluence with the Merced River by human alteration of formerly available habitat. The Sacramento and San Joaquin Rivers offer the only migration route to the drainages of the Sierra Nevada and southern Cascade mountain ranges for anadromous fish. The distance from the Pacific Ocean to spawning streams can exceed 300 km, providing unique potential for reproductive isolation among steelhead. The Central Valley is much drier than the coastal regions to the west, receiving on average only 10–50 cm of rainfall annually. The valley is characterized by alluvial soils, and native vegetation was dominated by oak forests and prairie grasses prior to agricultural development. Steelhead within this ESU have the longest freshwater migration of any population of winter steelhead. There is essentially one continuous run of steelhead in the upper Sacramento River. River entry ranges from July through May, with peaks in September and February. Spawning begins in late December and can extend into April (McEwan & Jackson, 1996).

Steelhead ranged throughout the tributaries and headwaters of the Sacramento and San Joaquin Rivers prior to dam construction, water development, and watershed perturbations of the 19th and 20th centuries. Present steelhead distribution in the central valley drainages has been greatly reduced (McEwan & Jackson, 1996), particularly in the San Joaquin basin. While there is little historical documentation regarding steelhead distribution in the San Joaquin River system, it can be assumed (based on known chinook salmon distributions in this drainage) that steelhead were present in the San Joaquin River and its tributaries from at least the San Joaquin River headwaters northward. With regards to the present distribution of steelhead, there is also only limited information. McEwan and Jackson (1996) reported that a small, remnant run of steelhead persists in the Stanislaus River, that steelhead were observed in the Tuolumne River in 1983, and that a few large rainbow trout that appear to be steelhead enter the Merced River Hatchery annually.

Recent allozyme data show that samples of steelhead from Deer and Mill Creeks and Coleman NFH on the Sacramento River are well differentiated from all other samples of steelhead from California. There are two recognized taxonomic forms of native *O. mykiss* within the Sacramento River Basin: Coastal steelhead/rainbow trout (*O. m. irideus*, Behnke, 1992) and Sacramento redband trout (*O. m. stonei*, Behnke, 1992). It is not clear how the coastal and Sacramento redband forms of *O. mykiss* interacted in the Sacramento River prior to construction of Shasta Dam in the 1940s. However, it appears the two forms historically co-occurred at spawning time, but may have maintained reproductive isolation.

Among the remaining questions regarding this ESU are the current presence, distribution, and abundance of steelhead in the San Joaquin River and its main tributaries (stanislaus, tuolumne, and Merced Rivers), and whether these steelhead stocks historically represented a separate ESU from those in the Sacramento River Basin. Also, the relationship between anadromous and nonanadromous *O. mykiss*, including possibly residualized fish upstream from dams, is unclear.

(13) Middle Columbia River Basin

This inland steelhead ESU occupies the Columbia River Basin from Mosier Creek, OR, upstream to the Yakima River, WA, inclusive. Steelhead of the Snake River Basin are excluded. Franklin and Dyrness (1973) placed the Yakima River Basin in the Columbia Basin Physiographic Province, along with the Deschutes, John Day, Walla Walla, and lower Snake River Basins. Geology within this province is dominated by the Columbia River Basalt formation, stemming from lava deposition in the miocene epoch, overlain by plio-Pleistocene deposits of glaciolacustrine origin (Franklin & Dyrness, 1973). This intermontane region includes some of the driest areas of the Pacific Northwest, generally receiving less than 40 cm of rainfall annually (Jackson, 1993). Vegetation is of the shrub-steppe province, reflecting the dry climate and harsh temperature extremes.

Genetic differences between inland and coastal steelhead are well established, although some uncertainty remains about the exact geographic boundaries of the two forms in the Columbia River (see discussion above for the Lower Columbia River ESU). Electrophoretic and meristic data show consistent differences between steelhead from the middle Columbia and Snake Rivers. No recent genetic data exist for natural steelhead populations in the upper Columbia River, but recent WDFW data show that the Wells Hatchery stock from the upper Columbia River does not have a close genetic affinity to sampled populations from the middle Columbia River.

All steelhead in the Columbia River Basin upstream from The Dalles Dam are summer-run, inland steelhead (Schreck et al., 1986; Reisenbichler et al., 1992; Chapman et al., 1994). Steelhead in Fifteenmile Creek, OR, are genetically allied with inland *O. mykiss*, but are winter-run. Winter steelhead are also found in the Klickitat and White Salmon Rivers, WA.

Life history information for steelhead of this ESU indicates that most middle Columbia River steelhead smolt at 2 years and spend 1 to 2 years in salt

water (i.e., 1-ocean and 2-ocean fish, respectively) prior to re-entering fresh water, where they may remain up to a year prior to spawning (Howell et al., 1985; BPA, 1992). Within this ESU, the Klickitat River is unusual in that it produces both summer and winter steelhead, and the summer steelhead are dominated by 2-ocean steelhead, whereas most other rivers in this region produce about equal numbers of both 1- and 2-ocean steelhead.

(14) Upper Columbia River Basin

This inland steelhead ESU occupies the Columbia River Basin upstream from the Yakima River, WA, to the United States/Canada Border. The geographic area occupied by this ESU forms part of the larger Columbia Basin Ecoregion (Omernik, 1987). The Wenatchee and Entiat Rivers are in the Northern Cascades Physiographic Province, and the Okanogan and Methow Rivers are in the Okanogan Highlands Physiographic Province. The geology of these provinces is somewhat similar and very complex, developed from marine invasions, volcanic deposits, and glaciation (Franklin & Dyrness, 1973). The river valleys in this region are deeply dissected and maintain low gradients except in extreme headwaters. The climate in this area includes extremes in temperatures and precipitation, with most precipitation falling in the mountains as snow. Streamflow in this area is provided by melting snowpack, groundwater, and runoff from alpine glaciers. Mullan et al. (1992) described this area as a harsh environment for fish and stated that ''it should not be confused with more studied, benign, coastal streams of the Pacific Northwest.''

Life history characteristics for Upper Columbia River Basin steelhead are similar to those of other inland steelhead ESUs; however, some of the oldest smolt ages for steelhead, up to 7 years, are reported from this ESU. This may be associated with the cold stream temperatures (Mullan et al., 1992). Based on limited data available from adult fish, smolt age in this ESU is dominated by 2-year-olds. Steelhead from the Wenatchee and Entiat Rivers return to fresh water after 1 year in salt water, whereas Methow River steelhead are primarily 2-ocean resident (Howell et al., 1985).

In 1939, the construction of Grand Coulee Dam on the Columbia River (RKm 956) blocked over 1,800 km of river from access by anadromous fish (Mullan et al., 1992). In an effort to preserve fish runs affected by Grand Coulee Dam, all anadromous fish migrating upstream were trapped at Rock Island Dam (RKm 729) from 1939 through 1943 and either released to spawn in tributaries between Rock Island and Grand Coulee Dams or spawned in hatcheries and the offspring released in that area (Peven, 1990; Mullan et al., 1992; Chapman et al., 1994). Through this process, stocks of all anadromous salmonids, including steelhead, which historically were native to several separate subbasins above Rock Island Dam, were randomly redistributed among tributaries in the Rock Island-Grand Coulee reach. Exactly how this has affected stock composition of steelhead is unknown.

(15) Snake River Basin

This inland steelhead ESU occupies the Snake River Basin of southeast Washington, northeast Oregon and Idaho. The Snake River flows through terrain that is warmer and drier on an annual basis than the upper Columbia Basin or other drainages to the north. Geologically, the land forms are older and much more eroded than most other steelhead habitat. The eastern portion of the basin flows out of the granitic geological unit known as the Idaho Batholith. The western Snake River Basin drains sedimentary and volcanic soils of the Blue Mountains complex. Collectively, the environmental factors of the Snake River Basin result in a river that is warmer and more turbid, with higher pH and alkalinity, than is found elsewhere in the range of inland steelhead.

Snake River Basin steelhead are summer steelhead, as are most inland steelhead, and comprise 2 groups, A-run and B-run, based on migration timing, ocean-age, and adult size. Snake River Basin steelhead enter fresh water from June to October and spawn in the following spring from March to May. A-run steelhead are thought to be predominately l-ocean, while B-run steelhead are thought to be 2-ocean (IDFG, 1994). Snake River Basin steelhead usually smolt at age-2 or -3 years (Whitt, 1954; BPA, 1992; Hassemer, 1992).

The steelhead population from Dworshak National Fish Hatchery (NFH) is the most divergent single population of inland steelhead based on genetic traits determined by protein electrophoresis. Additionally, steelhead returning to Dworshak NFH are considered to have a distinctive appearance and are the one steelhead population that is consistently referred to as B-run. NMFS considered the possibility that Dworshak NFH steelhead should be in their own ESU. However, little specific information was available regarding the characteristics of this population's native habitat in the North Fork Clearwater River, which is currently unavailable to anadromous fish due blockage by Dworshak Dam.

Status of Steelhead ESUs

The ESA defines the term ''endangered species'' as ''any species which is in danger of extinction throughout all or a significant portion of its range.'' The term ''threatened species'' is defined as ''any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.'' Thompson (1991) suggested that conventional rules of thumb, analytical approaches, and simulations may all be useful in making this determination. In previous status reviews (e.g., Weitkamp et al., 1995), NMFS has identified a number of factors that should be considered in evaluating the level of risk faced by an ESU, including: (1) Absolute numbers of fish and their spatial and temporal distribution; (2) current abundance in relation to historical abundance and current carrying capacity of the habitat; (3) trends in abundance; (4) natural and human-influenced factors that cause variability in survival and abundance; (5) possible threats to genetic integrity (e.g., from strays or outplants from hatchery programs); and (6) recent events (e.g., a drought or changes in harvest management) that have predictable short-term consequences for abundance of the ESU.

During the coastwide status review for steelhead, NMFS evaluated both quantitative and qualitative information to determine whether any proposed ESU is threatened or endangered according to the ESA. The types of information used in these assessments are described below, followed by a summary of results for each ESU.

