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Acting Secretary.

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DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

50 CFR Part 227

[Docket No. 950407093–6298–03; I.D. 012595A]

Endangered and Threatened Species; Threatened Status for Southern Oregon/Northern California Coast Evolutionarily Significant Unit (ESU) of Coho Salmon

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

ACTION: Final rule.

SUMMARY: The NMFS is issuing a final determination that the Southern Oregon/Northern California Coast Evolutionarily Significant Unit (ESU) of coho salmon (*Oncorhynchus kisutch*) is a ''species'' under the Endangered Species Act (ESA) of 1973, as amended, and is being listed as threatened. Coho salmon populations are very depressed in this ESU, currently numbering less than 10,000 naturally-produced adults. The threats to this ESU are numerous and varied. Several human-caused factors, including habitat degradation, harvest, and artificial propagation, exacerbate the adverse effects of natural environmental variability brought about by drought, floods, and poor ocean conditions. NMFS has determined that existing regulatory mechanisms are either inadequate or not implemented well enough to conserve this ESU. While conservation efforts are underway for some populations in this ESU, they are not considered sufficient to change the likelihood that the ESU as a whole will become endangered in the foreseeable future. NMFS will issue shortly protective regulations under section 4(d) of the ESA, which will apply section 9(a) prohibitions to this ESU, with certain exceptions. NMFS does not expect those regulations to become effective before July 1, 1997.

NMFS has further determined that the Oregon Coast ESU does not warrant listing at this time. Accordingly, NMFS will consider the Oregon Coast coho salmon ESU to be a candidate species in 3 years (or earlier if warranted by new information).

EFFECTIVE DATE: June 5, 1997.

ADDRESSES: Garth Griffin, NMFS, Northwest Region, Protected Species Program, 525 N.E. Oregon St., Suite 500, Portland, OR 97232–2737; Craig Wingert, NMFS, Southwest Region, Protected Species Management Division, 501 W. Ocean Blvd., Suite 4200, Long Beach, CA 90802–4213; or Joe Blum, NMFS, Office of Protected Resources, 1315 East-West Highway, Silver Spring, MD 20910.

FOR FURTHER INFORMATION CONTACT: Garth Griffin at (503) 231–2005; Craig Wingert at (310) 980–4021; or Joe Blum at (301) 713–1401.

SUPPLEMENTARY INFORMATION:

Species Background

The coho salmon (*Oncorhynchus kisutch*) is an anadromous salmonid species that was historically distributed throughout the North Pacific Ocean from central California to Point Hope, AK, through the Aleutian Islands, and from the Anadyr River, Russia, south to Hokkaido, Japan. Historically, this species probably inhabited most coastal streams in Washington, Oregon, and northern and central California. Some populations, now extinct, are believed to have migrated hundreds of miles inland to spawn in tributaries of the upper Columbia River in Washington and the Snake River in Idaho.

Coho salmon on the west coast of the contiguous United States and much of British Columbia generally exhibit a relatively simple 3-year life cycle. Adults typically begin their freshwater spawning migration in the late summer and fall, spawn by mid-winter, and then die. The run and spawning times vary between and within populations. Depending on river temperatures, eggs incubate in ''redds'' (gravel nests excavated by spawning females) 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 for up to 15 months, then migrate to the ocean as ''smolts'' in the spring. Coho salmon typically spend 2 growing seasons in the ocean before returning to their natal stream to spawn as 3 year-olds. Some precocious males, called ''jacks,'' return to spawn after only 6 months at sea.

During this century, indigenous, naturally-reproducing populations of coho salmon have been extirpated in nearly all Columbia River tributaries and they are in decline in numerous coastal streams throughout Washington, Oregon, and California. NMFS'' coho salmon status review identified six distinct population segments (i.e., ESUs) in Washington, Oregon, and California and noted that natural runs in all ESUs are substantially below historical levels (Weitkamp, et al. 1995). At least 33 populations have been identified by state agencies and conservation groups as being at moderate or high risk of extinction. In general, the impacts on West Coast coho salmon stocks decrease geographically from south to north, with the central California stocks being in the worst condition.

This **Federal Register** document focuses on listing determinations for two coho salmon ESUs—the Southern Oregon/Northern California Coast ESU and the Oregon Coast ESU—both of which were proposed as threatened species under the ESA on July 25, 1995 (60 FR 38011). The Southern Oregon/ Northern California Coast ESU is composed of populations between Punta Gorda (CA) and Cape Blanco (OR). In the 1940s, estimated abundance of coho salmon in this ESU ranged from 150,000 to 400,000 naturally spawning fish. Today, coho populations in this ESU are very depressed, currently numbering approximately 10,000 naturally produced adults. Populations in the California portion of this ESU could be less than 6 percent of their abundance during the 1940s (CDFG, 1994), while Oregon populations have exhibited a similar but slightly less severe decline (ODFW, 1995); however, it is important to note that population abundance in the Rogue River Basin has increased substantially over the last 3 years (NMFS, 1997a). The bulk of current coho salmon production in this ESU consists of stocks from the Rogue River, Klamath River, Trinity River, and Eel River basins. Smaller basins known to support coho salmon include the Elk River in Oregon, and the Smith and Mad Rivers and Redwood Creek in California.

The Oregon Coast ESU is composed of populations between Cape Blanco and the Columbia River. More than one million coho salmon are believed to have returned to Oregon coastal rivers in the early 1900s (Lichatowich, 1989), the bulk of them originating in this ESU. Current production is estimated to be less than 10 percent of historical levels. Spawning in this ESU is distributed over a relatively large number of basins, both large and small, with the bulk of the production being skewed to the southern portion of its range. There, the coastal lake systems (e.g., the Tenmile, Tahkenitch, and Siltcoos basins) and the Coos and Coquille Rivers have been particularly productive for coho salmon.

Previous Federal ESA Actions Related to Coho Salmon

The history of petitions received regarding coho salmon is summarized in the proposed rule published on July 25, 1995 (60 FR 38011). The most comprehensive petition was submitted by the Pacific Rivers Council and 22 co-petitioners on October 20, 1993. In response to that petition, NMFS assessed the best available scientific and commercial data, including technical information from Pacific Salmon Biological and Technical Committees (PSBTCs) in Washington, Oregon, and California. The PSBTCs consisted of scientists with technical expertise relevant to coho salmon. They were drawn from Federal, state, and local resource agencies, Indian tribes, industries, professional societies, and public interest groups. NMFS also established a Biological Review Team (BRT), composed of staff from its Northwest Fisheries Science Center and Southwest Regional Office, which conducted a coastwide status review for coho salmon (Weitkamp et al., 1995).

Based on the results of the BRT report, and after considering other information and existing conservation measures, NMFS published a proposed listing determination (60 FR 38011, July 25, 1995) that identified six ESUs of coho salmon ranging from southern British Columbia to central California. The Olympic Peninsula ESU was found not to warrant listing and the Oregon Coast ESU, Southern Oregon/Northern California Coast ESU, and Central California Coast ESU were proposed for listing as threatened species. The Puget Sound/Strait of Georgia ESU and the lower Columbia River/southwest Washington Coast ESU were identified as candidates for listing. NMFS is now in the process of completing status reviews for these latter two ESUs; results and findings for both will be announced in an upcoming **Federal Register** notice.

On October 31, 1996, NMFS published a final rule listing the Central California Coast ESU as a threatened species (61 FR 56138). Concurrently, NMFS announced that a 6-month extension was warranted for the Oregon Coast and Southern Oregon/Northern California Coast ESUs (61 FR 56211) due to the fact that there was substantial disagreement regarding the sufficiency and accuracy of the available data relevant to the listing determination (pursuant to section 4(b)(6)(B)(i) of the ESA). The NMFS has now completed a review of additional data pertaining to these two ESUs and has updated its west coast coho salmon status review (NMFS, 1997a).

Summary of Comments Regarding the Oregon Coast and Southern Oregon/ Northern California Coast ESUs

The NMFS held six public hearings in California, Oregon, and Washington to solicit comments on the proposed listing determination for west coast coho salmon. Sixty-three individuals presented testimony at the hearings. During the 90-day public comment period, NMFS received 174 written comments on the proposed rule from state, Federal, and local government agencies, Indian tribes, non-governmental organizations, the scientific community, and other individuals. In accordance with agency policy (59 FR 34270, July 1, 1994), NMFS also requested a scientific peer review of the proposed rule, receiving responses from two of the seven reviewers. A summary of major public comments pertaining to the Oregon and Northern California coho salmon ESUs (including issues raised by peer reviewers) is presented below, grouped by issue categories.

Issue 1: Sufficiency and Accuracy of Scientific Information and Analyses

Comment: Many individuals urged NMFS to use the best available scientific information in reaching a final determination regarding the risk of extinction that the coho salmon ESUs face. Comments received from a peer reviewer, as well as from scientists representing state fish and wildlife agencies, tribes, and the private sector, disputed the sufficiency and accuracy of data that NMFS employed in its proposed rule to list west coast coho salmon. In particular, they questioned the data relating to the ESUs in Oregon and California. The primary areas of disagreement concerned data relevant to risk assessment and NMFS' evaluation of existing protective measures.

Response: The ESA requires that listing determinations be made on the basis of a population's status which is determined by using the best available scientific and commercial data, with subsequent consideration being given to state and foreign efforts to protect the species. In response to the comments summarized above, NMFS published a document (61 FR 56211, October 31, 1996) extending the final listing determination deadline for the Oregon Coast and Southern Oregon/Northern California Coast ESUs for 6 months to solicit, collect, and analyze additional data. During this period, NMFS met with fisheries co-managers and received new and updated information on coho salmon in British Columbia, Washington, Oregon, and California. This was deemed critical to assessing the current status of coho salmon ESUs. This new information, more fully described in a report from the NMFS BRT (NMFS, 1997a), generally consists of updates of existing data series, new data series, and new analyses of various factors. NMFS also received analyses and conservation measures associated with the OCSRI (OCSRI, 1996 and 1997). The OCSRI components relating to hatchery and harvest measures were assessed by the BRT (NMFS, 1997a), while remaining measures were assessed by the NMFS Habitat program (NMFS, 1997b).

NMFS believes that information contained in the agency's 1995 west coast coho salmon status review (Weitkamp *et al.*, 1995), together with more recent information collected by NMFS scientists and information provided to NMFS by other sources since the proposed listing determination was published, represent the best scientific information presently available for coho salmon populations on the Oregon and California coast. NMFS believes that this information is sufficient and accurate, and, in accordance with the ESA, finds it both mandatory and appropriate to make a listing determination at this time. If substantial new scientific information indicates a change in the status of either coho salmon ESU, NMFS will reconsider the present listing determinations.

Comment: Some commenters felt that NMFS should establish explicit listing criteria common to all coho salmon ESUs, and noted that such criteria would lead to different conclusions regarding extinction risk.

Response: At this time, there is no accepted methodology nor explicit listing criteria for determining the likelihood of extinction for Pacific salmon. In November 1996, NMFS' Northwest and Southwest Fisheries Science Centers sponsored a symposium/workshop on ''Assessing Extinction Risk for West Coast Salmon'' (Seattle, November 13–15, 1996). The objective of the workshop was to evaluate scientific methods for assessing various factors contributing to extinction risk for Pacific salmon populations. A preliminary summary of key recommendations was considered by the BRT during the coho salmon status review. Most of these recommendations require long-term development of improved methods, and thus, could not be substantially applied in this review.