Quantitative Assessments: A significant component of NMFS' status determination was analyses of abundance trend data. Principal data sources for these analyses were historical and recent runsize estimates derived from dam and weir counts, stream surveys, and angler catch estimates. Of the 160 steelhead stocks for which sufficient data existed, 118 (74 percent) exhibited declining trends in abundance, while the remaining 42 (26 percent) exhibited increasing trends in abundance. Sixty-five of the stock abundance trends analyzed were statistically significant. Of these, 57 (88 percent) indicated declining trends in abundance and the remaining 8 (12 percent) indicated increasing trends in

abundance. It should be noted that NMFS' analysis assumes that catch trends reflect trends in overall population abundance. NMFS recognizes that there are many problems with this assumption, with the result that the index may not precisely represent trends in the total population in a river basin. However, angler catch is the only information available for many steelhead populations, and changes in catch still provide a useful indication of trends in total population abundance.

Analyses of steelhead abundance indicate that across the species' range, the majority of naturally-reproducing steelhead stocks have exhibited declining long-term trends in abundance. The severity of declines in abundance tends to vary by geographic region. Based on historical and recent abundance estimates, stocks in the southern extent of the coastal steelhead range (i.e., California's Central Valley, South/Central and Southern California ESUs) appear to have declined significantly, with widespread stock extirpations. Northern areas of the coastal steelhead range tend to be relatively more stable with larger overall population sizes. However, stocks in these areas continue to exhibit downward abundance trends as well. In several areas, a lack of accurate runsize and trend data make estimating abundance difficult.

Qualitative Assessments: Numerous studies have attempted to classify the status of steelhead populations on the west coast of the United States. However, problems exist in applying results of these studies to NMFS' ESA evaluations. A significant problem is that the definition of ''stock'' or ''population'' varies considerably in scale among studies, and sometimes among regions within a study. In several studies, identified units range in size from large river basins, to minor coastal streams and tributaries. Only two studies (Nehlsen et al., 1991; Higgins et al., 1992) used categories which relate to the ESA ''threatened'' or ''endangered'' status. However, these studies applied their own interpretations of these terms to individual stocks, not to broader geographic units such as those discussed here. Another significant problem in applying previously published studies to this evaluation is the manner in which stocks or populations were selected to be included in the review. Several studies did not evaluate stocks which were not perceived to be at risk; therefore, it is difficult to determine the proportion of stocks they considered to be at risk in any given area.

Nehlsen et al. (1991) considered salmon and steelhead stocks throughout Washington, Idaho, Oregon, and California and enumerated all stocks that they found to be extinct or at risk of extinction. They considered 23 steelhead stocks to be extinct, one possibly extinct, 27 at high risk of extinction, 18 at moderate risk of extinction, and 30 of special concern. Steelhead stocks that do not appear in their summary were either not at risk of extinction or there was insufficient information to classify them. Higgins et al. (1992) used the same classification scheme as Nehlsen et al. (1991), but provided a more detailed review of northern California salmon stocks. Of the eleven steelhead stocks Higgins et al. identified as being at some risk of extinction, eight were classified as at high risk, two were classified as at moderate risk, and one was classified as of concern. Nickelson et al. (1992) rated coastal Oregon (excluding Columbia River Basin) salmon and steelhead stocks on the basis of their status over the past 20 years, classifying stocks as ''depressed'' (spawning habitat underseeded, declining trends, or recent escapements below long-term average), ''healthy'' (spawning habitat fully seeded and stable or increasing trends), or ''of special concern'' (300 or fewer spawners or a problem with hatchery interbreeding). Of 27 coastal populations identified, 5 were classified as healthy, 1 as of special concern, and 21 as depressed. Washington Department of Fisheries et al. (1993) categorized all salmon and steelhead stocks in Washington on the basis of stock origin (''native,'' ''non-native,'' ''mixed,'' or ''unknown''), production type (''wild,'' ''composite,'' or ''unknown'') and status (''healthy,'' ''depressed,'' ''critical,'' or ''unknown''). Of the 141 steelhead stocks identified in Washington, 36 were classified as healthy, 44 as critical, 1 as depressed, and 60 as unknown.

The following summaries draw on these quantitative and qualitative assessments to describe NMFS' conclusions regarding the status of each steelhead ESU.

(1) Puget Sound

No estimates of historical (pre-1960s) abundance specific to the Puget Sound ESU are available. Total run size for Puget Sound for the early 1980s can be calculated from estimates in Light (1987) as about 100,000 winter steelhead and 20,000 summer steelhead. Light (1987) provided no estimate of hatchery proportion specific to Puget Sound streams. For Puget Sound and coastal Washington combined, Light (1987) estimated that 70 percent of steelhead in ocean runs were of hatchery origin; the percentage in escapement to spawning grounds would be substantially lower due to differential harvest and hatchery rack returns. Recent 5-year average natural escapements for streams with adequate data range from less than 100 to 7,200, with corresponding total run sizes of 550 to 19,800. Total recent run size for major stocks in this ESU was greater than 45,000, with total natural escapement of about 22,000.

Of the 21 independent stocks for which adequate escapement information exists, 17 stocks have been declining and 4 increasing over the available data series, with a range from 18 percent annual decline (Lake Washington winter steelhead) to 7 percent annual increase (Skykomish River winter steelhead). Eleven of these trends (nine negative, two positive) were significantly different from zero. The two basins producing the largest numbers of steelhead (Skagit and Snohomish Rivers) both have overall upward trends.

Hatchery fish in this ESU are widespread, spawn naturally throughout the region, and are largely derived from a single stock (Chambers Creek). The proportion of spawning escapement comprised of hatchery fish ranged from less than 1 percent (Nisqually River) to 51 percent (Morse Creek). In general, hatchery proportions are higher in Hood Canal and the Strait of Juan de Fuca than in Puget Sound proper. Most of the hatchery fish in this region originated from stocks indigenous to the ESU, but are generally not native to local river basins. The WDFW has provided information supporting substantial temporal separation between hatchery and natural winter steelhead in this ESU. Given the lack of strong trends in abundance for the major stocks and the apparently limited contribution of hatchery fish to production of the late-run winter stocks, most winter steelhead stocks in the Puget Sound ESU appear to be naturally sustaining at this time. However, there are clearly isolated problems with sustainability of some steelhead runs in this ESU, notably Deer Creek summer steelhead (although juvenile abundance for this stock increased in 1994) and Lake Washington winter steelhead. Summer steelhead stocks within this ESU are all small, occupy limited habitat, and most are subject to introgression by hatchery fish.

NMFS concludes that the Puget Sound steelhead ESU is not presently in danger of extinction, nor is it likely to become endangered in the foreseeable

future. Despite this conclusion, NMFS has several concerns about the overall health of this ESU and about the status of certain stocks within the ESU. Recent trends in stock abundance are predominantly downward, although this may be largely due to recent climate conditions. Trends in the two largest stocks (Skagit and Snohomish Rivers) have been upward. The majority of steelhead produced within the Puget Sound region appear to be of hatchery origin, but most hatchery fish are harvested and do not contribute to natural spawning escapement. NMFS is particularly concerned that the majority of hatchery production originates from a single stock (Chambers Creek). The status of certain stocks within the ESU is also of concern, especially the depressed status of most stocks in the Hood Canal area and the steep declines of Lake Washington winter steelhead and Deer Creek summer steelhead.

(2) Olympic Peninsula

No estimates of historical (pre-1960s) abundance specific to the Olympic Peninsula ESU are available. Total run size for the major stocks in the Olympic Peninsula ESU for the early 1980's can be calculated from estimates in Light (1987) as about 60,000 winter steelhead. Light (1987) provided no estimate of hatchery proportion for these streams. For Puget Sound and coastal Washington together, Light (1987) estimated that 70 percent of steelhead were of hatchery origin. Recent 5-year average natural escapements for streams with adequate data range from 250 to 6,900, with corresponding total run sizes of 450 to 19,700. Total recent (1989–1993 average) run size for major streams in this ESU was about 54,000, with a natural escapement of 20,000 fish.

Of the 12 independent stocks for which adequate information existed to compute trends, 7 were declining and 5 increasing over the available data series, with a range from 8 percent annual decline to 14 percent annual increase. Three of the downward trends were significantly different from zero. Three of the four river basins producing the largest numbers of natural fish had upward trends in basinwide total numbers.

Hatchery fish are widespread and escaping to spawn naturally throughout the region, with hatchery production largely derived from a few parent stocks. Estimated proportions of hatchery fish in natural spawning areas range from 16 percent (Quillayute River) to 44 percent (Quinault River), with the two largest producers of natural fish (Quillayute and Queets Rivers) having the lowest proportions. The WDFW has provided information supporting substantial temporal separation between hatchery and natural winter steelhead in this ESU. Given the lack of strong trends in abundance and the apparently limited contribution of hatchery fish to production of the late-run winter stocks, most winter steelhead stocks in the Olympic Peninsula ESU appear to be naturally sustaining at this time. However, there are clearly isolated problems with sustainability of some winter steelhead runs in this ESU, notably the Pysht/Independents stock, which has a small population with a strongly declining trend over the available data series, and the Quinault River stock, which has a declining trend and substantial hatchery contribution to natural spawning.

NMFS concludes that the Olympic Peninsula steelhead ESU is not presently in danger of extinction, nor is it likely to become endangered in the foreseeable future. Despite this conclusion, NMFS has several concerns about the overall health of this ESU and about the status of certain stocks within the ESU. The majority of recent trends are upward (including three of the four largest stocks), although trends in several stocks are downward. These downward trends may be largely due to recent climate conditions. There is widespread production of hatchery steelhead within this ESU, largely derived from a few parent stocks, which could increase genetic homogenization of the resource despite management efforts to minimize introgression of the hatchery gene pool into natural populations.

(3) Southwest Washington

No estimates of historical (pre-1960's) abundance specific to this ESU are available. Recent 5-year average natural escapements for individual tributaries with adequate data range from 150 to 2,300, with the Chehalis River and its tributaries representing the bulk of production. Total recent (5-year average) natural escapement for major streams in this ESU was about 13,000.

All but 1 (Wynoochee River) of the 12 independent stocks have been declining over the available data series, with a range from 7 percent annual decline to 0.4 percent annual increase. Six of the downward trends were significantly different from zero. For Washington streams, these trends are for the late run ''wild'' component of winter steelhead populations; Oregon data included all stock components. Most of the Oregon trends are based on angler catch, and so may not reflect trends in underlying population abundance. In general, stock condition appears to be healthier in southwest Washington than in the lower Columbia River Basin.

Hatchery fish are widespread and escaping to spawn naturally throughout the region, largely from parent stocks from outside the ESU. This could substantially change the genetic composition of the resource despite management efforts to minimize introgression of the hatchery gene pool into natural populations. Estimates of the proportion of hatchery fish on natural spawning grounds range from 9 percent (Chehalis, the largest producer of steelhead in the ESU) to 82 percent (Clatskanie). Available information suggests substantial temporal separation between hatchery and natural winter steelhead in this ESU; however, some Washington stocks (notably lower Columbia River tributaries) appear to have received substantial hatchery contributions to natural spawning.

NMFS concludes that the Southwest Washington steelhead ESU is not presently in danger of extinction, nor is it likely to become endangered in the foreseeable future. Almost all stocks within this ESU for which data exist have been declining in the recent past, although this may be partly due to recent climate conditions. NMFS is very concerned about the pervasive opportunity for genetic introgression from hatchery stocks within the ESU and about the status of summer steelhead in this ESU. There is widespread production of hatchery steelhead within this ESU, largely from parent stocks from outside the ESU. This could substantially change the genetic composition of the resource despite management efforts to minimize introgression of the hatchery gene pool into natural populations.

(4) Lower Columbia River

No estimates of historical (pre–1960's) abundance specific to this ESU are available. Total run size for the major stocks in the lower Columbia River (below Bonneville Dam, including the upper Willamette ESU) for the early 1980's can be calculated from estimates in Light (1987) as approximately 150,000 winter steelhead and 80,000 summer steelhead. Light (1987) estimated that 75 percent of the total run (summer and winter steelhead combined) was of hatchery origin. Recent 5-year average natural escapements for streams with adequate data range from less than 100 to 1,100. Total recent run size for major streams in this ESU was greater than 16,000, but this total includes only the few basins for which estimates are available.

Of the 18 stocks for which adequate adult escapement trend data exists, 11 have been declining and 7 increasing, with a range from 24 percent annual decline to 48 percent annual increase. Eight of these trends (5 negative, 3 positive) were significantly different from zero. Most of the data series for this ESU are short, beginning only in the late 1970's to the mid-1980's. Thus, they may be heavily influenced by short-term climate effects. Some of the Washington trends (notably those for the Cowlitz and Kalama River Basins) have been influenced (positively or negatively) by the 1980 eruption of Mount Saint Helens. For Washington streams, these trends are for the late run ''wild'' component of winter steelhead populations; Oregon data included all stock components. Most of the Oregon trends are based on angler catch, and so may not reflect trends in underlying population abundance.

Hatchery fish are widespread, and many stray to spawn naturally throughout the region. Most of the hatchery stocks used originated primarily from stocks within the ESU, but many are not native to local river basins. The WDFW has provided information supporting substantial temporal separation between hatchery and natural winter steelhead in this ESU; however, some Washington stocks (notably Kalama River winter and summer steelhead) appear to have substantial hatchery contribution to natural spawning. ODFW estimates of hatchery composition indicate a range from about 30 percent (Sandy River and Tanner Creek winter steelhead) to 80 percent (Hood River summer steelhead) hatchery fish in spawning escapements. Estimates for Hood River winter steelhead range from 0 percent (ODFW, 1995b) to greater than 40 percent (ODFW, 1995a).

NMFS concludes that the Lower Columbia River steelhead ESU is not presently in danger of extinction, but is likely to become endangered in the foreseeable future. The majority of stocks within this ESU for which data exist have been declining in the recent past, but some have been increasing strongly. However, the strongest upward trends are either non-native stocks (Lower Willamette River and Clackamas River summer steelhead) or stocks that are recovering from major habitat disruption and are still at low abundance (mainstem and North Fork Toutle River). NMFS is very concerned about the pervasive opportunity for genetic introgression from hatchery stocks within the ESU and about the status of summer steelhead in this ESU. Concerns about hatchery influence are especially strong for summer steelhead and Oregon winter steelhead stocks, where there appears to be substantial overlap in spawning between hatchery and natural fish.

(5) Upper Willamette River

No estimates of historical (pre-1960's) abundance specific to this ESU are available. Total recent 5-year average run size for this ESU can be estimated from counts at Willamette Falls for the years 1989–1993. Dam counts indicate that the late-run (''native'') winter steelhead average run size was approximately 4,200, while early-run winter and summer steelhead averaged 1,900 and 9,700 respectively. Adequate angler catch data are available to derive approximate average winter steelhead escapement for three tributaries: Mollala River, 2,300 (predominantly non-native); North Fork Santiam River, 2,000; South Fork Santiam River, 550.

Total basin run-size or escapement estimates for both total winter and late winter steelhead exhibit declines, while summer steelhead estimates exhibit an increase. All of these basin-wide estimates have exhibited large fluctuations. Of the three tributary winter steelhead stocks for which adequate adult escapement information exists to compute trends, two have been declining and one increasing, with a range from 4.9 percent annual decline to 2.4 percent annual increase. None of these trends were significantly different from zero.

Hatchery fish are widespread and escaping to spawn naturally throughout the region. Both summer steelhead and early-run winter steelhead have been introduced into the basin and escape to spawn naturally in substantial numbers. Indigenous late-run winter steelhead are also produced in the Santiam River Basin. Estimates of hatchery contribution to winter steelhead escapements are available only for the North Fork Santiam River and the Mollala River and are variable, ranging from 14 percent (ODFW, 1995b) to 54 percent (ODFW, 1995a) on the North Fork Santiam River. There is probably some temporal and spatial separation in spawning between the early and late winter stocks. While little information exists on the actual contribution of hatchery fish to natural production, given the generally low numbers of fish escaping to tributaries and the general declines in winter steelhead abundance in the basin, NMFS has substantial concern that the majority of natural winter steelhead populations in this ESU may not be self-sustaining. All summer steelhead within the range of this ESU are introduced from outside the area (i.e., they are non-native), so are not considered as part of the ESU. Natural reproduction by these introduced summer steelhead may be quite limited.

NMFS concludes that the Upper Willamette steelhead ESU is not presently in danger of extinction, nor is it likely to become endangered in the foreseeable future. While historical information regarding this ESU is lacking, geographic range and historical abundance are believed to have been relatively small compared to other ESUs, and current production probably represents a larger proportion of historical production than is the case in other Columbia River Basin ESUs. NMFS is concerned about the pervasive opportunity for genetic introgression from hatchery stocks within the ESU, as well as the potential ecological interactions between introduced stocks and native stocks.

(6) Oregon Coast

No estimates of historical abundance specific to this ESU are available, except for counts at Winchester Dam on the North Umpqua River and angler catch records beginning in 1953. Estimated total run size for the major stocks on the Oregon Coast (including areas south of Cape Blanco) for the early 1980s are given by Light (1987) as approximately 255,000 winter steelhead and 75,000 summer steelhead. Of these, 69 percent of winter and 61 percent of summer steelhead were of hatchery origin, resulting in estimated naturally-produced run sizes of 79,000 winter and 29,000 summer steelhead. Recent 5-year average total (natural and hatchery) run sizes for streams with adequate data range from 250 to 15,000, corresponding to escapements from 200 to 12,000. Total recent (5-year average) run size for major streams in this ESU was approximately 129,000 (111,000 winter, 18,000 summer), with a total escapement of 96,000 (82,000 winter, 14,000 summer). These totals do not include all streams in the ESU, so they may underestimate total ESU run size and escapements.

Adequate adult escapement information was available to compute trends for 42 independent stocks within this ESU. Of these, 36 data series exhibit declines and six exhibit increases over the available data series, with a range from 12 percent annual decline (Drift Creek on the Siletz River) to 16 percent annual increase (North Fork Coquille River). Twenty (18 decreasing, 2 increasing) of these trends were significantly different from zero. Upward trends were only found in the southernmost portion of the ESU, from

Siuslaw Bay south. In contrast, longer-term trends in angler catch using data from the early 1950's to the present generally were increasing. This may reflect long-term stability of populations or may be an artifact of long-term increases in statewide fishing effort coupled with the differences in bias correction of catch summaries before and after 1970.

Hatchery fish are widespread and escaping to spawn naturally throughout the region. Most of the hatchery stocks used in this region originated from stocks indigenous to the ESU, but many are not native to local river basins. The ODFW estimates of hatchery composition for winter steelhead escapements are high in many streams, ranging from 10 percent (North Umpqua River) to greater than 80 percent (Drift Creek on the Alsea River and Tenmile Creek south of Umpqua Bay). For summer steelhead, hatchery composition (where reported) ranged from 38 percent (South Umpqua River) to 90 percent (Siletz River). Several summer steelhead stocks have been introduced to rivers with no native summer runs. Overall, about half of the stocks in this ESU for which NMFS has information have hatchery composition in excess of 50 percent. Few stocks in the ESU are documented to have escapements above 1,000 fish and no significant decline; most of these are in the southern portion of the ESU and have high hatchery influence. While little information exists on the actual contribution of hatchery fish to natural production, given the substantial presence of hatchery fish in the few stocks that are relatively abundant and stable or increasing, NMFS is concerned that the majority of natural steelhead populations in this ESU may not be self-sustaining.

NMFS concludes that the Oregon Coast steelhead ESU is not presently in danger of extinction, but is likely to become endangered in the foreseeable future. Most steelhead populations within this ESU have been declining in the recent past (although this may be partly due to recent climate conditions), with increasing trends restricted to the southernmost portion (south of Siuslaw Bay). NMFS is very concerned about the pervasive opportunity for genetic introgression from hatchery stocks within the ESU, as well as the potential ecological interactions between introduced stocks and native stocks.

(7) Klamath Mountains Province

NMFS has previously published a proposal to list this ESU as threatened under the ESA (60 FR 14253, March 16, 1995). Although historical trends in overall abundance within the ESU are not clearly known, NMFS believes there has been a substantial replacement of natural fish with hatchery-produced fish. While absolute abundance remains fairly high, since about 1970, trends in abundance have been downward in most steelhead populations for which NMFS has data within the ESU, and a number of populations are considered by various agencies and groups to be at some risk of extinction. Declines in summer steelhead populations are of particular concern. Most natural populations of steelhead within the area experience a substantial infusion of naturally spawning hatchery fish each year.

Risk analyses for this and other ESUs are unusually difficult due to the paucity of abundance data and, where data are available, the possible biases associated with particular data sets (e.g., angler catch records). Also, the Klamath Mountains Province status review was the first NMFS assessment in which the issue of naturally spawning hatchery fish and the questions they raise about the sustainability of natural populations was an important consideration. NMFS will continue to seek additional information and pursue assessments with Federal, state, and tribal fisheries managers that should help clarify the risk faced by Klamath Mountains Province Steelhead. Hence, NMFS will make a final determination on the status of this ESU concurrently with final listing determinations on all west coast steelhead ESUs.