In recent months, NMFS has also evaluated three different population simulation models for coho salmon developed by members of the OCSRI Science Team. The preliminary results of these viability models provide a wide range of results, with one model suggesting that most Oregon coastal stocks cannot sustain themselves at the ocean survival rates that have been observed in the last 5 years (even in the absence of harvest) and another suggesting that stocks are highly resilient and would be at significant risk of extinction only if habitat degradation continues into the future (more detailed evaluations of these models are presented in NMFS' status review update (NMFS, 1997a)). While these models have potential heuristic value, NMFS is presently reluctant to employ them to forecast extinction risk for coho salmon. Instead, NMFS has relied on its traditional assessment method, which employs a variety of information types to evaluate the level of risk faced by an ESU. These include: (1) Absolute numbers of fish and their spatial and temporal distribution; (2) current abundance in relation to historical abundance and carrying capacity of the habitat; (3) trends in abundance, based on indices such as dam or redd counts or on estimates of spawner-recruit ratios; (4) natural and human-influenced factors that cause variability in survival and abundance; (5) possible threats to genetic integrity (e.g., fisheries and interactions between hatchery and natural fish); and (6) recent events (e.g., a drought or a change in management) that have predictable short-term effects on the ESU's abundance. These considerations and the approaches to evaluating them are described in more detail in Weitkamp et al. (1995) and have been used by NMFS in other salmon status reviews. At this time, NMFS believes that an integrated assessment using these types of information is both desirable and appropriate for determining whether a Pacific salmon species is likely to become endangered or extinct.

Issue 2: Description and Status of the Southern Oregon/Northern California Coast and Oregon Coast Coho Salmon ESUs

Comment: A few commenters disputed NMFS' conclusions regarding the geographic boundaries for these ESUs; those who did, believed that NMFS should reduce the size/number of populations that constitute ESUs. One commenter believed that the Umpqua River basin (in the Oregon Coast ESU) should be considered a separate ESU and that listing was not warranted.

Response: The NMFS has published a policy describing how it would apply the ESA definition of a ''species'' to anadromous salmonid species (56 FR 58612, November 20, 1991). More recently, NMFS and the U.S. Fish and Wildlife Service (FWS) published a joint policy, consistent with NMFS' policy, regarding the definition of ''distinct population segments'' (61 FR 4722, February 7, 1996). The earlier policy is more detailed and applies specifically to Pacific salmonids and, therefore, was used for this determination. This policy indicates that one or more naturally reproducing salmonid populations will be considered to be distinct and, hence, species under the ESA, if they represent an ESU of the biological species. To be considered an ESU, a population must satisfy two criteria: (1) It must be reproductively isolated from other population units of the same species, 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 have been strong enough to permit evolutionarily important differences to occur in different population units. The second criterion is met if the population contributes substantially to the ecological or genetic diversity of the species as a whole. Guidance on applying this policy is contained in a scientific paper entitled: ''Pacific Salmon (*Oncorhynchus* spp.) and the Definition of 'Species' under the Endangered Species Act.'' It is also found in a NOAA Technical Memorandum: ''Definition of 'Species' Under the Endangered Species Act: Application to Pacific Salmon.'' NMFS' proposed listing determination and rule (60 FR 38011, July 25, 1995) for west coast coho salmon and the west coast coho salmon status review (Weitkamp et al., 1995) describe the genetic, ecological, and life history characteristics, as well as human-caused genetic changes, that NMFS assessed to determine the number and geographic extent of the coho salmon ESUs.

With respect to the Umpqua River, NMFS recognizes that physical and hydrological conditions in this basin are unique (i.e., it is by far the largest basin in the Oregon Coast ESU, and it is the only basin in the ESU to cut through the Coast Range to drain the Cascade Mountains). However, NMFS believes that application of the agency's policy (described above) justifies including Umpqua River coho salmon populations as an integral part of the Oregon Coast ESU. Ocean distribution patterns (based on marine recovery locations of fish tagged with coded wire tags) for coho salmon released from this ESU (including releases from the Umpqua stocks) are distinctly different from the distribution patterns for coho salmon released from ESUs to the north and south. Thus, NMFS concludes that the ocean migration patterns of the Umpqua stocks are similar to the rest of the stocks in the ESU. In addition, genetic data that NMFS reviewed (Weitkamp *et al.*, 1995) indicate that genetic discontinuities are particularly pronounced at Cape Blanco and the mouth of the Columbia River. While there is evidence of genetic heterogeneity within this area (e.g., the Oregon Department of Fish and Wildlife (ODFW) has identified the Umpqua River basin as one of six distinct gene conservation groups of coho salmon), NMFS believes that this ESU, as a whole, which includes the Umpqua stocks, exhibits a reasonable degree of reproductive isolation from the other two ESUs that border it.

Comment: Most commenters expressed an opinion as to whether listing was warranted for these and other coho salmon ESUs, although few provided substantive new information relevant to making risk assessments. The majority of comments stated that both ESUs should be listed as threatened or endangered, while relatively few stated that listing was not warranted.

Response: Recent Status of the Southern Oregon/Northern California Coast ESU: The Estimates of natural population abundance in the ESU continue to be based on very limited information, but the ESU has clearly undergone a dramatic decline. Favorable indicators include recent increases in abundance in the Rogue River and the presence of natural populations in both large and small basins within the ESU—factors that may provide some buffer against the ESU's extinction. However, large hatchery programs, particularly in the Klamath/Trinity basin, raise serious concerns about effects on, and sustainability of, natural populations. For example, available information indicates that virtually all of the naturally spawning fish in the Trinity River are first-generation hatchery fish. Several hatcheries in the California portion of this ESU have used exotic stocks extensively in the past, in contrast to Cole Rivers Hatchery in Oregon which has only released Rogue River stock into the Rogue River. New data relating to coho salmon presence/absence in northern California streams that historically supported coho salmon are even more disturbing than earlier

results, indicating that a smaller percentage of streams in this ESU contain coho salmon than did during an earlier study. However, it is unclear whether these new data represent actual trends in local extinctions, or if they are simply biased by sampling methods.

In the Rogue River basin, natural spawner abundance in 1996 was slightly above levels found in 1994 and 1995. Abundances in the most recent 3 years are all substantially higher than they were in 1989–93, and are comparable to counts at Gold Ray Dam (upper Rogue) in the 1940s. Estimated return ratios for 1996 are the highest on record, but this may be influenced by an underestimate of parental spawners. The Rogue River run included an estimated 60 percent hatchery fish in 1996; this figure is comparable to the percentages found in recent years. The majority of these hatchery fish return to Cole Rivers Hatchery, but NMFS has no estimate of the actual number that stray into natural habitat.

Response: Recent Status of the Oregon Coast ESU: While this ESU's current abundance is substantially less than it was historically, recent trends indicate that spawner escapements in this ESU are stable or increasing as a likely result of significant harvest restrictions (or other factors). Although escapement has been increasing for the ESU as a whole (1996 estimate of ESU-wide escapement indicates an approximately four-fold increase since 1990), recruitment and recruits-to-spawner ratios have remained low. While recent natural escapement has been estimated to be on the order of 50,000 fish per year in this ESU (reaching approximately 80,000 fish in 1996), this has been coincident with drastic reductions in harvest. Pre-fishery recruitment was higher in 1996 than in either 1994 or 1995, but it still exhibits a relatively flat trend since 1990. When looked at on a finer geographic scale, the northern Oregon coast still has very poor escapement, the north-central coast is mixed with strong increases in some streams but continued poor escapement in others, and the south-central coast continues to have increasing escapement.

In contrast to most of the 1980s, spawner-to-spawner ratios in this ESU have remained at or above replacement since 1990 (due primarily to sharp reductions in harvest). This represents the longest period of sustained replacement observed in the past 20 years. It is notable that this sustained replacement has occurred during a period of low recruitment and primarily poor-to-fair ocean conditions. However, significant concerns remain regarding the declining trend in this ESU's productivity.

Issue 3: Factors Contributing to the Decline of West Coast Coho Salmon ESUs

Comment: Many commenters addressed factors contributing to the decline of coho salmon. These included overharvest, predation by pinnipeds, effects of artificial propagation, and the deterioration or loss of freshwater and marine habitats. One peer reviewer and several commenters believed that NMFS' assessment did not adequately consider the large influence of natural environmental fluctuations. Some commenters took exception to generalizations that NMFS made regarding the various factors for decline and requested more detail on the various factors so that recovery efforts could be appropriately focussed.

Response: NMFS agrees with the commenters that many factors, past and present, have contributed to the decline of coho salmon. The agency also recognizes that natural environmental fluctuations have likely played a large role in the species' recent declines. However, NMFS believes that other human-induced impacts (e.g., from overharvest, hatchery practices, and habitat modification) have been equally significant and, moreover, have likely reduced the coho salmon populations' resiliency in the face of adverse natural factors such as drought and poor ocean conditions. Since the time of NMFS' proposed listing, several documents have been produced that describe in more detail the impacts of various factors contributing to the decline of coho and other salmonids (NMFS, 1996a, 1997a, and 1997b; OCSRI 1997). In addition, NMFS has developed a document titled ''Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Watershed Scale'' (NMFS, 1996b). This document presents guidelines to facilitate and standardize determinations of ''effect'' under the ESA and includes a matrix for determining the condition of various habitat parameters. This matrix is being implemented in several northern California and Oregon coastal watersheds and is expected to help guide efforts to define salmon risk factors and conservation strategies throughout the west coast. A concise description of information contained in these documents, as well as new information provided by commenters, has been incorporated in the section below titled ''Summary of Factors Affecting Coho Salmon.''

Issue 4: Adequacy of Existing Conservation Measures or Regulatory Mechanisms

Comment: Many commenters expressed opinions regarding the adequacy of existing conservation efforts or regulatory mechanisms. While many thought that existing programs were sufficient to conserve coho salmon (and hence avoid listing), others believed that efforts were either inadequate, poorly implemented, or of uncertain benefit to the species.

Response: The regulatory mechanisms established by Federal, state, tribal, and local governments provide the most effective and available means to prevent a species from facing the peril of extinction. In its proposed rule, NMFS concluded that existing measures were not sufficient to offset population declines. Since that time, several documents have been produced that describe in more detail the existing conservation efforts for salmon in Oregon and California (NMFS, 1996a, 1996c, and 1997b; OCSRI, 1997). Moreover, the agency has reviewed a variety of state and Federal conservation efforts (including regulatory mechanisms) aimed at protecting coho salmon and their habitats in these ESUs, and NMFS recognizes that significant conservation efforts have been made by an array of government agencies and private groups in California and Oregon. NMFS has also developed a document titled ''Coastal Salmon Conservation: Working Guidance for Comprehensive Salmon Restoration Initiatives on the Pacific Coast'' (NMFS, 1996d). This document was drafted to guide the Pacific Coast states, tribes, and other entities in taking the initiative for coastal salmon restoration; it also provides a framework for developing successful salmon restoration strategies. Information that commenters provided regarding existing regulatory mechanisms has been incorporated in the sections below titled: ''Summary of Factors Affecting Coho Salmon, and Efforts to Protect Oregon and California Coho Salmon.''

Issue 5: Information Received After the Close of the Comment Period

Comment: When the states of Oregon and California announced that they were in the process of developing salmon restoration initiatives (61 FR 56211, October 31, 1996), it generated considerable interest among the general public. This was especially true for the OCSRI. Between the time the August OCSRI draft was released and this **Federal Register** document was written, NMFS received a great deal of

correspondence on this subject. Some of the mail was addressed to NMFS, but much of it arrived in the form of courtesy copies of mailings sent to the state. The majority of the comments NMFS received supported the concept of a state restoration initiative, but they also expressed the thought that NMFS should still provide the additional protections afforded by a listing under the ESA.

Response: NMFS has considered this information and thanked as many of these commenters as time has allowed, and, moreover, appreciates the input it has received from the many comments that were submitted.

Summary of Factors Affecting Coho Salmon

Section 4(a)(1) of the ESA and NMFS listing regulations (50 CFR part 424) set forth procedures for listing species. The Secretary of Commerce (Secretary) 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 educational purposes; (3) disease or predation; (4) inadequacy of existing regulatory mechanisms; or (5) other natural or human-made factors affecting its continued existence.

The factors threatening naturally-reproducing coho salmon throughout its range are numerous and varied. For coho salmon populations in California and Oregon, the present depressed condition is the result of several long-standing, human-induced factors (e.g., habitat degradation, harvest, water diversions, and artificial propagation) that serve to exacerbate the adverse effects of natural environmental variability from such factors as drought, floods, and poor ocean conditions.

As noted earlier, NMFS received numerous comments regarding the relative importance of various factors contributing to the decline of coho salmon. Several recent documents have been produced that describe in more detail the impacts of various factors contributing to the decline of coho and other salmonids (NMFS, 1996a, 1997a, and 1997b; OCSRI, 1997). The following sections provide an overview of the various risk factors and their role in the decline of Oregon and California coho salmon.

A. The Present or Threatened Destruction, Modification, or Curtailment of its Habitat or Range

NMFS, in conjunction with the State of Oregon, identified the habitat factors for decline that have affected coho salmon. The factors are: Channel morphology changes, substrate changes, loss of instream roughness, loss of estuarine habitat, loss of wetlands, loss/degradation of riparian areas, declines in water quality (e.g., elevated water temperatures, reduced dissolved oxygen, altered biological communities, toxics, elevated pH, and altered stream fertility), altered streamflows, fish passage impediments, elimination of habitat, and direct take. Additional detail on each of these factors for decline can be found in reports by NMFS (NMFS, 1996a, 1997a, and 1997b) and the State of Oregon (OCSRI, 1997).

The major activities responsible for the decline of coho salmon in Oregon and California are logging, road building, grazing and mining activities, urbanization, stream channelization, dams, wetland loss, beaver trapping, water withdrawals and unscreened diversions for irrigation. Many commenters expressed concern that these and other habitat-related activities, if unchecked, could ultimately lead to the ESUs' becoming endangered or extinct. The following discussion provides an overview of the types of activities and conditions that adversely affect coho salmon in coastal watersheds.

Numerous studies have demonstrated that land use activities associated with logging, road construction, urban development, mining, agriculture, and recreation have significantly altered the quantity and quality of coho salmon habitat. Impacts of concern associated with these activities include the following: Alteration of streambank and channel morphology, alteration of ambient stream water temperatures, alteration of the magnitude and timing of annual stream flow patterns, elimination of spawning and rearing habitat, fragmentation of available habitats, elimination of downstream recruitment of spawning gravels and large woody debris, removal of riparian vegetation resulting in increased stream bank erosion, and degradation of water quality (CDFG, 1965; Bottom *et al.*, 1985; California Advisory Committee on Salmon and Steelhead Trout, 1988; CDFG, 1991; Nehlsen *et al.*, 1991; California State Lands Commission, 1993; Wilderness Society, 1993; Bryant, 1994; CDFG, 1994; Brown *et al.*, 1994; Botkin *et al.*, 1995; McEwan and Jackson, 1996). Of particular concern is the increased sediment input into spawning and rearing areas that results from loss of properly functioning riparian areas, land management activities that occur on unstable slopes, and certain agricultural practices. Further, historical practices, such as the use of splash dams, widespread removal of log jams, removal of snags from river channels, and eradication of beaver have adversely modified fish habitat (Bottom *et al.*, 1985).

Agricultural practices have also contributed to the degradation of salmonid habitat on the west coast through irrigation diversions, overgrazing in riparian areas, and compaction of soils in upland areas from livestock (Botkin *et al.*, 1995; Spence *et al.*, 1996). The vigor, composition, and diversity of natural vegetation can be altered by livestock grazing in and around riparian areas. This in turn can affect the site's ability to control erosion, provide stability to stream banks, and provide shade, cover, and nutrients to the stream. Mechanical compaction can reduce the productivity of the soils appreciably and cause bank slough and erosion. Mechanical bank damage often leads to channel widening, lateral stream migration, increases in water temperature, and excess sedimentation. Agricultural practices are also a key producer of non-point source pollution which includes runoff from livestock and tilled fields (nutrients and sediments) and agricultural chemicals.

Urbanization has degraded coho salmon habitat through stream channelization, floodplain drainage, and riparian damage (Botkin *et al.*, 1995). When watersheds are urbanized, problems may result simply because structures are placed in the path of natural runoff processes, or because the urbanization itself has induced changes in the hydrologic regime. In almost every point that urbanization activity touches the watershed, point source and nonpoint source pollution occurs. Water infiltration is reduced due to an increase in impervious surfaces. As a result, runoff from the watershed is flashier, with increased flood hazard (Leopold, 1968). Flood control and land drainage schemes may concentrate runoff, resulting in increased bank erosion which causes a loss of riparian vegetation and undercut banks and eventually causes widening and down-cutting of the stream channel. Sediments washed from the urban areas contain trace metals such as copper, cadmium, zinc, and lead (CSLC, 1993). These, together with pesticides, herbicides, fertilizers, gasoline, and

other petroleum products, contaminate drainage waters and harm aquatic life necessary for coho salmon survival. The California State Water Resources Control Board (CSWRCB, 1991) reported that nonpoint source pollution is the cause of 50 to 80 percent of impairment to water bodies in California.

Forestry has degraded coho salmon habitat through removal and disturbance of natural vegetation, disturbance and compaction of soils, construction of roads, and installation of culverts. Timber harvest activities can result in sediment delivered to streams through mass wasting and surface erosion that can elevate the level of fine sediments in spawning gravels and fill the substrate interstices inhabited by invertebrates. Where logging in the riparian areas occurs, inputs of leaf litter, terrestrial insects, and large woody debris to the stream are reduced. Loss of large woody debris, combined with alteration of hydrology and sediment transport, reduces complexity of stream micro-and macrohabitats and causes loss of pools and channel sinuosity. The structure of the biological community may also change. This includes fish assemblages and diversity as well as timing of life history events (Spence *et al.*, 1996).

Depletion and storage of natural flows have drastically altered natural hydrological cycles, especially in California and southern Oregon rivers and streams. Alteration of streamflows has increased juvenile salmonid mortality for a variety of reasons: Migration delay resulting from insufficient flows or habitat blockages; loss of usable habitat due to dewatering and blockage; stranding of fish resulting from rapid flow fluctuations; entrainment of juveniles into unscreened or poorly screened diversions; and increased juvenile mortality resulting from increased water temperatures (California Advisory Committee on Salmon and Steelhead Trout, 1988; CDFG, 1991; CBFWA, 1991; Bergren and Filardo, 1991; Palmisano *et al.*, 1993; Reynolds *et al.*, 1993; Chapman *et al.*, 1994; Cramer *et al.*, 1995; Botkin *et al.*, 1995). In addition, reduced flows degrade or diminish fish habitats via increased deposition of fine sediments in spawning gravels, decreased recruitment of new spawning gravels, and encroachment of riparian and non-endemic vegetation into spawning and rearing areas.

Important elements of water quality include water temperatures within the range that corresponds with migration, rearing and emergence needs of fish and the aquatic organisms upon which they depend (Sweeney and Vannote, 1978; Quinn and Tallman, 1987). Desired conditions for coho salmon include an abundance of cool (generally in the range of 11.8 degrees C to 14.6 degrees C), well oxygenated water that is present year-round, free of excessive suspended sediments and other pollutants that could limit primary production and benthic invertebrate abundance and diversity (Cordone and Kelley, 1961; Reiser and Bjornn, 1979; Lloyd *et al.*, 1987).

There are approximately 18,137 miles (30,228 km) of streams in the coastal basins of Oregon. Of that number, 6,086 stream miles (10,143 km) (33.5 percent) have been assessed by Oregon Department of Environmental Quality (DEQ) for compliance with existing water quality standards using available water quality information. Of the 6,086 stream miles assessed (10,143 km), 3,035 stream miles (5,058 km) (49.9 percent) were found to be water quality limited, and 2,345 stream miles (3,908 km)(38.5 percent) need additional data or were of potential concern. Only 706 stream miles (1,177 km)(11.6 percent) of those assessed were found to be meeting all state water quality standards (OCSRI, 1997).

Eighteen water bodies in northern California, including eight within the range of the Southern Oregon/Northern California Coast ESU, have been designated as impaired by the Environmental Protection Agency (EPA) under section 303(d) of the Federal Clean Water Act (CWA). These eight river basins include the Mattole, Eel, Van Duzen, Mad, Shasta, Scott, Klamath, and Trinity Rivers. The primary factors for listing these river basins as impaired are excessive sediment load and elevated water temperatures.

Although individual management activities by themselves may not cause significant harm to salmonid habitats, incrementally and collectively, they may degrade habitat and cause long-term declines in fish abundance (Bisson *et al.*, 1992). Changes in sediment dynamics, streamflow, and water temperature are not just local problems restricted to a particular reach of a stream, but problems that can have adverse cumulative effects throughout the entire downstream basin (Sedell and Swanson, 1984; Grant, 1988). For example, increased erosion in headwaters, combined with reduced sediment storage capacity in small streams, from loss of stable instream large woody debris (LWD), can overwhelm larger streams with sediment (Bisson *et al.*, 1992). Likewise, increased water temperature in headwater streams may not harm salmonids there but can contribute to downstream warming (Bisson *et al.*, 1987; Bjornn and Reiser, 1991).

The most pervasive cumulative effect of past forest practices on habitats for anadromous salmonids has been an overall reduction in habitat complexity (Bisson *et al.*, 1992), from loss of multiple habitat components. Habitat complexity has declined principally because of reduced size and frequency of pools due to filling with sediment and loss of LWD (Reeves *et al.*, 1993; Ralph *et al.*, 1994). However, there has also been a significant loss of off-channel rearing habitats (e.g., side channels, riverine ponds, backwater sloughs) important for juvenile salmon production, particularly coho salmon (Peterson, 1982). Cumulative habitat simplification has caused a widespread reduction in salmonid diversity throughout California, Oregon, and the region.

B. Overutilization for Commercial, Recreational, Scientific, or Education Purposes

Coho salmon have historically been a staple of Pacific Northwest and northern California Indian tribes and have been targeted in recreational and commercial fisheries since the early 1800s (Nickelson *et al.*, 1992). Coho salmon harvested by California Native American tribes in the northern California portion of the Southern Oregon/Northern California Coast ESU is primarily incidental to larger chinook salmon subsistence fisheries in the Klamath and Trinity Rivers; in neither basin is tribal harvest considered to be a major factor for the decline of coho salmon. The recent estimated Yurok tribal net harvest of coho salmon in the Klamath River was 27 in 1994, 660 in 1995, and 540 in 1996. The Yurok tribal fishery is managed annually under a Harvest Management Plan adopted by the Tribal Council pursuant to the authority of the Yurok Tribal Fishing Rights Ordinance. The Hoopa Tribe's estimated net harvest of coho salmon from 1982–96 averaged 263 fish per year and ranged from a low of 25 fish in 1994 to a high of 1,115 fish in 1985. Harvest management practiced by the tribes is conservative and has resulted in limited impacts on the coho salmon stocks in the Klamath and Trinity Rivers.

Overfishing in non-tribal fisheries is believed to have been a significant factor in the decline of coho salmon. Marine harvest in the Oregon Coast and Southern Oregon/Northern California Coast ESUs occurs primarily in nearshore waters off Oregon, and California (Weitkamp *et al.*, 1995). Coho

salmon landings off the California and Oregon coast ranged from 0.7 to 3.0 million in the 1970s, were consistently below 1 million in the 1980s, and averaged less than 0.4 million in the early 1990s prior to closure of the fisheries in 1994 (PFMC, 1995).

Significant overfishing occurred from the time marine survival turned poor for many stocks (ca. 1976) until the mid-1990s when harvest was substantially curtailed. This overfishing compromised escapement levels. Spawning escapement targets established for the Oregon Coastal Natural (OCN) coast wide aggregate (comprised of all naturally produced coho salmon from Oregon coastal streams) were rarely met over the past 2 decades. There are many reasons that escapement targets were not met, including excessive harvests and difficulty in estimating the maximum sustainable yield given extreme fluctuations in ocean productivity and the inability to properly distinguish wild spawners from stray hatchery fish.