(8) Northern California

Historical (pre-1960's) abundance information specific to this ESU is available from dam counts in the upper Eel River (Cape Horn Dam—annual average of 4,400 adult steelhead in the 1930's; McEwan & Jackson, 1996), the South Fork Eel River (Benbow Dam—annual average of 19,000 adult steelhead in the 1940's; McEwan & Jackson, 1996), and the Mad River (Sweasey Dam—annual average of 3,800 adult steelhead in the 1940's; Murphy & Shapovalov, 1951; CDFG, 1994).

In the mid-1960's, CDFG (1965) estimated that steelhead spawning populations for many rivers in this ESU totaled 198,000 fish. Estimated statewide total run size for the major stocks in California in the early 1980's was given by Light (1987) as approximately 275,000 fish. Of this total, 22 percent were estimated to be of hatchery origin, resulting in a naturally-produced run size of 215,000 steelhead statewide. Roughly half of this production was thought to be in the Klamath River Basin (including the Trinity River), so the total natural production for all ESUs south of the Klamath River was probably on the order of 100,000 adults.

The only current run-size estimates for this area are dam counts on the Eel River (Cape Horn Dam) and summer steelhead snorkel surveys in a few tributaries that provide no total abundance estimate. Statewide adult summer steelhead abundance is estimated at about 2,000 adults (McEwan & Jackson, 1996). While no overall recent abundance estimate for this ESU exists, the substantial declines in run size from historic levels at major dams in the region indicate a probable similar overall decline in abundance from historical levels.

Adequate adult escapement information was available to compute trends for seven stocks (Redwood Creek, Mad River [winter and summer runs], the mainstem, Middle Fork, and South Fork of the Eel River, and the South Fork of the Van Duzen River). Of these, five data series exhibit declines and two exhibit increases over the available data series, ranging from a 5.8-percent annual decline (mainstem Eel River) to a 3.5-percent annual increase (south Fork of the Van Duzen River). Three (all decreasing) of these trends were significantly different from zero. For one long-term data set (Eel River, Cape Horn Dam counts), a separate trend for the last 21 years (1971–1991) was calculated for comparison. The full-series trend showed a significant decline, but the recent data showed a lesser, non-significant decline, suggesting that the major stock decline occurred prior to 1970.

State hatchery planting records indicate that large numbers of out-of-basin hatchery fish are planted throughout this ESU and are allowed to spawn naturally throughout the region. According to McEwan and Jackson (1996), ''despite the large number of hatchery smolts released, steelhead runs in north coast drainages are comprised mostly of naturally produced fish.'' There is little information on the actual contribution of hatchery fish to natural spawning, and little information on present total run sizes for this ESU. However, given the preponderance of significant negative trends in the available data series, there is concern that steelhead populations in this ESU may not be self-sustaining.

NMFS concludes that the Northern California steelhead ESU is not presently in danger of extinction, but is likely to become endangered in the foreseeable future. Population abundances are very low relative to historical estimates (1930's dam counts),

and recent trends are downward in stocks for which data exist, except for two small summer steelhead stocks. Summer steelhead abundance is very low. The abundance of introduced Sacramento squawfish (*Ptychocheilus grandis*), a known predator of salmonids, in the Eel River is also a concern. For certain rivers (particularly the Mad River), NMFS is concerned about the influence of hatchery stocks, both in terms of genetic introgression and potential ecological interactions between introduced stocks and native stocks.

(9) Central California Coast

Only two estimates of historical (pre-1960's) abundance specific to this ESU are available: an average of about 500 adults in Waddell Creek in the 1930's and early 1940's (Shapovalov & Taft, 1954), and an estimate of 20,000 steelhead in the San Lorenzo River before 1965 (Johnson, 1964). In the mid-1960's, CDFG (1965) estimated 94,000 steelhead spawning in many rivers of this ESU, including 50,000 and 19,000 fish in the Russian and San Lorenzo Rivers, respectively. NMFS has comparable recent estimates for only the Russian (approximately 7,000 fish) and San Lorenzo (approximately 500 fish) Rivers. These estimates indicate that recent total abundance of steelhead in these two rivers is less than 15 percent of their abundance 30 years ago. Additional recent estimates for several other streams (Lagunitas Creek, Waddell Creek, Scott Creek, San Vincente Creek, Soquel Creek, and Aptos Creek) indicate individual run sizes are 500 fish or less; however, no recent estimates of total run size exist for this ESU. McEwan and Jackson (1996) noted that steelhead in most streams tributary to San Francisco and San Pablo Bays have been extirpated. Small ''fair to good'' runs of steelhead apparently occur in coastal Marin County tributaries.

Adequate adult escapement information was not available to compute trends for any stocks within this ESU. However, general trends can be inferred from the comparison of 1960's and 1990's abundance estimates provided above, which indicate substantial rates of decline in the two main steelhead stocks (Russian and San Lorenzo Rivers) within this ESU.

The principal hatchery production in this ESU is from Warm Springs Hatchery on the Russian River and the Monterey Bay Salmon and Trout Project (Big Creek Hatchery off Scott Creek and other facilities). There are other small private and cooperative programs producing steelhead within this ESU. Most of the hatchery stocks used in this region originated from stocks indigenous to the ESU, but many are not native to local river basins. Little information is available regarding the actual contribution of hatchery fish to natural spawning, and little information on present run sizes or trends for this ESU exists. However, given the substantial rates of declines for those stocks where data do exist, it is likely that the majority of natural production in this ESU is not self-sustaining.

NMFS concludes that the Central California Coast steelhead ESU is presently in danger of extinction. The southernmost portion of the ESU (south of Scott and Waddell Creeks, including one of two major rivers within the ESU) and the portion within San Francisco and San Pablo Bays appear to be at highest risk. In the northern coastal portion of the ESU, steelhead abundance in the Russian River has been reduced roughly sevenfold since the mid-1960's, but abundance in smaller streams appears to be stable at low levels. There is particular concern for sedimentation and channel restructuring due to floods, apparently resulting in part from poor land management practices.

(10) South/Central California Coast

Historical estimates of steelhead abundance are available for a few streams in this region. In the mid-1960's, CDFG (1965) estimated a total of 27,750 steelhead spawning in many rivers of this ESU. Recent estimates for those rivers where comparative abundance information is available show a substantial decline during the past 30 years. In contrast to the CDFG (1965) estimates, McEwan and Jackson (1996) reported runs ranging from 1,000 to 2,000 in the Pajaro River in the early 1960's, and Snider (1983) estimated escapement of about 3,200 steelhead for the Carmel River for the 1964–1975 period. No recent estimates for total run size exist for this ESU; however, recent run-size estimates are available for five streams (Pajaro River, Salinas River, Carmel River, Little Sur River, and Big Sur River). The total of these estimates is less than 500 fish, compared with a total of 4,750 for the same streams in 1965, which suggests a substantial decline for the entire ESU from 1965 levels.

Adequate adult escapement information was available to compute a trend for only one stock within this ESU (Carmel River above San Clemente Dam). This data series shows a significant decline of 22 percent per year from 1963 to 1993, with a recent 5-year average count of only 16 adult steelhead at the dam. General trends can be inferred from the comparison of 1960's and 1990's abundance estimates provided above.

Presently, there is little hatchery production within this ESU. There are small private and cooperative programs producing steelhead within this ESU, as well as one captive broodstock program intended to conserve the Carmel River steelhead strain (McEwan & Jackson, 1996). Most of the hatchery stocks used in this region originated from stocks indigenous to the ESU, but many are not native to local river basins. Little information exists regarding the actual contribution of hatchery fish to natural spawning, and little information on present total run sizes or trends are available for this ESU. However, given the substantial reductions from historical abundance or recent negative trends in the stocks for which data does exist, it is likely that the majority of natural production in this ESU is not self-sustaining.

NMFS concludes that the South-Central California Coast steelhead ESU is presently in danger of extinction. Total abundance is extremely low, and most stocks for which NMFS has data in the ESU show recent downward trends. There is also concern about the genetic effects of widespread stocking of rainbow trout.

(11) Southern California

Historically, steelhead occurred naturally south into Baja California. Estimates of historical (pre-1960's) abundance for several rivers in this ESU are available: Santa Ynez River, before 1950, 20,000 to 30,000 (Shapovalov & Taft, 1954; CDFG, 1982; Reavis, 1991; Titus et al., in press); Ventura River, pre-1960, 4,000 to 6,000 (Clanton & Jarvis, 1946; CDFG, 1982; AFS, 1991; Hunt et al., 1992; Henke, 1994; Titus et al., in press); Santa Clara River, pre-1960, 7,000 to 9,000 (Moore, 1980; Comstock, 1992; Henke, 1994); Malibu Creek, pre-1960, 1,000 (Nehlsen et al., 1991; Reavis, 1991). ln the mid-1960's, CDFG (1965) estimated steelhead spawning populations for smaller tributaries in San Luis Obispo County as 20,000 fish; however, no estimates for streams further south were provided.

The present estimated total run size for six streams (Santa Ynez River, Gaviota Creek, Ventura River, Matilija Creek, Santa Clara River, Malibu Creek) in this ESU are summarized in Titus et al. (in press), and all are less than 200 adults. Titus et al. (in press) concluded that populations have been extirpated from all streams south of Ventura County, with the exception of Malibu Creek in Los Angeles County. While there are no comprehensive stream

surveys conducted for steelhead trout occurring in streams south of Malibu Creek, there continues to be anecdotal observations of steelhead in rivers as far south as the Santa Margarita River, San Diego County, in years of substantial rainfall (Barnhart, 1986; Higgins, 1991; McEwan and Jackson, 1996). Titus et al. (in press) cited extensive loss of steelhead habitat due to water development, including impassable dams and dewatering.

No time series of data are available within this ESU to estimate population trends. Titus et al. (in press) summarized information for steelhead populations based on historical and recent survey information. Of the populations south of San Francisco Bay (including part of the Central California Coast ESU) for which past and recent information was available, 20 percent had no discernable change, 45 percent had declined, and 35 percent were extinct. Percentages for the counties comprising this ESU show a very high percentage of declining and extinct populations.