Coho salmon stocks are managed by NMFS in conjunction with the Pacific Fishery Management Council (PFMC), the states, and certain tribes. Coho salmon ocean harvest is managed by setting escapement goals for OCN coho salmon. This stock aggregate constitutes the largest portion of naturally-produced coho salmon caught in ocean salmon fisheries off California and Oregon (PFMC, 1993). The PFMC prohibited the retention of coho salmon in both the commercial and recreational salmon fisheries along the entire west coast in 1994. A similar action prohibiting the retention of coho salmon in all salmon fisheries south of Cape Falcon (on the northern Oregon coast) was implemented in 1995. These actions were taken because of the depressed status of Oregon and California coastal coho salmon stocks in 1994 and 1995 and are believed to have immediately benefitted these stocks by increasing escapement.

New OCN coho salmon adult spawner escapement rebuilding criteria and associated fishery management strategy for OCN are currently being proposed by Oregon to the PFMC and NMFS and are described in more detail in the OCSRI (1997). Key provisions of this management strategy include: (1) Disaggregation of OCN stock into four components for better management of weaker stock units; (2) setting new adult spawner escapement rebuilding criteria for each component derived from a model based on freshwater habitat assessment and production capability; and (3) establishing future coho salmon fishery-related exploitation rates under a more restrictive fishery management regime that allocates most of future population increases to escapement.

Recreational fishing for coho salmon is pursued in numerous streams throughout the Oregon and California coast when adults return on their fall spawning migration. The contribution of coho salmon to the in-river sport catch is unknown for most California watersheds, and losses due to injury and mortality from incidental capture in other authorized fisheries, principally steelhead, are also unknown. The California Department of Fish and Game (CDFG) has monitored, with Trinity River Basin Fish and Wildlife Restoration Act funding, angler harvest of coho salmon in the Trinity River above Willow Creek with reward tags since 1977. In-river angler harvest estimates for coho salmon range from zero in 1980 to a high of 3,368 in 1987, with an average of 598 coho salmon harvested per year.

In the Oregon portion of the Southern Oregon/Northern California Coast ESU, marked hatchery coho salmon are allowed to be harvested in the Rogue River. All other recreational coho salmon fisheries in the Oregon portion of this ESU are closed. In the Oregon Coast ESU, recreational fisheries for coho salmon are limited to three rivers: North Fork Nehalem River (primarily a hatchery run), Trask River, and Yaquina River. Regulations for the latter two rivers allow only marked hatchery fish to be kept. With the marking of all hatchery fish, the Nehalem River recreational fishery will also be limited to harvest of marked hatchery coho salmon in the near future.

Collection for scientific research and educational programs is believed to have had little or no impact on coho salmon populations in these ESUs. In both California and Oregon, most of the scientific collection permits are issued to environmental consultants, Federal resource agencies, and universities by the CDFG and the ODFW. Regulation of take is controlled by conditioning individual permits. The state fish and wildlife agencies require reporting of any coho salmon taken incidentally to other monitoring activities; however, no comprehensive total or estimate of coho salmon mortalities related to scientific sampling is kept for watersheds in either state. Neither CDFG (F. Reynolds, pers. comm.) nor ODFW (R. Temple, pers. comm.) believe that mortalities, as regulated by the states' permitting processes, are detrimental to coho salmon in California and Oregon.

C. Disease or Predation

Relative to effects of fishing, habitat degradation, and hatchery practices, disease and predation are not believed to be major factors contributing to the overall decline of coho salmon in California and Oregon. However, disease and predation may have substantial impacts in local areas.

Coho salmon are exposed to numerous bacterial, protozoan, viral, and parasitic pathogens in freshwater and marine environments. Specific diseases such as bacterial kidney disease (BKD), ceratomyxosis, columnaris, furunculosis, infectious hematopoietic necrosis, redmouth and black spot disease, Erythrocytic Inclusion Body Syndrome, whirling disease, and others are present and known to affect salmon and steelhead (Rucker *et al.*, 1953; Wood, 1979; Leek, 1987; Cox, 1992; Foott *et al.*, 1994; Gould and Wedemeyer, undated). Very little current or historical information exists to quantify prevalences and mortality rates attributable to these diseases for coho salmon. However, studies have shown that native fish tend to be less susceptible to these pathogens than hatchery-reared fish (Buchanon *et al.*, 1983; Sanders *et al.*, 1992).

Infectious disease is one of many factors that can influence adult and juvenile survival (Buchanan *et al.*, 1983). Disease may be contracted by direct infection with waterborne pathogens or by interbreeding with infected hatchery fish (Fryer and Sanders, 1981; Evelyn *et al.*, 1984 and 1986). Salmonids typically are exposed to a variety of pathogens throughout their life; however, disease results only when the complex interaction among host, pathogen, and environment is altered.

Many natural and hatchery coho salmon populations throughout California's coast have tested positive for *Renibacterium salmoninarum*, the causative bacterium of BKD (Cox, 1992; Foott, 1992). For example, in the Central California Coast ESU, the overall prevalence of BKD measured by direct fluorescent antibody technique among Scott Creek coho salmon was 100 percent (13/13 fish) and 95.5 percent (21/22 fish) among San Lorenzo River coho salmon (Cox, 1992). The CDFG recently initiated a treatment protocol to attempt to control BKD outbreaks in hatchery fish released into the Russian River and Scott Creek (Cox, 1992). The impacts of this disease are subtle. Juvenile salmonids may survive well in their journey downstream but may be unable to make appropriate changes in kidney function for a successful

transition to sea water (Foott, 1992). Stress during migration may also cause overt disease (Schreck, 1987). Water quantity and quality during late summer is a critical factor in controlling disease epidemics. As water quantity and quality diminishes, stress may trigger the onset of these diseases in fish that are carrying the infectious agents (Holt *et al.*, 1975; Wood, 1979; Matthews *et al.*, 1986; Maule *et al.*, 1988).

Freshwater predation by salmonids and other fishes is not believed to be a major factor contributing to the decline of coho salmon in the Oregon Coast and Southern Oregon/Northern California Coast ESUs, although it could be a factor for some individual populations. For example, predation by exotic warmwater fish is believed to be a major factor limiting the production in Tenmile Lake, formerly one of the largest producers of coho salmon along the Oregon coast (Reimers, 1989). Higgins *et al.* (1992) and CDFG (1994) reported that Sacramento River squawfish have been found occupying anadromous salmonid habitat throughout the Eel River basin and are considered to be a serious threat to native coho salmon. Avian predators have been shown to impact some juvenile salmonids in freshwater and nearshore environments. Ruggerone (1986) estimated that ring-billed gulls consumed 2 percent of the salmon and steelhead trout passing Wanapum Dam, in the Columbia River, during the spring smolt outmigration in 1982. Wood (1987) estimated that the common merganser, a known freshwater predator of juvenile salmonids, were able to consume 24 to 65 percent of coho salmon production in coastal British Columbia streams. Known avian predators in the nearshore marine environment include herons, cormorants, and alcids (Allen, 1974). Cooper and Johnson (1992) and Botkin *et al.* (1995) reported that marine mammal and avian predation may occur on some local salmonid populations; however, they believed that it was a minor factor in the decline of coastwide salmonid populations. With the decrease in quality riverine and estuarine habitats, increased predation by freshwater, avian, and marine predators will occur. With the decrease in avoidance habitat (e.g., deep pools and estuaries, and undercut banks) and adequate migration and rearing flows, predation may play a role in the reduction of some localized coho salmon stocks.

California sea lions and Pacific harbor seals (which occur in most estuaries and rivers where salmonid runs occur on the west coast) are known predators of salmonids and their populations are increasing. This raises concerns over the negative impacts of predation on small salmonid populations, particularly when the pinnipeds co-occur with depressed salmonid populations in estuaries and rivers during salmonid migrations (NMFS, 1997c). The observations of steelhead predation by California sea lions at the Ballard Locks in Seattle, WA, show that a significant proportion (65 percent) of an entire salmonid run can be consumed by sea lions (Scordino and Pfeifer, 1993) and this clearly demonstrates that the combination of high local predator abundance during salmonid migrations, restricted passage, and depressed fish stocks can result in significant impacts on local salmonid populations (NMFS, 1997c). Unfortunately, there are only a few areas on the west coast, other than the Ballard Locks, where studies have documented the influence of pinniped predation on local salmonid populations. In the Puntledge River estuary in British Columbia, Bigg *et al.* (1990) observed Pacific harbor seals surface feeding on salmonids and documented predation rates of up to 46 percent of the returning adult fall chinook. In the same river, observations of harbor seal predation on coho salmon smolts in 1995 indicated that the seals consumed 15 percent of the total production. Predation on coho salmon has also been observed at the Ballard Locks with a single California sea lion documented to have consumed 136 coho salmon in 62 hours (2.1 coho salmon per hour) (NMFS, 1997c). Although there have been no specific studies in any coastal estuary on the west coast on impacts of pinniped predation, it is known that pinniped foraging on coho salmon can be extensive based on ancillary information from hatcheries that have documented pinniped scarring on 11–20 percent of the returning coho salmon (NMFS, 1997c).

In many of the small coastal rivers and streams in southern Oregon and northern California, there is a situation that makes returning adult coho salmon and winter steelhead more vulnerable to pinniped predation than larger systems (NMFS, 1997c). In low rainfall years, or when rain arrives late in the winter season, small coastal rivers do not flow with sufficient volume to open the beach crest and flow into the sea. Low tide periods also create or compound this condition in low-flowing small rivers and streams. During such periods, adult fish arrive and accumulate in nearshore waters just offshore of the closed-off river mouth. The adult salmonids are then exposed to days or weeks of pinniped predation at these sites until sufficient rainfall occurs or higher tides allow access to the river or stream. During successive years of drought, the situation is exacerbated because the river mouths are open only intermittently during the salmonid spawning season. Downstream migrating smolts also become more vulnerable to pinniped and bird predation in these conditions as they congregate in the lagoons formed near the river mouth until it opens up to the sea.

It is unlikely that pinniped predation was a significant factor in the decline of coho salmon populations on the west coast; there have been no specific studies that demonstrate a cause-effect relationship between increases in pinniped numbers and declines in salmonid populations. However, with reduced salmonid populations and increased pinniped populations, pinniped predation can be a factor affecting the recovery of some salmonid populations. Pinniped predation on small salmonid populations, especially at areas of restricted fish passage, can have negative impacts on the recovery of depressed salmonids. Seasonal predation by pinnipeds on some salmonid populations has been observed, and a significant negative impact on at least one salmonid population has been documented (i.e., winter steelhead migrating through the Ballard Locks). Pinniped impacts on salmonids are more likely due to opportunistic behavior by certain individual pinnipeds that have learned to exploit situations where salmonids are concentrated and particularly vulnerable rather than being strictly related to pinniped population size. As the number of pinnipeds increases, however, the likelihood of more pinnipeds discovering these situations increases, as does the opportunity to pass on such learned behavior to other pinnipeds.

All in all, the relative impacts of marine predation on anadromous salmonids are not well understood, but marine predation was not likely a major factor in the coho salmon decline, although it can be a factor in the recovery of some localized coho salmon stocks. Normally, predators play an important role in the ecosystem, culling out unfit individuals, thereby strengthening the species as a whole. The increased impact of certain predators has been, to a large degree, the result of ecosystem modification. Therefore, it would seem more likely that increased predation is but a symptom of a much larger problem,

namely, habitat modification and a decrease in water quantity and quality.

D. Inadequacy of Existing Regulatory Mechanisms

Habitat Management

1. Northwest Forest Plan (NFP). The NFP is a Federal program with important benefits for coho salmon, as described below (see Federal Conservation Efforts). While the NFP covers a very large area, the overall effectiveness of the NFP in conserving Oregon and California coho salmon is limited by the extent of Federal lands and the fact that Federal land ownership is not uniformly distributed in watersheds within the affected ESUs. In some areas, Federal lands tend to be located in the upper reaches of watersheds or river basins, upstream of lower gradient river reaches that were historically important for coho salmon production. In other areas, particularly Bureau of Land Management (BLM) ownership, Federal lands are distributed in a checkerboard fashion, resulting in fragmented landscapes. Both of these Federal land distribution factors place constraints on the ability of the NFP to achieve its aquatic habitat restoration objectives at watershed and river basin scales and highlight the importance of complementary salmon habitat conservation measures on non-Federal lands within the subject ESUs.

2. State Forest Practices. The California Department of Forestry and Fire Protection (CDF) enforces the State of California's forest practice rules (CFPRs) which are promulgated through the Board of Forestry (BOF). The CFPRs contain provisions that can be protective of coho salmon if fully implemented. However, NMFS believes that the ability of the CFPRs to protect coho salmon can be improved, particularly in the area of developing properly functioning riparian habitat. For this reason, NMFS is attempting to improve the condition of riparian buffers in ongoing habitat conservation plan negotiations with private landowners. Specifically, the CFPRs do not adequately address large woody debris recruitment, streamside tree retention to maintain bank stability, and canopy retention standards that assure stream temperatures are properly functioning for all life stages of coho salmon. The current process for approving Timber Harvest Plans (THPs) under the CFPRs does not include monitoring of timber harvest operations to determine whether a particular operation damaged habitat and, if so, how it might be mitigated in future THPs. The CFPR rule that permits salvage logging is also an area where better environmental review and monitoring could provide NMFS with the information to determine whether this practice impacts coho salmon.

There have been several reviews of the current CFPRs and particularly the rules associated with the Water/lake Protection Zones (WLPZs) for their adequacy in protecting aquatic dependent species such as coho salmon. Most reviews have shown that implementation and enforcement of the current rules are not adequate in protecting coho salmon or their habitats (CDFG, 1994; Murphy, 1995). NMFS' inability to assess the adequacy of the CFPRs is primarily due to the lack of published documentation that the CFPRs are functioning to protect coho salmon. NMFS is currently reviewing the CFPRs so that discussions can be opened with CDF to determine where improvements in the language and definition of the CFPRs would be beneficial.

The CDF has recently proposed 15 amendments to the CFPRs that would become effective on January 1, 1998, if approved by the BOF. The proposed changes are a positive sign that CDF recognizes the need to provide a higher level of protection to stream side zones, provide for additional control of sediment inputs from road construction and harvest operations, and clarify conditions for exemptions in stream zones. However, the adoption of the proposed changes to the CFPRs is uncertain at this time.

The BOF's Monitoring Study Group (MSG) has developed a Long-Term Monitoring Program (LTMP) for assessing the effectiveness of the CFPRs in protecting water quality. The MSG recently published a report on its Pilot Monitoring Program for the LTMP (January, 1997) which evaluated canopy retention in 50 randomly selected THPs in Mendocino and Humboldt Counties. The Pilot Study found that canopy retention was higher (70 percent) in the THPs which were evaluated than the minimum required by the CFPRs (50 percent).

The Oregon Forest Practices Act (OFPA), while modified in 1995 and improved over the previous OFPA, does not have implementing rules that adequately protect coho salmon habitat. In particular, the current OFPA does not provide adequate protection for the production and introduction of large woody debris (LWD) to medium, small and non-fish bearing streams. Small non-fish bearing streams are vitally important to the quality of downstream habitats. These streams carry water, sediment, nutrients, and LWD from upper portions of the watershed. The quality of downstream habitats is determined, in part, by the timing and amount of organic and inorganic materials provided by these small streams (Chamberlin *et al.* in Meehan, 1991). Given the existing depleted condition of most riparian forests on non-Federal lands, the time needed to attain mature forest conditions, the lack of adequate protection for non-riparian LWD sources in landslide-prone areas and small headwater streams (which account for about half the wood found naturally in stream channels) (Burnett and Reeves, 1997, citing Van Sickle and Gregory, 1990; McDade *et al.*, 1990; and McGreary, 1994), and current rotation schedules (approximately 50 years), there is a low probability that adequate LWD recruitment could be achieved under the current requirements of the OFPA. Also, the OFPA does not adequately consider and manage timber harvest and road construction on sensitive, unstable slopes subject to mass wasting, nor does it address cumulative effects.

3. Dredge, Fill, and Inwater Construction Programs. The Army Corps of Engineers (COE) regulates removal/fill activities under section 404 of the CWA, which requires that the COE not permit a discharge that would ''cause or contribute to significant degradation of the waters of the United States.'' One of the factors that must be considered in this determination is cumulative effects. However, the COE guidelines do not specify a methodology to be used in assessing cumulative impacts or how much weight to assign them in decision-making. In 1996 the Portland District Office of the COE issued approximately 250 section 404 permits for removal/fill in Oregon. The COE does not have in place any process to address the additive effects of the continued development of waterfront, riverine, coastal, and wetland properties.

The Oregon Division of State Lands (DSL) manages the state-permitted portion of the removal fill laws. Oregon intends to halt habitat degradation through the development of standardized permit conditions incorporating best management practices for Removal-Fill activities and through strengthening interagency coordination in Removal-Fill permitting. The DSL also does not currently have methods to assess, analyze, or manage cumulative effects.

4. Water Quality Programs. The Federal CWA is intended to provide for the protection of beneficial uses, including fishery resources. To date, implementation has not been effective

in adequately protecting fishery resources, particularly with respect to non-point sources of pollution. In Oregon, water quality standards are implemented by the DEQ pursuant to section 303(c) of the CWA. DEQ is required by section 303(d)(1) (C) and (D) of the CWA to prepare Total Maximum Daily Loads (TMDLs) for all water bodies that do not meet State water quality standards.

TMDLs are a method for quantitative assessment of environmental problems in a watershed and identifying pollution reductions needed to protect drinking water, aquatic life, recreation, and other use of rivers, lakes, and streams. TMDLs may address all pollution sources, including point sources such as sewage or industrial plant discharges, and non-point discharges such as runoff from roads, farm fields, and forests. The CWA gives state governments the primary responsibility for establishing TMDLs, however, EPA can also develop them.

Oregon DEQ entered into a consent decree in 1987 to develop at least two TMDLs per year. The Healthy Streams Partnership describes a general approach to address non-point source water quality problems in Oregon, particularly with respect to agricultural activities. If Oregon's Healthy Streams Partnership is fully funded, DEQ expects to complete all TMDLs for all impaired coastal watersheds within 10 years. Oregon's guidance for non-point source TMDLs includes an implementation component that is lacking in prior non-point source TMDLs nationwide. Since the beneficial use of salmonid fishes is most often affected by the largely non-point source sediment and temperature impairments, this advance in non-point source TMDLs may be important. The development of strong TMDLs to cover all water quality impaired coastal waters could contribute substantially to coho salmon recovery.

The CWA gives state governments the primary responsibility for establishing TMDLs. However, EPA is required to do so if a state does not meet this responsibility. In California, as a result of recent litigation, the EPA has made a legal commitment guaranteeing that either EPA or the State of California will establish TMDLs, which identify pollution reduction targets, for these 18 impaired river basins in northern California by the year 2007. The State of California has made a commitment to establish TMDLs for approximately half the 18 river basins by 2007. The EPA will develop TMDLs for the remaining basins and has also agreed to complete all TMDLS if the state fails to meet its commitment within the agreed upon time frame.

The ability of these TMDLs to protect coho salmon in Oregon and California is expected to be significant in the long-term; however, it will be difficult to develop them quickly in the short-term and their efficacy in protecting coho salmon habitat will be unknown for years to come.

5. State Agricultural Practices. Historically, the impacts to fish habitat from agricultural practices have not been closely regulated. The Oregon Department of Agriculture has recently completed guidance for development of agricultural water quality management plans (AWQMPs) (as enacted by State Senate Bill 1010). Plans that are consistent with this guidance are likely to achieve state water quality standards. It is open to question, however, whether they will adequately address salmonid habitat factors, such as properly functioning riparian conditions. Their ability to address all relevant factors will depend on the manner in which they are implemented. AWQMPs are anticipated to be developed at a basin scale, so the entirety of coastal Oregon may be covered. AWQMPs include regulatory authority and enforcement provisions. The Healthy Streams Partnership schedules adoption of AWQMPs for all impaired waters by 2001.

6. State Urban Growth Management. On lands inside Oregon's urban growth boundaries, some upgraded riparian area protection will be afforded by the newly revised requirements for statewide planning Goal 5. Local governments will amend their local comprehensive plans to implement these new requirements. Unfortunately, Goal 5 does not require establishment and protection of riparian vegetation to provide adequate large woody debris and allows limited road building in riparian areas.

Harvest Management

Harvest of coho salmon in Federal waters off the west coast is managed by the PFMC and NMFS. Harvest of California and Oregon coastal coho salmon has been managed based on achieving adequate escapement of OCN coho salmon. Despite annual management and use of best available scientific information, spawning escapements have declined significantly over the past 20 years. Prior to 1994, harvest rates on OCN coho salmon were too high for the poor ocean conditions that are now realized to have been occurring. Further, declining numbers of natural spawning fish were masked by high stray rates of hatchery fish. Since 1994, the PFMC has recommended harvest rates of 10–13 percent even though regulations allowed up to a 20 percent harvest rate during the same time period. Since 1994, the PFMC also has recommended prohibiting the retention of coho salmon south of Cape Falcon, OR, which has resulted in relatively low levels of incidental mortality. Oregon also has begun marking all hatchery fish so that natural escapements can be more accurately quantified. Oregon has proposed that the PFMC amend its ocean fisheries regulations to adopt the OCSRI harvest framework.

Fisheries management of coho salmon in Oregon state waters inside the 3-mile (5 km) limit historically had similar problems and contributed to the overall decline. In more recent years, however, state angling regulations have required the release of all naturally-produced coho salmon in the Oregon portion of the Southern Oregon/Northern California Coast ESU. The harvest measures and associated monitoring plan in the OCSRI will provide a significantly better framework from which PFMC and Oregon will manage their coho salmon fisheries.

Oregon currently manages several populations of non-indigenous fish species (e.g., striped, largemouth, and smallmouth bass) for optimal recreational fisheries. These fish were in many cases introduced into Oregon waters in violation of Oregon law. Scientists have documented that at least in some circumstances, the presence of these non-indigenous species has reduced or eliminated coho salmon populations (OCSRI 1997). The ongoing management applied to these exotic fish species, in certain locales, may not be consistent with the goals of the ESA. The OCSRI contains provisions to review the science and management direction pertinent to the interaction of non-indigenous fish species and coastal coho salmon. Results of this review will guide NMFS and Oregon in the future management or actions addressing interactions of these species with coho salmon.

The State of California has jurisdiction over ocean salmon fishing within 3 miles (5 km) of the coast offshore California. Subsequent to NMFS's implementation of ocean salmon harvest regulations for the Exclusive Economic Zone, the California Fish and Game Commission (CFGC) and CDFG, respectively, conform the State's ocean salmon regulations for commercial and sportfishing within the 3-mile (5 km) limit to those adopted by NMFS. In most years the CFGC and CDFG issue

regulations that conform fully with Federal ocean salmon regulation.

The CFGC is also responsible for issuing in-river sportfishing regulations in California. At present, the state's sportfishing regulations continue to allow fishing for coho salmon in the inland waters of the Southern Oregon/ Northern California Coast ESU, and the Commission has not proposed to take action in the event the ESU is listed under the Federal ESA.

The contribution of coho salmon to the in-river sport catch is unknown for most California watersheds, as are losses due to injury and mortality from incidental capture in other state-authorized fisheries such as steelhead. However, the CDFG has conducted limited in-river monitoring of coho salmon harvest by anglers in the Trinity River above Willow Creek since 1977, and estimates that in-river angler harvest for coho salmon in this reach of the Trinity River has averaged 598 coho salmon harvested per year. Current state funding and personnel resources are not available to implement comprehensive monitoring programs to evaluate the magnitude of in-river harvest impacts in California.

Hatchery Management

Oregon has adopted a Wild Fish Policy that guides many aspects of hatchery use, their broodstock protocols, and the degree of interaction between hatchery and wild fish. This policy has improved many hatchery operations throughout Oregon with respect to the protection of wild fish populations and their genetic diversity. However, full and prompt implementation of the policy has not occurred and Oregon continues to make program adjustments to achieve fish management consistent with the purposes of the policy and the Federal ESA.