The influence of hatchery practices on this ESU is not well documented. In some populations, there may be genetic introgression from past steelhead plants and from planting of rainbow trout (Nielsen 1991). Habitat fragmentation and population declines resulting in small, isolated populations also pose genetic risk from inbreeding, loss of rare alleles, and genetic drift.

NMFS concludes that the Southern California steelhead ESU is presently in danger of extinction. Steelhead have already been extirpated from much of their historical range in this ESU. There is also concern about the genetic effects of widespread stocking of rainbow trout.

(12) Central Valley

Historical abundance estimates are available for some stocks within this ESU, but no overall estimates are available prior to 1961, when Hallock et al. (1961) estimated a total run size of 40,000 steelhead in the Sacramento River, including San Francisco Bay. In the mid-1960's, CDFG (1965) estimated steelhead spawning populations for the rivers in this ESU, totaling almost 27,000 fish. Limited data exist on recent abundance for this ESU. The present total run size for this ESU based on dam counts, hatchery returns, and past spawning surveys is probably less than 10,000 fish. Both natural and hatchery runs have declined since the 1960's. Counts at Red Bluff Diversion Dam averaged 1,400 fish over the last 5 years, compared with runs in excess of 10,000 fish in the late 1960's. Recent run-size estimates for the hatchery produced American River stock average less than 1,000 fish, compared to 12,000 to 19,000 in the early 1970's (McEwan & Jackson, 1996).

Adequate adult escapement information was available to compute a trend for only one stock within this ESU (Sacramento River above Red Bluff Diversion Dam). Fish passing over this dam are primarily (70 to 90 percent) of hatchery origin (CDFG, 1995; McEwan & Jackson, 1996). This data series shows a significant decline of 9 percent per year from 1966 to 1992. McEwan and Jackson (1996) cite substantial declines in hatchery returns within the basin as well. The majority of native, natural steelhead production in this ESU occurs in upper Sacramento River tributaries (Antelope, Deer, Mill, and other Creeks) below Red Bluff Diversion Dam, but these populations are nearly extirpated. The American, Feather, and Yuba (and possibly the upper Sacramento and Mokelumne) Rivers also have naturally-spawning populations (CDFG, 1995), but these populations have had substantial hatchery influence and their ancestry is not clearly known. The Yuba River had an estimated run size of 2,000 in 1984. Recent run size estimates for the Yuba River are unknown, but the population appears to be stable and supports a sport fishery (McEwan & Jackson, 1996). However, the status of native, natural fish in this stock is unknown. This stock has been influenced by Feather River Hatchery fish, and biologists familiar with the stock report that the Yuba River supports almost no natural production of steelhead (Hallock, 1989). However, CDFG (1995) asserted that ''a substantial portion of the returning adults are progeny of naturally spawning adults from the Yuba River.'' This stock currently receives no hatchery steelhead plants and is managed as a naturally sustained population (CDFG, 1995; McEwan & Jackson, 1996).

In the San Joaquin River Basin, there is little available historic or recent information on steelhead distribution or abundance. According to McEwan and Jackson (1996), there are reports of a small remnant steelhead run in the Stanislaus River. Also, steelhead were observed in the Tuolumne River in 1983, and large rainbow trout (possibly steelhead) have been observed at Merced River Hatchery recently.

NMFS concludes that the Central Valley steelhead ESU is presently in danger of extinction. Steelhead have already been extirpated from most of their historical range in this ESU. Habitat concerns in this ESU focus on the widespread degradation, destruction, and blockage of freshwater habitats within the region, and the potential results of continuing habitat destruction and water allocation problems. NMFS is also very concerned about the pervasive opportunity for genetic introgression from hatchery stocks within the ESU because of the widespread production of hatchery steelhead, and the potential ecological interactions between introduced stocks and native stocks.

(13) Middle Columbia River Basin

Estimates of historical (pre-1960's) abundance indicate that the total historical run size for this ESU might have been in excess of 300,000. Total run sizes for the major stocks in the upper Columbia River (above Bonneville Dam, including the Upper Columbia River, Snake River Basin, and parts of the Southwest Washington and Lower Columbia River ESUs) for the early 1980's were estimated by Light (1987) as approximately 4,000 winter steelhead and 210,000 summer steelhead. Based on dam counts for this period, the Middle Columbia River ESU represented the majority of this total run estimate, so the run returning to this ESU was probably somewhat below 200,000 at that time. Light (1987) estimated that 80 percent of the total Columbia River Basin run (summer and winter steelhead combined) above Bonneville Dam was of hatchery origin. The most recent 5-year average run size was 142,000, with a naturally-produced component of 39,000. These data indicate approximately 74 percent hatchery fish in the total run to this ESU. Recent escapement or run size estimates exist for only five basins in this ESU. For the main Deschutes River (counted at Sherars Falls), total recent (5-year average) run size was approximately 11,000, with a natural escapement of 3,000. Hatchery escapement to spawning grounds (calculated by subtracting Pelton Ladder and other hatchery returns from the counts at Sherars Falls) has averaged about 4,000 adults over the last five brood years (BPA 1992). For the Warm Springs River (steelhead passing above Warm Springs NFH), escapement has averaged 150 adults over the last 5 years. In the Umatilla River (counts at Three Mile Dam) escapement has averaged 1,700 adults over the last 5 years. In the Yakima River, total escapement has averaged 1,300 adults, with a natural escapement of 1,200 adults, over the last 5 years. In addition to these estimates, ODFW (1995a) suggested that 5 sub-basins of the John Day River each have runs in excess of 1,000, so the total run size for the John

Day River is probably in excess of 5,000 fish.

Stock trend data are available for various basins from dam counts, spawner surveys, and angler catch. Of the 14 independent stock indices for which trends could be computed, 10 have been declining and 4 increasing over the available data series, with a range from 20 percent annual decline to 14 percent annual increase. Eight of these trends (seven negative, one positive) were significantly different from zero. Of the major basins, the Yakima, Umatilla, and Deschutes Rivers show upward overall trends, although all tributary counts in the Deschutes River are downward and the Yakima River is recovering from extremely low abundance in the early 1980's. The John Day River probably represents the largest native, natural spawning stock in the ESU, and combined spawner surveys for the John Day River have been declining at a rate of about 15 percent per year since 1985. However, estimates of total run size for the ESU based on differences in counts at dams show an overall increase in steelhead abundance, with a relatively stable naturally-produced component.

Hatchery fish are widespread and straying to spawn naturally throughout the region. Hatchery production in this ESU is derived primarily from within-basin stocks. Recent estimates of the proportion of natural spawners with hatchery origin range from low (Yakima River, Walla Walla River, John Day River) to moderate (Umatilla River, Deschutes River). Little information is available on the actual contribution of hatchery production to natural spawning.

NMFS concludes that the Middle Columbia steelhead ESU is not presently in danger of extinction, but has reached no conclusion regarding its likelihood of becoming endangered in the foreseeable future. NMFS remains concerned about the status of this ESU and will carefully evaluate conservation measures affecting this ESU and continue monitoring its status during the period between this proposed rule and publication of a final rule. There is particular concern about Yakima River stocks and winter steelhead stocks. Winter steelhead are reported within this ESU only in the Klickitat River and Fifteenmile Creek. No abundance information exists for winter steelhead in the Klickitat River, but they have been declining in abundance in Fifteenmile Creek. Total steelhead abundance in the ESU appears to have been increasing recently, but the majority of natural stocks for which NMFS has data within this ESU have been declining, including those in the John Day River, which is the largest producer of native, natural steelhead. NMFS is very concerned about the pervasive opportunity for genetic introgression from hatchery stocks within the ESU. There is widespread production of hatchery steelhead within this ESU, but largely based on within basin stocks. Estimated proportion of hatchery fish on spawning grounds ranges from low (Yakima River, Walla Walla River, John Day River) to moderate (Umatilla River, Deschutes River).

(14) Upper Columbia River Basin

Estimates of historical (pre-1960s) abundance specific to this ESU are available from fish counts at dams. Counts at Rock Island Dam from 1933 to 1959 averaged 2,600 to 3,700, suggesting a pre-fishery run size in excess of 5,000 adults for tributaries above Rock Island Dam (Chapman et. al., 1994). However, runs may already have been depressed by lower Columbia River fisheries at this time. Recent 5-year (1989–93) average natural escapements are available for two stock units: Wenatchee River, 800 steelhead, and Methow and Okanogan Rivers, 450 steelhead. Recent average total escapement for these stocks were 2,500 and 2,400, respectively. Average total run size at Priest Rapids Dam for the same period was approximately 9,600 adult steelhead.

Trends in total (natural and hatchery) adult escapement are available for the Wenatchee River (2.6 percent annual increase, 1962–1993) and the Methow and Okanogan Rivers combined (12 percent annual decline, 1982–93). These two stocks represent most of the escapement to natural spawning habitat within the range of the ESU; the Entiat River also has a small spawning run (WDF et al., 1993).

Hatchery fish are widespread and escaping to spawn naturally throughout the region. The hatchery stock used in this region originated from stocks indigenous to the ESU during the Grand Coulee Fish Maintenance Project, but represents a blend of fish from all basins within the ESU (and from areas above Grand Coulee Dam). Spawning escapement is strongly dominated by hatchery production, with recent contributions averaging 65 percent (Wenatchee River) to 81 percent (Methow and Okanogan Rivers). The WDFW estimated adult replacement ratios of only 0.3:1.0 in the Wenatchee River and 0.25:1.0 in the Entiat River, and concluded that both these stocks and the Methow/Okanogan stock are not self-sustaining without substantial hatchery production.

NMFS concludes that the Upper Columbia steelhead ESU is presently in danger of extinction. While total abundance of populations within this ESU has been relatively stable or increasing, this appears to be true only because of major hatchery production programs. Estimates of the proportion of hatchery fish in spawning escapement are 65 percent (Wenatchee River) and 81 percent (Methow and Okanogan Rivers). The major concern for this ESU is the clear failure of natural stocks to replace themselves. NMFS is very concerned about problems of genetic homogenization due to hatchery supplementation within the ESU. Significant concern also exists regarding the apparent high harvest rates on steelhead smolts in rainbow trout fisheries and the degradation of freshwater habitats within the region.