One provision of the Wild Fish Policy is that hatcheries using local broodstock and managed according to specific protocols can contribute up to 50 percent of the number of fish spawning in the natural habitat. NMFS believes this 50 percent guideline can be appropriate when the hatchery fish are part of a recovery program needed to boost an at-risk population. However, current scientific information indicates that it is not appropriate in hatchery programs intended to enhance populations for the purposes of increased harvest. Consequently discussions between NMFS and ODFW have resulted in the OCSRI including a measure to manage coho salmon hatchery and harvest programs so that natural spawning populations contain no more than 10 percent hatchery strays.

In California, the CDFG directly operates artificial propagation programs for coho salmon at three hatcheries in the Southern Oregon/Northern California Coast ESU. These include Iron Gate Hatchery, Trinity River Hatchery, and the Mad River Hatchery. The CDFG has recently developed production goals and constraints for both the Iron Gate and Trinity River Hatchery programs (CDFG, 1997a). Both hatcheries now operate under goals and constraints which specify use of adults returning to the hatcheries and prohibits use of stocks from other drainages for spawning and rearing. Transfer of production to outside drainages is generally prohibited, but can occur under some circumstances. Additional privately-owned and operated hatchery programs for coho salmon are conducted in Rowdy Creek (Rowdy Creek Hatchery), the Eel River (Hollow Tree Creek Hatchery), and in the Mattole River. Other smaller programs that are not currently propagating coho salmon are in Freshwater Creek and Prairie Creek.

In the past, non-native coho salmon stocks have been introduced as broodstock in hatcheries and widely transplanted in many coastal rivers and streams in the California portion of the Southern Oregon/Northern California Coast ESU (Weitkamp *et al.*, 1995). Because of problems associated with this practice, CDFG developed its Salmon and Steelhead Stock Management Policy. This policy recognizes that such stock mixing is detrimental and seeks to maintain the genetic integrity of all identifiable stocks of salmon and steelhead in California, as well as minimize interactions between hatchery and natural populations. To protect the genetic integrity of salmon and steelhead stocks, this policy directs CDFG to evaluate each salmon and steelhead stream and classify it according to its probable genetic source and degree of integrity. However, this has not yet been accomplished by the state.

Although non-native coho salmon stocks have been introduced in the Southern Oregon/Northern California Coast ESU, most hatchery programs are now being conducted without the import of broodstock from other ESUs in accordance with CDFG's policy. With the exception of the Mad River Hatchery, hatchery programs in this ESU are being operated as supplementation hatcheries rather than production hatcheries. They are taking eggs from the rivers in which they operate and returning fish to the river from which they were taken. Release of hatchery fish occurs in streams with stocks similar to the native runs. Efforts are made to return hatchery fish to their natal streams, and they are held for an acclimation period to increase the probability of imprinting. In contrast, the Mad River Hatchery has used numerous out-of-basin and out-of-state coho salmon stocks. A review of CDFG hatchery production and planting records indicates that coho salmon smolts still continue to be planted in streams other than that where the hatchery is located. These out-of-stream plants have occurred both in other coho salmon ESUs and in other basins within individual ESUs. In addition, there are inadequate CDFG resources to tag enough hatchery coho salmon to monitor return rates and rates of straying (CDFG 1995).

The CFGC has also developed specific policies for Private Non-profit Hatcheries (section 1170–1175 of the Fish and Game Code) and Cooperative Salmon and Steelhead Rearing Facilities (sections 1200–1206 of the Fish and Game Code) that have been incorporated into the Fish and Game Code. These policies are intended to ensure that the bulk of the state's salmon and steelhead resources are produced naturally and that the state's goals of maintaining and increasing natural production take precedence over the goals of cooperatively operated rearing programs. Privately owned rearing and hatchery programs for coho salmon in the Southern Oregon/Northern California Coast ESU are operated in accordance with these policies.

In its comments on the proposed rule (CDFG, 1995), CDFG stated that its coho salmon hatchery programs can be integrated into recovery plans for each ESU within California through re-evaluation of each hatchery's goals and constraints with program modifications where appropriate. In a letter dated March 7, 1997 (CDFG, 1997b), CDFG reiterated its view that its coho salmon hatchery programs are compatible with the recovery of coho salmon and other at-risk salmon and steelhead populations in California.

E. Other Natural or Human-Made Factors Affecting Its Continued Existence

Natural Factors

Long-term trends in rainfall and marine productivity associated with atmospheric conditions in the North Pacific Ocean likely have a major influence on coho salmon production. Numerous comments received by NMFS

underscored both the importance and uncertainties surrounding natural environmental fluctuations, but few provided substantive new information. Some commenters thought that recent coho salmon declines were merely reflective of a natural production cycle while others believed that declines had been exacerbated by human influences, especially on freshwater habitats.

Populations that are fragmented or reduced in size and range are more vulnerable to extinction by natural events. Whether recent climatic conditions represent a long-term change that will continue to affect salmonid stocks in the future or whether these changes are short-term environmental fluctuations that can be expected to reverse in the near future remains unclear. Many of the coho salmon population declines began prior to these recent drought conditions.

1. Drought. Many areas of the Pacific coast have experienced drought conditions during much of the past decade, a situation that has undoubtedly contributed to the decline of many salmonid populations. Drought conditions reduce the amount of water available, resulting in reductions (or elimination) of flows needed for adult coho salmon passage, egg incubation, and juvenile rearing and migration. There are indications in tree ring records that droughts more severe than the drought that California recently experienced occurred in the past (Stine 1994). Aside from the critical role that habitat complexity plays in providing fish with instream refugia during drought conditions, the key to survival in this type of variable and rapidly changing environment is the evolution of behaviors and life history traits that allow coho salmon to cope with a variety of environmental conditions.

2. Floods. With high inherent erosion risk, urban encroachment, and intensive timber management, flood events can cause major soil loss (Hagans *et al.*, 1986; Nawa *et al.*, 1991; Higgins *et al.*, 1992). As previously mentioned, sedimentation of stream beds has been implicated as a principal cause of declining salmonid populations throughout their range. Floods can result in mass wasting of erodible hillslopes and failure of roads on unstable slopes causing catastrophic erosion. In addition, flooding can cause scour and redeposition of spawning gravels in typically inaccessible areas.

During flood events, land disturbances resulting from logging, road construction, mining, urbanization, livestock grazing, agriculture, fire, and other uses may contribute sediment directly to streams or exacerbate sedimentation from natural erosive processes (California Advisory Committee on Salmon and Steelhead Trout, 1988; CSLC, 1993; FEMAT, 1993). Judsen and Ritter (1964), the California Department of Water Resources (CDWR, 1982), and the California State Lands Commission (CSLC, 1993) have stated that northwestern and central coastal California have some of the most erodible terrain in the world. Several studies have indicated that, in this region, catastrophic erosion and subsequent stream sedimentation (such as during the 1955 and 1964 floods) resulted from areas which had been clearcut or which had roads constructed on unstable soils (Janda *et al.*, 1975; Wahrhaftig, 1976; Kelsey, 1980; Lisle, 1982; Hagans *et al.*, 1986).

As streams and pools fill in with sediment, flood flow capacity is reduced. Such changes cause decreased stream stability and increased bank erosion, and, subsequently, exacerbate existing sedimentation problems (Lisle, 1982), including sedimentation of spawning gravels and filling of pools and estuaries. Channel widening and loss of pool-riffle sequence due to sedimentation has damaged spawning and rearing habitat of all salmonids. By 1980, the pool-riffle sequence and pool quality in some California streams still had not fully recovered from the 1964 regional flood. In fact, Lisle (1982) and Weaver and Hagans (1996) found that many Pacific coast streams continue to show signs of harboring debris flow from the 1964 flood. Such streams have remained shallow, wide, warm, and unstable.

More recently, between November 1995 and April 1996, the Pacific Northwest experienced a rare series of storm and flood events. High winds, heavy rainfall, rapid snowmelt, numerous landslides and debris torrents, mobilization of large woody debris and high runoff occurred over portions of Oregon, Washington, Idaho, and Montana (USFS and BLM, 1996). These storms, which resulted in 100-year floods in some Oregon coastal basins, also had a potentially large effect on the survival of Oregon coast coho salmon and the freshwater habitats upon which they depend. Aerial surveys from a study by Pacific Watershed Associates (PWA undated) in the middle Coast Range of Oregon noted that areas with the greatest impact were typically watersheds with a combination of steep slopes, unstable bedrock geology, recent timber harvesting, high road densities, and within the altitude range where precipitation intensities were probably the greatest. This study also stressed that landslides were highly correlated with management activities and originated from recent clear-cuts and forest roads at much higher frequencies than from wilderness or unmanaged areas. In addition to these observations, Pacific Watershed Associates concluded that the floods may have had long-term effects on watershed habitats. For example, they suggested that materials destabilized but not mobilized by the flood may remain unstable and therefore be susceptible to future flood events for some time, materials deposited in streams and rivers may persist for decades, and the impact to larger streams and rivers may actually increase over a period of several years as sediment is moved downstream.

With regard to impacts to in-stream coho salmon habitat, changes due to flooding were both positive and negative, depending on the area. For example, ODFW surveys (Moore and Jones, 1997) identified some areas with many new channels cut, which could provide off-channel habitat for coho salmon. In the Tillamook Bay basin, the Wilson River received major negative impacts, while the Tillamook and Trask Rivers received little impact. Siuslaw National Forest (SNF, 1996) reported that the February 1996 flooding actually increased positive habitat changes (increased pool area and quality, increased cover complexity, and shift from bedrock, boulder and cobble substrates to gravel and sand) in many smaller streams in areas undergoing habitat improvement projects but not in adjacent, untreated reaches, nor in habitat improvement projects in large streams. Bush *et al.* (1997) noted that decreases in pool area ranged from 10–50 percent, and largely resulted from a 60-percent loss of beaver pond habitat (which provide critical overwinter coho salmon habitat). Large woody debris decreased by approximately 25 percent from the initial surveys, although much of the lost wood had been pushed up onto the floodplain or out of the active channel. Overall, large amounts of gravel were added to most streams, and new gravel bars were common.

Recent stream production studies conducted by ODFW (Solazzi and Johnson, 1997) indicate that 1996 smolt production in four central Oregon coast study streams were lower than recent averages, with overwinter survival the lowest or second lowest on record for the two streams for which estimates were made, and that age zero fish production was also low. They concluded that the most significant impact of the flooding was on juveniles and coho salmon eggs that were in the

gravel at the time of the flood. While these results are based on a small sample of streams and may not reflect average effects of the floods, it suggests that 1997 and 1998 adult returns to some coastal basins will be reduced by the floods. Longer-term effects of the floods can also be expected to vary among basins, but most reports available to us suggest that long-term effects should generally be neutral or slightly beneficial (e.g., from sediment removal and increased off-channel habitat) to coho salmon.

3. Ocean Conditions and El Niño. Large fluctuations in Pacific salmon catch have occurred during the past century. Annual world harvest of Pacific salmon has varied from 772 million kg in the 1930s to about 409 million kg in 1977 and back to 818 million kg by 1989 (Hare and Francis, 1993). Mechanisms linking atmospheric and oceanic physics and fish populations have been suggested for Pacific salmon (Rogers, 1984; Nickelson, 1986; Johnson, 1988; Brodeur and Ware, 1992; Francis *et al.*, 1992; Francis, 1993; Hare and Francis, 1993; Ward, 1993). Many studies have tried to correlate the production or marine survival of salmon with environmental factors (Pearcy, 1992; Neeley, 1994). Vernon (1958), Holtby and Scrivener (1989), and Holtby *et al.* (1990) have reported associations between salmon survival and sea surface temperature and salinity, especially during the first few months that salmonids are at sea. Francis and Sibley (1991), Rogers (1984), and Cooney *et al.* (1993) also found relationships between salmon production and sea surface temperature. Some studies have tried to link salmon production to oceanic and atmospheric climate change. For example, Beamish and Bouillon (1993) and Ward (1993) found that trends in Pacific salmon catches were similar to trends in winter atmospheric circulation in the North Pacific.

Francis and Sibley (1991) and Francis *et al.* (1992) have developed a model linking decadal-scale atmospheric variability and salmon production that incorporates hypotheses developed by Hollowed and Wooster (1991) and Wickett (1967), as well as evidence presented in many other studies. The model developed by Francis *et al.* (1992) describes a time series of biological and physical variables from the Northeast Pacific that appear to share decadal-scale patterns. Biological and physical variables that appear to have undergone shifts during the late 1970s include the following: Abundance of salmon (Rogers, 1984 and 1987; Hare and Francis, 1993) and other pelagic fish, cephalopods, and zooplankton (Brodeur and Ware, 1992); oceanographic properties such as current transport (Royer, 1989), sea surface temperature and upwelling (Holowed and Wooster, 1991); and atmospheric phenomena such as atmospheric circulation patterns, sea-surface pressure patterns, and sea-surface wind-stress (Trenberth, 1990; Trenberth *et al.*, 1993).

Finally, Scarnecchia (1981) reported that near-shore conditions during the spring and summer months along the California coast may dramatically affect year-class strength of salmonids. Bottom *et al.* (1986) believed that coho salmon along the Oregon and California coast may be especially sensitive to upwelling patterns because these regions lack extensive bays, straits, and estuaries, such as those found along the Washington, British Columbia, and Alaskan coast, which could buffer adverse oceanographic effects. They speculate that the paucity of high quality near-shore habitat, coupled with variable ocean conditions, makes freshwater rearing habitat more crucial for the survival and persistence of many coho salmon populations.

An environmental condition often cited as a cause for the decline of west coast salmonids is the condition known as ''El Niño.'' El Niño is a warming of the Pacific Ocean off South America and is caused by atmospheric changes in the tropical Pacific Ocean. During an El Niño event, a plume of warm sea water flows from west to east toward South America, eventually reaching the coast where it is deflected south and north along the continents.

El Niño ocean conditions are characterized by anomalously warm sea surface temperature and changes in thermal structure, coastal currents, and upwelling. Principal ecosystem alterations include decreases in primary and secondary productivity and changes in prey and predator species distributions. Several El Niño events have been recorded during the last several decades, including those of 1940–41, 1957–58, 1982–83, 1986–87, 1991–92, and 1993–94. The degree to which adverse ocean conditions can influence coho salmon production was demonstrated during the El Niño event of 1982–83, which resulted in a 24 to 27 percent reduction in fecundity and a 58 percent reduction (based on pre-return predictions) in survival of adult coho salmon stocks originating from the Oregon Production Index area (Johnson, 1988).

Manmade Factors—Artificial Propagation

Potential problems associated with hatchery programs include genetic impacts on indigenous, naturally-reproducing populations, disease transmission, predation of wild fish, difficulty in determining wild stock status due to incomplete marking of hatchery fish, depletion of wild stock to increase brood stock, and replacement rather than supplementation of wild stocks through competition and continued annual introduction of hatchery fish (Waples, 1991; Hindar *et al.*, 1991; Stewart and Bjornn, 1990). All things being equal, the more hatchery fish that are released, the more likely natural populations are to be impacted by hatchery fish. Similarly, the more genetically similar hatchery fish are to natural populations they spawn with, the less change there will be in the genetic makeup of future generations in the natural population. Non-native coho salmon stocks have been introduced as broodstock in hatcheries and widely transplanted in many coastal rivers and streams in Oregon and California (Bryant, 1994; Weitkamp *et al.*, 1995; NMFS, 1997a).

Advancement and compression of run timing have been common phenomena in hatchery populations, and these changes can affect future generations of naturally-reproducing fish. Fry of early-spawning adults generally hatch earlier and grow faster and can thus displace fry of later-spawning natural fish (Chapman, 1962). Conversely, early-spawning coho salmon redds are more prone to being destroyed by early fall floods. Consequently, early-spawning individuals may be unable to establish permanent, self-sustaining populations but may nevertheless adversely affect existing natural populations (Solazzi *et al.*, 1990). A recent study found that over a period of 13 years, the range of spawning timing of coho salmon at five Washington hatcheries decreased from 10 weeks to 3 weeks, causing the range of the period of return to the hatcheries to decrease by one-half (Flagg *et al.*, 1995).

Another common hatchery practice with coho salmon is release of ''excess'' hatchery production into natural habitat as fry or parr. Outplanting large numbers of large hatchery juveniles into streams already occupied by naturally-produced juveniles may place the resident fish at a competitive disadvantage and may force them into marginal habitats that have low survival potential (Chapman, 1962; Solazzi *et al.*, 1990).

Stock transfers of coho salmon were common throughout the Oregon and California coast; the nature and magnitude of these transfers varied by area and basin. Compared to areas farther north, hatcheries in central California and southern Oregon/ northern California are relatively small and widely dispersed, given the size of both areas. Northern California hatcheries have received fairly large transplants of coho salmon from hatcheries in Washington and Oregon, which have spread to central California through stock transfers. Because of the predominance of hatchery stocks in the Klamath River basin, stock transfers into Trinity and Iron Gate Hatcheries may have had a substantial impact on natural populations in the basin and raises serious concerns about their sustainability. Available information indicates that virtually all of the naturally spawning fish in the Trinity River are first generation hatchery fish. In contrast, Cole Rivers Hatchery (on the Rogue River) appears to have relied exclusively on native stocks.

In recent years, large hatcheries in southern Oregon/northern California (e.g., Mad and Trinity River Hatcheries) have produced 400,000 to 500,000 juveniles annually, while smaller hatcheries, and most hatcheries in central California, produce no more than 100,000 to 200,000 juveniles each year. Most Oregon coastal hatcheries recently produced approximately 400,000 to 1,400,000 juveniles annually, although private hatcheries (no longer in operation) recently produced 2 to 5 million juvenile coho salmon annually. Most historic transfers of coho salmon into Oregon coastal hatcheries used other Oregon coastal stocks. However, some coastal hatchery programs (notably private hatcheries no longer in existence) made extensive use of Puget Sound coho salmon stocks. Some transfers of Columbia River coho salmon into Oregon coastal hatcheries have occurred, but these were relatively infrequent and minor. Similarly, most outplants of coho salmon into Oregon coastal rivers have used Oregon coastal stocks, with outplants of stocks from other areas being relatively small and infrequent.

NMFS received a number of comments regarding the impacts of hatchery fish on wild coho salmon populations. Some commenters (including a peer reviewer) contended that NMFS overstated the significance of impacts from hatchery fish on wild coho salmon. NMFS has worked with the state agency comanagers to resolve uncertainties regarding these impacts, and has documented these findings in a status review update (NMFS 1997a). These findings note that widespread spawning by hatchery fish continues to be a major concern for both the Oregon Coast and Southern Oregon/Northern California Coast ESUs. Scale analyses to determine hatchery-wild ratios of naturally spawning fish indicate moderate to high levels of hatchery fish spawning naturally in many basins on the Oregon coast, and at least a few hatchery fish were identified in almost every basin examined. Although it is possible that these data do not provide a representative picture of the extent of this problem, they represent the best information available at the present time. In addition to concerns for genetic and ecological interactions with wild fish, these data also suggest that the natural portion (i.e., fish born in the gravel) of the natural spawner abundance may be overestimated by ODFW and that the declines in recruits per spawner in many areas may have been even more severe than current estimates indicate (NMFS, 1997a). However, Oregon has made some significant changes in its hatchery practices, such as substantially reducing production levels in some basins, switching to on-station smolt releases, and decreasing fry releases, and proposes additional changes (discussed below), to address this and other concerns about the impacts of hatchery fish on natural populations.

While there are obvious concerns over the negative effects of hatchery fish on wild coho salmon stocks, it is important to note that artificial propagation could play an important role in coho salmon recovery and that some hatchery populations of coho salmon may be deemed essential for the recovery of threatened or endangered ESUs (e.g., if the associated natural population(s) were already extinct or at high risk of extinction). Under these circumstances, NMFS would consider taking the administrative action of listing the hatchery fish.

Efforts To Protect Oregon and California Coho Salmon

Under section 4 of the ESA, a determination to propose a species for listing as threatened or endangered requires considering the biological status of the species, as well as efforts being made to protect the species. Since the early 1990s Federal agencies, state and local governments and private parties have taken substantial measures to protect coho salmon in Oregon and California. These measures affect habitat, harvest, and hatchery activities. In the agency's decision to invoke a statutory extension for the listing determination (October 31, 1996, 61 FR 56211), it was noted that the State of Oregon was planning to submit a peer-reviewed salmon restoration initiative (i.e., the Oregon Coastal Salmon Restoration Initiative) for NMFS' consideration in the spring of 1997. California was undertaking a similar effort, but it was less certain when its plan would be completed. These plans were expected to contain detailed summaries and assessments of conservation measures which benefit coho salmon in the respective states, and hence aid NMFS in making a listing determination. The following sections summarize these Federal and state conservation efforts.

I. Federal Conservation Efforts. 1. NFP. The NFP is a Federal interagency cooperative program, the Record of Decision for Amendments to U.S. Forest Service (USFS) and BLM Planning Documents Within the Range of the Spotted Owl, which was signed and implemented in April 1994. The NFP represents a coordinated ecosystem management strategy for Federal lands administered by the USFS and BLM within the range of the Northern spotted owl (which overlaps considerably with the freshwater range of coho salmon). The NFP region-wide management direction either amended or was incorporated into approximately 26 USFS land and resource management plans (LRMPs) and two regional guides.

The most significant element of the NFP for anadromous fish is its Aquatic Conservation Strategy (ACS), a regional-scale aquatic ecosystem conservation strategy that includes: (1) Special land allocations, such as key watersheds, riparian reserves, and late-successional reserves, to provide aquatic habitat refugia; (2) special requirements for project planning and design in the form of standards and guidelines; and (3) new watershed analysis, watershed restoration, and monitoring processes. These ACS components collectively ensure that Federal land management actions achieve a set of nine Aquatic Conservation Strategy objectives, which include salmon habitat conservation. In recognition of over 300 ''at-risk'' Pacific salmonid stocks within the NFP area (Nehlsen et al., 1991), the ACS was developed by aquatic scientists, with NMFS participation, to restore and maintain the ecological health of watersheds and aquatic ecosystems on public lands. The ACS strives to maintain and restore ecosystem health at watershed and landscape scales to protect habitat for fish and other riparian-dependent species and resources and to restore currently degraded habitats. The approach seeks

to prevent further degradation and to restore habitat on Federal lands over broad landscapes.

In the final rule listing Umpqua River cutthroat trout as endangered (August 9, 1996, 61 FR 41514), NMFS acknowledged that NFP amendments to Federal LRMPs were ''intended to ultimately reverse the trend of aquatic ecosystem degradation and contribute toward recovery of fish habitat,'' however, it was noted at the time that the results of the NFP ACS were ''yet to be demonstrated.'' Following 3 years of NFP implementation, NMFS subsequently reviewed the adequacy of 14 individual LRMPs, as modified by the NFP and its ACS, for conserving Oregon Coast and Southern Oregon/ Northern California Coast coho salmon. The results of these reviews are described in two conference opinions (NMFS, 1995 and 1997d) that document NMFS'' determinations that the programmatic direction for Federal land management actions embodied in the 14 LRMPs would not be likely to jeopardize the continued existence of Oregon Coast or Southern Oregon/ Northern California Coast coho salmon. Moreover, the opinions concluded that implementation of management direction in the LRMPs and RMPs will result in substantially improved habitat conditions for these ESUs over the next few decades and into the future. Improved habitat conditions will result in increased survival of the freshwater life stages of these fish. Implementation of actions consistent with the ACS objectives and components—including watershed analysis, watershed restoration, reserve and refugia land allocations, and associated standards and guidelines—will provide high levels of aquatic ecosystem understanding, protection, and restoration for aquatic habitat-dependent species.