(15) Snake River Basin

No estimates of historical (pre-1960's) abundance specific to this ESU are available. Light (1987) estimated that 80 percent of the total Columbia River Basin run (summer and winter steelhead combined) above Bonneville Dam was of hatchery origin. All steelhead in the Snake River Basin are summer steelhead, which for management purposes are divided into ''A-run'' and ''B-run'' steelhead. Each has several life history differences including spawning size, run timing, and habitat type. Although there is little information for most stocks within this ESU, there are recent run-size and/or escapement estimates for several stocks. Total recent-year average (1990–1994) escapement above Lower Granite Dam was approximately 71,000, with a natural component of 9,400 (7,000 A-run and 2,400 B-run). Run-size estimates are available for only a few tributaries within the ESU, all with small populations.

The aggregate trend in abundance for this ESU (indexed at Lower Granite Dam) has been upward since 1975, although natural escapement has been declining during the same period. However, the aggregate trend has been downward (with wide fluctuations) over the past 10 years, recently reaching levels below those observed at Ice Harbor Dam in the early 1960's. Naturally-produced escapement has declined sharply in the last ten years. Adult abundance trend information is available for several individual stocks from a variety of sources, including spawner surveys, dam counts, and angler catch. Of the thirteen stock indices (excluding the Lower Granite

Dam counts discussed above) for which sufficient adequate information exists to compute trends, nine have been declining and four increasing over the available data series, with a range from 30 percent annual decline to a 4 percent annual increase. Four of these trends (all negative) were significantly different from zero. In addition to these adult abundance data, the focus of IDFG's steelhead monitoring program is juvenile (parr) surveys in areas designated as ''wild'' (i.e., sites with limited hatchery influence) as well as in natural production areas. Summaries in Leitzinger and Petrosky (in press) show declines in average parr density over the past 7 or 8 years for both A- and B-run steelhead in both wild and natural production areas. From 1985 to 1993, estimates of mean percent of rated parr carrying capacity for these surveys ranged from as low as 11.2 percent (wild-production B-run) to 62.1 percent (wild-production A-run). The *U.S.* v. *Oregon* Technical Advisory Committee found that A-run steelhead densities were closer to rated capacities than were B-run steelhead; it noted that ''percent carrying capacity indicates that all surveyed areas are underseeded'' (TAC, 1991).

Hatchery fish are widespread and escaping to spawn naturally throughout the region. During the past five years, an average of 86 percent of steelhead passing above Lower Granite Dam were of hatchery origin. Only two hatchery composition estimates are available for individual stocks: 0 percent for Joseph Creek (Grande Ronde River), and 57 percent for the Tucannon River. In general, there are wild production areas with limited hatchery influence remaining in the Selway River, lower Clearwater River, Middle and South Forks of the Salmon River, and the lower Salmon River (Leitzinger & Petrosky, in press). In other areas, such as the upper Salmon River, there appears to be little or no natural production of locally-native steelhead (IDFG, 1995). Given the relatively low natural run sizes to individual streams for which estimates are available, the declines in natural returns at Lower Granite Dam and in parr density estimates, and the widespread presence of hatchery fish, NMFS concludes that the majority of natural steelhead populations in this ESU are probably not self-sustaining at this time.

NMFS concludes that the Snake River Basin steelhead ESU is not presently in danger of extinction, but is likely to become endangered in the foreseeable future. While total run size (hatchery and natural) has increased since the mid-1970's, there has been a severe recent decline in natural run size. The majority of natural stocks for which adequate data exists within this ESU have been declining. Parr densities in natural production areas have been substantially below estimated capacity in recent years. Downward trends and low parr densities indicate a particularly severe problem for B-run steelhead, the loss of which would substantially reduce life-history diversity within this ESU. NMFS is very concerned about the pervasive opportunity for genetic introgression from hatchery stocks within the ESU. There is widespread production of hatchery steelhead within this ESU. The total Snake River steelhead run at Lower Granite Dam is estimated to average 86 percent hatchery fish in recent years. Estimates of proportion of hatchery fish in spawning escapement for tributaries range from 0 percent (Joseph Creek) to above 80 percent (upper Salmon River, IDFG, 1995).

Existing Protective Efforts

Under § 4(b)(1)(A) of the ESA, the Secretary of Commerce is required to make listing determinations solely on the basis of the best scientific and commercial data available and after taking into account efforts being made to protect a species. During the status review for west coast steelhead, NMFS reviewed an array of protective efforts for steelhead and other salmonids, ranging in scope from regional strategies to local watershed initiatives. NMFS has summarized some of the major efforts in a document entitled ''Steelhead Conservation Efforts: A Supplement to the Notice of Determination for West Coast Steelhead under the Endangered Species Act.'' This document is available upon request (see **ADDRESSES** section).

Despite numerous efforts to halt and reverse declining trends in west coast steelhead, it is clear that the status of many native, naturally-reproducing populations has continued to deteriorate. NMFS therefore believes it highly likely that past efforts and programs to address the conservation needs of these stocks have proven inadequate, including efforts to reduce mortalities and improve the survival of these stocks through all stages of their life cycle. Important factors include the continued decline in the productivity of freshwater habitat for a wide variety of reasons, significant potential negative impacts from interactions with hatchery stocks, overfishing, and natural environmental variability.

While NMFS recognizes that many of the ongoing protective efforts are likely to promote the conservation of steelhead and other salmonids, in the aggregate, they do not achieve steelhead conservation at a scale that is adequate to protect and conserve ESUs. NMFS believes that most existing efforts lack some of the critical elements needed to provide a high degree of certainty that the efforts will be successful. These elements include: (1) Identification of specific factors for decline; (2) immediate measures required to protect the best remaining populations and habitats and priorities for restoration activities; (3) explicit and quantifiable objectives and timelines; and (4) monitoring programs to determine the effectiveness of actions, including methods to measure whether recovery objectives are being met.

The best available scientific information on the biological status of the species supports a proposed listing of 10 steelhead ESUs under the ESA (see Proposed Determination). NMFS concludes that existing protective efforts are inadequate to alter the proposed determination of threatened or endangered for these 10 steelhead ESUs. However, during the period between publication of this proposed rule and publication of a final rule, NMFS will continue to solicit information regarding protective efforts (see Public Comments Solicited) and will work with Federal, state and tribal fisheries managers to evaluate the efficacy of the various salmonid conservation efforts. If, during this process, NMFS determines that existing protective efforts are likely to avert extinction and provide for the recovery of a steelhead ESU(s), NMFS will modify this listing proposal.

Summary of Factors Affecting the Species

Section 2(a) of the ESA states that various species of fish, wildlife, and plants in the United States have been rendered extinct as a consequence of economic growth and development untempered by adequate concern for ecosystem conservation. Section 4(a)(1) of the ESA and the listing regulations (50 CFR part 424) set forth procedures for listing species. NMFS must determine, through the regulatory process, if a species is endangered or threatened based upon any one or a combination of the following factors: (1) The present or threatened destruction, modification, or curtailment of its habitat or range; (2) overutilization for commercial, recreational, scientific, or education purposes; (3) disease or predation; (4) inadequacy of existing regulatory mechanisms; or (5) other natural or human-made factors affecting its continued existence.

NMFS has prepared a supporting document which addresses the factors that have led to the decline of this species entitled ''Factors for Decline: A supplement to the notice of determination for West Coast steelhead.'' This report, available upon request (see **ADDRESSES** section), concludes that all of the factors identified in section 4(a)(1) of the ESA have played a role in the decline of the species. The report identifies destruction and modification of habitat, overutilization for recreational purposes, and natural and human-made factors as being the primary reasons for the decline of west coast steelhead. The following discussion summarizes findings regarding factors for decline across the range of west coast steelhead. While these factors have been treated here in general terms, it is important to underscore that impacts from certain factors are more acute for specific ESUs. For example, impacts from hydropower development are more pervasive for ESUs in the upper Columbia River Basin than for some coastal ESUs.

Steelhead on the west coast of the United States have experienced declines in abundance in the past several decades as a result of natural and human factors. Forestry, agriculture, mining, and urbanization have degraded, simplified, and fragmented habitat. Water diversions for agriculture, flood control, domestic, and hydropower purposes (especially in the Columbia River and Sacramento-San Joaquin Basins) have greatly reduced or eliminated historically accessible habitat. Studies indicate that in most western states, about 80 to 90 percent of the historic riparian habitat has been eliminated. Further, it has been estimated that during the last 200 years, the lower 48 states have lost approximately 53 percent of all wetlands and the majority of the rest are severely degraded. Washington and Oregon's wetlands are estimated to have diminished by one-third, while California has experienced a 91-percent loss of its wetland habitat. Loss of habitat complexity has also contributed to the decline of steelhead. For example, in national forests in Washington, there has been a 58-percent reduction in large, deep pools due to sedimentation and loss of pool-forming structures such as boulders and large wood. Similarly, in Oregon, the abundance of large, deep pools on private coastal lands has decreased by as much as 80 percent. Sedimentation from land use activities is recognized as a primary cause of habitat degradation in the range of west coast steelhead.

Steelhead support an important recreational fishery throughout their range. During periods of decreased habitat availability (e.g., drought conditions or summer low flow when fish are concentrated), the impacts of recreational fishing on native anadromous stocks may be heightened. Steelhead are not generally targeted in commercial fisheries. However, high seas driftnet fisheries in the past may have contributed slightly to a decline of this species in local areas, but this could not be solely responsible for the large declines in abundance observed along most of the Pacific coast over the past several decades.

Introductions of non-native species and habitat modifications have resulted in increased predator populations in numerous river systems, thereby increasing the level of predation experienced by salmonids. Predation by marine mammals is also of concern in areas experiencing dwindling steelhead runsizes. However, salmon and marine mammals have coexisted for thousands of years and most investigators consider predation an insignificant contributing factor to the large declines observed in west coast steelhead populations.

Natural climatic conditions have served to exacerbate the problems associated with degraded and altered riverine and estuarine habitats. Persistent drought conditions have reduced already limited spawning, rearing and migration habitat. Further, climatic conditions appear to have resulted in decreased ocean productivity which, during more productive periods, may help (to a small degree) offset degraded freshwater habitat conditions.

In an attempt to mitigate the loss of habitat, extensive hatchery programs have been implemented throughout the range of steelhead on the West Coast. While some of these programs have been successful in providing fishing opportunities, the impacts of these programs on native, naturally-reproducing stocks are not well understood. Competition, genetic introgression, and disease transmission resulting from hatchery introductions may significantly reduce the production and survival of native, naturally-reproducing steelhead. Furthermore, collection of native steelhead for hatchery broodstock purposes may result in additional negative impacts to small or dwindling natural populations. It is important to note, however, that artificial propagation could play an important role in steelhead recovery and that some hatchery populations of steelhead may be deemed essential for the recovery of threatened or endangered steelhead ESUs (see Proposed Determination). In addition, alternative uses of supplementation, such as for the creation of terminal fisheries, must be fully explored to try to limit negative impacts to remaining natural populations. This use must be tempered with the understanding that protecting native, naturally-reproducing steelhead and their habitats is critical to maintaining healthy, fully-functioning ecosystems.

Proposed Determination

The ESA defines an endangered species as any species in danger of extinction throughout all or a significant portion of its range, and a threatened species as any species likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. Section 4(b)(1) of the ESA requires that the listing determination be based solely on the best scientific and commercial data available, after conducting a review of the status of the species and after taking into account those efforts, if any, being made to protect such species.

Based on results from its coastwide assessment, NMFS has determined that on the west coast of the United States, there are fifteen ESUs of steelhead which constitute ''species'' under the ESA. NMFS has determined that five ESUs are currently endangered (Central California Coast, South Central California Coast, Southern California, Central Valley, and Upper Columbia ESUs) and another five ESUs are currently threatened (Snake River Basin, lower Columbia River, Oregon Coast, Klamath Mountains Province, and northern California ESUs) and NMFS proposes to list them as such at this time. The geographic boundaries (i.e., the watersheds within which the members of the ESU spend their freshwater residence) for these ESUs are described under ''ESU Determinations.''

The Klamath Mountains Province ESU was proposed for listing under a previous determination (60 FR 14253, March 16, 1995). However, due to unresolved issues and practical considerations, NMFS believes it more prudent to make a final determination on Klamath Mountains Province steelhead in the context of final determinations for West Coast steelhead ESUs. NMFS has received comments on the previous proposal to list this ESU and will seek additional information that should help clarify the degree of risk faced by Klamath Mountains Province steelhead. The agency will make a final determination on this ESU concurrently with final listing

determinations on all west coast steelhead ESUs.

NMFS has determined that steelhead in the Middle Columbia River ESU (the Columbia River Basin from Mosier Creek, OR, upstream to the Yakima River, WA) do not warrant listing. However, because there is sufficient concern regarding the health of steelhead in this region, NMFS is adding this ESU to its candidate species list. NMFS will conduct a thorough reevaluation of the status of this ESU before the final listing determination.

In all 10 ESUs identified as threatened or endangered, only native, naturally-reproducing steelhead are being proposed for listing. Prior to the final listing determination, NMFS will examine the relationship between hatchery and natural populations of steelhead in these ESUs, and assess whether any hatchery populations are essential for their recovery. This may result in the inclusion of specific hatchery populations as part of a listed ESU in NMFS' final determination.

In addition, NMFS is proposing to list only anadromous life forms of *O. mykiss* at this time due to uncertainties regarding the relationship between resident rainbow trout and steelhead. Prior to the final listing determination, NMFS will seek additional information on this issue and work with the U.S. Fish and Wildlife Service and fisheries comanagers to better define the relationship between resident and anadromous *O. mykiss* in the ESUs proposed for listing.

Conservation Measures

Conservation measures provided to species listed as endangered or threatened under the ESA include recognition, recovery actions, Federal agency consultation requirements, and prohibitions on taking. Recognition through listing promotes public awareness and conservation actions by Federal, state, and local agencies, private organizations, and individuals.

Several conservation efforts are underway that may reverse the decline of west coast steelhead and other salmonids. These include the Northwest Forest Plan (on Federal lands within the range of the northern spotted owl), Pacfish (on all additional Federal lands with anadromous salmonid populations), Oregon's Coastal Salmon Restoration Initiative, Washington's Wild Stock Restoration Initiative, California's Coastal Salmon Initiative and Steelhead Management Plan, NMFS' Proposed Recovery Plan for Snake River Salmon, and a Draft Recovery Plan for Sacramento Winter-run Chinook Salmon. NMFS is very encouraged by a number of these efforts and believes that they have or may constitute significant strides in the efforts in the region to develop a scientifically well grounded conservation plan for these stocks. NMFS intends to support and work closely with these efforts—staff and resources permitting—in the belief that they could have a substantial impact on a final decision on the need to list these stocks or on the type of final listing. The degree to which these conservation efforts are able to provide reliable, scientifically well grounded commitments through a variety of measures to provide for the conservation of these stocks will have a direct and substantial effect on any final listing determination of NMFS.

Section 7(a)(4) of the ESA requires that Federal agencies confer with NMFS on any actions likely to jeopardize the continued existence of a species proposed for listing and on actions likely to result in the destruction or adverse modification of proposed critical habitat. For listed species, section 7(a)(2) requires Federal agencies to ensure that activities they authorize, fund, or conduct are not likely to jeopardize the continued existence of a listed species or to destroy or adversely modify its critical habitat. If a Federal action may affect a listed species or its critical habitat, the responsible Federal agency must enter into consultation with NMFS.

Examples of Federal actions likely to affect steelhead include authorized land management activities of the U.S. Forest Service and U.S. Bureau of Land Management, as well as operation of hydroelectric and storage projects of the Bureau of Reclamation and U.S. Army Corps of Engineers (COE). Such activities include timber sales and harvest, hydroelectric power generation, and flood control. Federal actions, including the COE section 404 permitting activities under the Clean Water Act, COE permitting activities under the River and Harbors Act, Federal Energy Regulatory Commission licenses for non-Federal development and operation of hydropower, and Federal salmon hatcheries, may also require consultation.

Based on information presented in this proposed rule, general conservation measures that could be implemented to help conserve the species are listed below. This list does not constitute NMFS' interpretation of a recovery plan under section 4(f) of the ESA.

1. Measures could be taken to promote land management practices that protect and restore steelhead habitat. Land management practices affecting steelhead habitat include timber harvest, road building, agriculture, livestock grazing, and urban development.

2. Evaluation of existing harvest regulations could identify any changes necessary to protect steelhead populations.

3. Artificial propagation programs could be required to incorporate practices that minimize impacts upon native populations of steelhead.

4. Efforts could be made to ensure that existing and proposed dam facilities are designed and operated in a manner that will not adversely affect steelhead populations. For example, NMFS could require that fish passage facilities at dams effectively pass migrating juvenile and adult steelhead.

5. Water diversions could have adequate headgate and staff gauge structures installed to control and monitor water usage accurately. Water rights could be enforced to prevent irrigators from exceeding the amount of water to which they are legally entitled.

6. Irrigation diversions affecting downstream migrating steelhead trout could be screened. A thorough review of the impact of irrigation diversions on steelhead could be conducted.

NMFS recognizes that, to be successful, protective regulations and recovery programs for steelhead will need to be developed in the context of conserving aquatic ecosystem health. NMFS intends that Federal lands and Federal activities play a primary role in preserving listed populations and the ecosystems upon which they depend. However, throughout the range of all ten ESUs proposed for listing, steelhead habitat occurs and can be affected by activities on state, tribal or private land. Agricultural, timber, and urban management activities on nonfederal land could and should be conducted in a manner that avoids adverse effects to steelhead habitat.

NMFS encourages nonfederal landowners to assess the impacts of their actions on potentially threatened or endangered salmonids. In particular, NMFS encourages the formulation of watershed partnerships to promote conservation in accordance with ecosystem principles. These partnerships will be successful only if state, tribal, and local governments, landowner representatives, and Federal and nonfederal biologists all participate and share the goal of restoring steelhead to the watersheds.

Section 9 of the ESA prohibits certain activities that directly or indirectly affect endangered species. These prohibitions apply to all individuals, organizations, and agencies subject to

U.S. jurisdiction. Section 4(d) of the ESA allows the promulgation of protective regulations that modify or apply any or all of the prohibitions of section 9 to threatened species. Section 9 prohibits violations of protective regulations for threatened species promulgated under section 4(d).

At this time, NMFS proposes to adopt protective measures to prohibit ''taking,'' interstate commerce, and the other ESA prohibitions applicable to endangered species, with the exceptions provided under section 10 of the ESA, for the five ESUs of steelhead proposed as threatened herein. Under the ESA, the term ''take'' means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. NMFS is proposing to extend the provisions of section 9 and section 10 to these ESUs to provide immediate protections to them upon final listing. However, prior to the final listing determination, NMFS will consider adopting specific regulations under section 4(d) that will apply to one or more ESUs of steelhead identified as threatened (see Public Comments Solicited). These regulations, promulgated pursuant to the Administrative Procedures Act, 5 U.S.C. 551 *et seq.*, may be in lieu of the Section 9 taking prohibition and Section 10 permit exception.

Sections 10(a)(1)(A) and 10(a)(1)(B) of the ESA provide NMFS with authority to grant exceptions to the ESA's ''taking'' prohibitions. Section 10(a)(1)(A) scientific research and enhancement permits may be issued to entities (Federal and non-Federal) conducting research that involves a directed take of listed species. A directed take refers to the intentional take of listed species. NMFS has issued section 10(a)(1)(A) research/enhancement permits for other listed species (e.g., Snake River chinook salmon and Sacramento River winter-run chinook salmon) for a number of activities, including trapping and tagging, electroshocking to determine population presence and abundance, removal of fish from irrigation ditches, and collection of adult fish for artificial propagation programs.

Section 10(a)(1)(B) incidental take permits may be issued to non-Federal entities performing activities which may incidentally take listed species. The types of activities potentially requiring a section 10(a)(1)(B) incidental take permit include the operation and release of artificially propagated fish by state or privately operated and funded hatcheries, state or University research not receiving Federal authorization or funding, and the implementation of state fishing regulations. NMFS Policies on Endangered and Threatened Fish and Wildlife

On July 1, 1994, NMFS, jointly with the U.S. Fish and Wildlife Service, published a series of policies regarding listings under the ESA, including a policy for peer review of scientific data (59 FR 34270) and a policy to identify, to the maximum extent possible, those activities that would or would not constitute a violation of section 9 of the ESA (59 FR 34272).

Role of peer review: The intent of the peer review policy is to ensure that listings are based on the best scientific and commercial data available. Prior to a final listing, NMFS will solicit the expert opinions of three qualified specialists, concurrent with the public comment period. Independent peer reviewers will be selected from the academic and scientific community, Tribal and other native American groups, Federal and state agencies, and the private sector.

Identification of those activities that would constitute a violation of Section 9 of the ESA: The intent of this policy is to increase public awareness of the effect of this listing on proposed and ongoing activities within the species' range. NMFS will identify, to the extent known at the time of the final rule, specific activities that will not be considered likely to result in violation of section 9, as well as activities that will be considered likely to result in violation. NMFS believes that, based on the best available information, the following actions will not result in a violation of section 9:

(1) Possession of steelhead acquired lawfully by permit issued by NMFS pursuant to section 10 of the ESA, or by the terms of an incidental take statement pursuant to section 7 of the ESA.

(2) Federally approved projects that involve activities such as silviculture, grazing, mining, road construction, dam construction and operation, discharge of fill material, stream channelization or diversion for which consultation has been completed, and when such activity is conducted in accordance with any terms and conditions given by NMFS in an incidental take statement accompanied by a biological opinion.

Activities that NMFS believes could potentially harm the steelhead and result in ''take'', include, but are not limited to:

(1) Unauthorized collecting or handling of the species. Permits to conduct these activities are available for purposes of scientific research or to enhance the propagation or survival of the species.

(2) Unauthorized destruction/alteration of the species' habitat such as removal of large woody debris or riparian shade canopy, dredging, discharge of fill material, draining, ditching, diverting, blocking, or altering stream channels or surface or ground water flow.

(3) Discharges or dumping of toxic chemicals or other pollutants (i.e., sewage, oil and gasoline) into waters or riparian areas supporting the species.

(4) Violation of discharge permits.

(5) Pesticide applications in violation of label restrictions.

(6) Interstate and foreign commerce (commerce across State lines and international boundaries) and import/export without prior obtainment of an endangered species permit.

This list is not exhaustive. It is provided to give the reader some examples of the types of activities that may be considered by the NMFS as constituting a ''take'' of steelhead under the ESA and regulations. Questions regarding whether specific activities will constitute a violation of section 9, and general inquiries regarding prohibitions and permits, should be directed to NMFS (see **ADDRESSES**).

Critical Habitat

Section 4(a)(3)(A) of the ESA requires that, to the extent prudent and determinable, critical habitat be designated concurrently with the listing of a species. While NMFS has completed its initial analysis of the biological status of steelhead populations from Washington, Oregon, Idaho, and California, it has not performed the analysis (including economic analysis) necessary for designating critical habitat. Further, NMFS is placing a higher priority on listings than on critical habitat designations due to staffing and workload constraints resulting from the lifting of the recent listing moratorium. In most cases, the substantive protections of critical habitat designations are duplicative of those of listings, however, in cases in which critical habitat designation is deemed essential to the conservation of the species, such a designation could warrant a higher priority. It is NMFS' intention to develop and publish a critical habitat designation for West Coast steelhead as time and workload permit.

Public Comments Solicited

To ensure that the final action resulting from this proposal will be as accurate and effective as possible, NMFS is soliciting comments and suggestions from the public, other

governmental agencies, the scientific community, industry, and any other interested parties. Public hearings will be held in several locations in the range of the proposed ESUs; details regarding locations, dates, and times will be published in a forthcoming Federal Register notice. NMFS recognizes that there are serious limits to the quality of information available, and, therefore, NMFS has executed its best professional judgment in developing this proposal. NMFS will appreciate any additional information regarding, in particular: (1) The relationship between rainbow trout and steelhead, specifically whether rainbow trout and steelhead populations in the same geographic area should be considered a single ESU; (2) biological or other relevant data concerning any threat to steelhead or rainbow trout; (3) the range, distribution, and population size of steelhead and rainbow trout in all identified ESUs; (4) current or planned activities in the subject areas and their possible impact on this species; (5) steelhead escapement, particularly escapement data partitioned into natural and hatchery components; (6) the proportion of naturally-reproducing fish that were reared as juveniles in a hatchery; (7) homing and straying of natural and hatchery fish; (8) the reproductive success of naturally-reproducing hatchery fish (i.e., hatchery-produced fish that spawn in natural habitat) and their relationship to the identified ESUs; (9) efforts being made to protect native, naturally-reproducing populations of steelhead and rainbow trout in Washington, Oregon, Idaho and California; and (10) suggestions for specific regulations under section 4(d) of the ESA that should apply to threatened steelhead ESUs. Suggested regulations may address activities, plans, or guidelines that, despite their potential to result in the incidental take of listed fish, will ultimately promote the conservation and recovery of threatened steelhead.

NMFS is also requesting quantitative evaluations describing the quality and extent of freshwater and marine habitats for juvenile and adult steelhead as well as information on areas that may qualify as critical habitat in Washington, Oregon, Idaho, and California for the proposed ESUs. Areas that include the physical and biological features essential to the recovery of the species should be identified. NMFS recognizes that there are areas within the proposed boundaries of some ESUs that historically constituted steelhead habitat, but may not be currently occupied by steelhead. NMFS is requesting information about steelhead in these currently unoccupied areas (in particular, for the Southern California and Central Valley ESUs) and whether these habitats should be considered essential to the recovery of the species or excluded from designation. Essential features include, but are not limited to: (1) Habitat for individual and population growth, and for normal behavior; (2) food, water, air, light, minerals, or other nutritional or physiological requirements; (3) cover or shelter; (4) sites for reproduction and rearing of offspring; and (5) habitats that are protected from disturbance or are representative of the historic geographical and ecological distributions of the species.

For areas potentially qualifying as critical habitat, NMFS is requesting information describing: (1) The activities that affect the area or could be affected by the designation, and (2) the economic costs and benefits of additional requirements of management measures likely to result from the designation.

The economic cost to be considered in the critical habitat designation under the ESA is the probable economic impact ''of the [critical habitat] designation upon proposed or ongoing activities'' (50 CFR 424.19). NMFS must consider the incremental costs specifically resulting from a critical habitat designation that are above the economic effects attributable to listing the species. Economic effects attributable to listing include actions resulting from section 7 consultations under the ESA to avoid jeopardy to the species and from the taking prohibitions under section 9 of the ESA. Comments concerning economic impacts should distinguish the costs of listing from the incremental costs that can be directly attributed to the designation of specific areas as critical habitat.

NMFS will review all public comments and any additional information regarding the status of the steelhead ESUs described herein and, as required under the ESA, will complete a final rule within 1 year of this proposed rule. The availability of new information may cause NMFS to reassess the status of steelhead ESUs. In particular, NMFS will conduct a thorough reevaluation of the status of the Middle Columbia River ESU before the final listing determination. Although NMFS has concluded that information available at the present time is not sufficient to demonstrate that a listing is warranted for this ESU, there is concern over the health of natural populations in this ESU.

NMFS is aware and strongly supportive of the current efforts by the states of Oregon, Washington, and California to develop effective and scientifically based conservation measures to address at-risk salmon and steelhead stocks. NMFS believes that these efforts, if successful, could serve as the central components of a broad conservation program that would provide a steady, predictable, and well grounded road to recovery and rebuilding of these stocks. NMFS intends to work closely with these efforts and those of local or regional watershed groups, as well as other involved Federal agencies, and hopes that this proposal will add greater impetus to those efforts.

References

A complete list of all references cited herein is available upon request (see **ADDRESSES** section).

Classification

The 1982 amendments to the ESA, in section 4(b)(1)(A), restrict the information that may be considered when assessing species for listing. Based on this limitation of criteria for a listing decision and the opinion in *Pacific Legal Foundation* v. *Andrus*, 675 F. 2d 825 (6th Cir. 1981), NMFS has categorically excluded all ESA listing actions from environmental assessment requirements of the National Environmental Policy Act under NOAA Administrative Order 216–6.

This proposed rule is exempt from review under E.O. 12866.

Dated: July 31, 1996.

C. Karnella,

Acting Program Management Officer, National Marine Fisheries Service.

List of Subjects

50 CFR Part 222

Administrative practice and procedure, Endangered and threatened wildlife, Exports, Imports, Reporting and recordkeeping requirements, Transportation.

50 CFR Part 227

Endangered and threatened species, Exports, Imports, Marine mammals, Transportation.

For the reasons set out in the preamble, 50 CFR parts 222 and 227 are proposed to be amended as follows:

PART 222—ENDANGERED FISH OR WILDLIFE

1. The authority citation of Part 222 continues to read as follows:

Authority: 16 U.S.C. 1531 *et seq.*

§ 222.23 [Amended]

2. In § 222.23, paragraph (a) is amended by adding the phrases ''Central California Coast steelhead (*Oncorhynchus mykiss*); South-Central California Coast steelhead (*Oncorhynchus mykiss*); Southern California steelhead (*Oncorhynchus mykiss*); Central Valley steelhead (*Oncorhynchus mykiss*); and Upper Columbia River steelhead (*Oncorhynchus mykiss*);'' immediately after the phrase ''Umpqua River cutthroat trout (*Oncorhynchus clarki clarki*)''.

PART 227—THREATENED FISH AND WILDLIFE

1. The authority citation for part 227 continues to read as follows:

Authority: 16 U.S.C. 1531 *et seq.*

2. In § 227.4, paragraphs (n), (o), (p), and (q) are added to read as follows:

§ 227.4 Enumeration of threatened species.

* * * * *

(n) Lower Columbia River steelhead *(Oncorhynchus mykiss*)

(o) Oregon Coast steelhead *(Oncorhynchus mykiss*)

(p) Northern California steelhead *(Oncorhynchus mykiss*)

(q) Snake River Basin steelhead *(Oncorhynchus mykiss*).

3. Section 227.21 is revised to read as follows:

§ 227.21 Threatened salmon.

(a) *Prohibitions.* The prohibitions of section 9 of the Act (16 U.S.C. 1538) relating to endangered species apply to threatened species of salmon listed in § 227.4 (f), (g), (j), (k), (l), (m), (n), (o), (p), and (q) except as provided in paragraph (b) of this section.

(b) *Exceptions.* The exceptions of section 10 of the Act (16 U.S.C. 1539) and other exceptions under the Act relating to endangered species, including regulations implementing such exceptions, also apply to the threatened species of salmon listed in § 227.4 (f), (g), (j), (k), (l), (m), (n), (o), (p), and (q). This section supersedes other restrictions on the applicability of parts 217 and 222 of this chapter, including, but not limited to, the restrictions specified in §§ 217.2 and 222.22(a) of this chapter with respect to the species identified in § 227.21(a).

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