Federal lands managed under the NFP comprise about 35 percent of the total area of the Oregon Coast coho salmon ESU. This includes all or part of the Siskiyou, Siuslaw, and Umpqua National Forests (NF); and the Coos Bay, Eugene, Medford, Roseburg and Salem BLM Districts. Federal land ownership in the Southern Oregon/Northern California Coast coho salmon ESU represents approximately 53 percent of the total area of the ESU and includes Federal land managed by the USFS, BLM, and National Park Service (NPS). The USFS lands, for example, include all or substantial portions of four National Forests (Klamath NF, Six Rivers NF, Shasta-Trinity NF, and Mendocino NF). The vast majority of the USFS land is concentrated in the northernmost California watersheds, including significant portions of the Smith River basin (including the Smith River National Recreational Area, which is part of Six Rivers NF), the mid-to upper Klamath basin (with the exception of Scott and Shasta Rivers), and the Trinity River basin.

2. Other Federal Programs. Other significant federally funded and/or managed conservation programs or activities in the California portion of the Southern Oregon/Northern California Coast ESU include the Klamath Basin Restoration Program, the Trinity River Basin Fish and Wildlife Restoration Program, the Action Plan for the Restoration of the South Fork Trinity River Watershed and Fisheries, and Redwood National Park efforts to restore anadromous salmonid habitat in the Redwood Creek basin.

In addition to these major efforts, NMFS is also engaged in significant ESA section 7 consultation actions on several Federal projects or activities in the California portion of this ESU. These efforts include: (1) Consultation with the Bureau of Reclamation (BOR) concerning operations management of the Klamath Project in the upper Klamath River basin to provide adequate flows for anadromous salmonids in the mainstem Klamath River, (2) consultation with the FWS and BOR to provide adequate flows and temperatures for anadromous salmonids in the mainstem Trinity River, (3) consultation with the COE to address gravel mining and other instream activities, and (4) consultation with the Federal Energy Regulatory Commission (FERC) concerning inter-basin water transfers from the Eel River to the Russian River (between the Southern Oregon/Northern California Coast ESU and Central California ESU) via Pacific Gas & Electric's Potter Valley Project. These consultation efforts are expected to contribute significantly to the long-term conservation of coho salmon and its habitat. Other Federal efforts in Oregon include the South Slough National Estuarine Research Reserve located in Coos Bay, an upcoming consultation on a hydropower facility on the Umpqua River, continued road retirement and obliteration on Federal forest lands, and ongoing review of Elk Creek Dam and Savage Rapids Dam on the Rogue River and the proposed Milltown Hill Dam on the Umpqua River.

The Natural Resource Conservation Service (NRCS) assists agriculture in addressing impacts to anadromous fish. The NRCS is currently engaged with the NMFS in discussions about updating their Field Office Technical Guides (FOTGs) to better assist landowners in California and Oregon desiring to implement voluntary conservation measures protective of, or benefitting, salmonids. A subset of the FOTGs are the guidance that local field offices follow when engaging in actions that may affect anadromous fish or their habitats.

3. Habitat Conservation Plans. NMFS and the FWS are engaged in an ongoing effort to assist in the development of multiple species Habitat Conservation Plans (HCPs) for state and privately owned lands in both California and Oregon. While section 7 of the ESA addresses species protection on Federal lands, Habitat Conservation Planning under section 10 of the ESA addresses species protection on private (non-Federal) lands. HCPs are particularly important since approximately 65 percent of the habitat in the range of these ESUs is in non-federal ownership. The intent of the HCP process is to reduce conflicts between listed species and economic development activities, and to provide a framework that would encourage ''creative partnerships'' between the public and private sectors and state, municipal, and Federal agencies in the interests of endangered and threatened species and habitat conservation (NRC, 1995).

II. Oregon's Coastal Salmon Restoration Initiative (OCSRI). Beginnings of the OCSRI. In October 1995, Oregon's Governor John Kitzhaber launched the OCSRI. One of the Governor's first steps was to establish a team approach for developing an action plan to restore the health of coastal salmon and trout populations. The following key teams were formed early in the process: (1) A Salmon Strategy Team in which the directors of key state agencies met with the Governor on a biweekly basis; (2) an Outreach and Education Team that was directed to work with key agency stakeholders, ask for their advice, and present ideas for their comment; (3) a Science Team to work on technical issues; and (4) an Agency Planning & Implementation Team to coordinate many aspects of the development of the conservation plan. Senior NMFS staff members participated as members of the Salmon Strategy Team, the Science Team, and the Agency Planning & Implementation Team.

This effort focussed each of the major state agencies on developing a plan, removing institutional barriers, and working through difficult issues with their state and Federal colleagues, stakeholders, and the public. Meanwhile, the science team was

working on the biological underpinnings of the OCSRI.

Essential Tenets of the OCSRI

1. The plan comprehensively addresses all factors for decline of the coho salmon, most notably, those factors relating to harvest, habitat, and hatchery activities.

2. Under this plan, all State agencies whose activities affect salmon are held accountable for coordinating their programs in a manner that conserves and restores the species and their habitat. This is essential because coastal salmon have been affected by the actions of many different state agencies.

3. The Plan includes a framework for prioritizing conservation and restoration efforts. Draft coho salmon ''core areas'' are identified in order to focus measures on retaining current salmon strongholds while rebuilding other areas.

4. The Plan includes a comprehensive monitoring plan that coordinates Federal, state, and local efforts to improve our understanding of freshwater and marine conditions, determine populations trends, evaluate the effects of artificial propagation, and rate the OCSRI's success in restoring the salmon.

5. The Plan recognizes that actions to conserve and restore salmon must be worked out by communities and landowners—those who possess local knowledge of problems and who have a genuine stake in the outcome. Watershed councils, soil and water conservation districts, and other grassroots efforts are the vehicles for getting this work done.

6. The Plan is based upon the principles of adaptive management. Through this process, there is an explicit mechanism for learning from experience, evaluating alternative approaches, and making needed changes in the programs and measures.

7. The Plan includes an Independent Multidisciplinary Science Team (IMST). The IMST's purpose is to provide an independent audit of the OCSRI's strengths and weaknesses. They will aid the adaptive management process by compiling new information into a yearly review of goals, objectives, and strategies, and by recommending changes.

8. The Plan requires that a yearly report be made to the Governor, the legislature, and the public. This will help the agencies make the adjustments described for the adaptive management process (above).

Development of the OCSRI

The state distributed a draft OCSRI to interested parties in August 1996. Shortly thereafter, county commissioners sponsored a series of public information meetings to involve key groups and interested individuals in the following locations: Astoria, Tillamook, Newport, Coos Bay, Grants Pass, Gold Beach, Roseburg, and Portland. The Governor's staff presented the draft OCSRI and explained the opportunities for public comment. More than 550 people attended these public meetings. The August 1996 OCSRI draft was critically reviewed and over 600 pages of comments, suggestions, and questions on the draft Plan were received. Those comments were used by Oregon to revise the Plan.

In September 1996, NMFS published and distributed *Coastal Salmon Conservation: Working Guidance For Comprehensive Salmon Restoration Initiatives On the Pacific Coast* (NMFS, 1996d). The intent of the document was to help guide restoration initiatives such as the OCSRI. The OCSRI was revised and supplemented in many areas in response to that guidance. In early November 1996, William Stelle, Jr., NMFS' Northwest Regional Administrator, sent Governor Kitzhaber a package of substantive comments on the August OCSRI draft.

A second draft of the OCSRI was issued on February 24, 1997. Although time was short, Legislators, constituents, and NMFS technical staff reviewed this draft and provided additional suggestions for improving the Plan. Many of these were incorporated into the final document. As part of the Oregon Legislature's consideration of the OCSRI, several more public hearings were held and testimony was taken. In March 1997, NMFS received the final OCSRI for consideration in this coho salmon listing decision.

Addressing Coho Salmon Factors for Decline

The protective measures contained in the OCSRI represent commitments by various state agencies (and their stakeholders), watershed councils, the forest industry, and the Federal government to address coho salmon ''factors for decline.'' Factors for decline identified in the OCSRI include: Loss/degradation of riparian areas, changes in channel morphology, changes in stream substrate, loss of instream roughness (structure), fish passage impediments, loss of estuarine rearing habitat, loss of wetlands, water quality degradation/sedimentation, changes in flow, elimination of habitat, harvest impacts on spawner escapement, illegal salmon catch, salmon bycatch, low ocean productivity, loss of genetic adaptation through interbreeding with genetically dissimilar hatchery fish, competition with hatchery fish, predation by pinnipeds and sea birds, and interaction with exotic fishes. The OCSRI incorporates measures presented by state agencies and their stakeholders as well as Federal agencies to address these factors for decline.

OCSRI Habitat Measures

The OCSRI organized its habitat measures by the 17 habitat-related factors for decline listed above. This organization enables an evaluation of the extent to which the OSCRI's measures influence or reverse each of the factors for decline. Typically, more than one management sector (forestry, agriculture, urban, etc.) contributed to each of the factors for decline. For example, forestry and agricultural measures both address several factors for decline, including loss of riparian areas, channel morphology, substrate changes, instream roughness, water quality and sedimentation (NMFS, 1997b).

On state lands, the Oregon Department of Forestry is preparing a Northwest Oregon State Forest Management Plan. The State of Oregon has indicated interest in working with NMFS and FWS on a multiple-species HCP for approximately 600,000 acres in the Clatsop, Tillamook, and possibly Elliott State Forests. These HCPs would contain aquatic conservation strategies that meet the standards of section 10 of the ESA. Additional HCPs with private landowners may increase the total acreage managed under protective HCPs within this timeframe.

On private forested lands, the State of Oregon developed new forest practices regulations (effective July 1995) that represent an improvement over past forest practices. The OCSRI also provides some additional voluntary measures on the part of industrial forest landowners and small woodland owners that focus on OCSRI core areas, including increased conifer retention in riparian management areas and in-unit leave tree placement for some fish and non-fish bearing streams. Another voluntary measure with significant promise is a road erosion and risk reduction measure that could reduce road-related sediment inputs, road related mass failures, and culvert problems.

On agricultural lands, the State of Oregon addresses coho salmon habitat protection and restoration through the 1993 Senate Bill (SB) 1010 (ORS 568.900–933) and its extension, the Healthy Streams Partnership (HSP). The purpose of SB1010 is to meet the requirements of the Federal CWA on

agricultural lands. Complete and successful implementation of the CWA, and the State's water quality programs, could substantially benefit coho salmon.

The OCSRI's greatest contribution is that it provides a comprehensive framework for integrating habitat protection and restoration efforts by all entities, public and private. An important innovation is the emphasis upon voluntary citizen action, utilizing the industry and resource management expertise of local private property owners. Critical components of the OCSRI that should contribute to habitat restoration include watershed council programs, monitoring, and adaptive management described below.

OCSRI Harvest Measures

Overfishing has greatly depleted the coastal coho salmon; it is a primary factor for the species' decline. Harvest rates on coho salmon have at times exceeded 80 percent, but have recently been reduced to an average of less than 15 percent. Ocean harvest of coho salmon stocks is managed by NMFS in conjunction with the Pacific Fishery Management Council, the states, and certain tribes. Coho salmon ocean harvest is managed by setting escapement goals for OCN coho salmon. Due to concerns over declining population status, directed harvest of coho salmon has been eliminated since 1994.

The OCSRI establishes a comprehensive, weak-stock management framework for ensuring that fishing-related mortalities remain at low levels. The harvest levels may increase in the future, but only moderately, and only based on (1) substantiated increases in coho salmon escapement beyond targeted levels, and (2) greater marine survival that will ensure continued growth of the natural spawning populations.

More specifically, the OCSRI establishes new, disaggregated escapement objectives for four component stocks of the existing OCN coho salmon stock. Harvest rates on each of these four stock components will be allowed to increase from current levels of 10–13 percent (to a maximum of 35 percent) only if significant increases are attained in escapement and productivity. In mixed-stock areas, such as most ocean waters, harvest rates will be limited by the weakest stock component. Within any given stock component, terminal and in-river harvest will be regulated to achieve escapement limits for that component. In addition, if any individual basin has a severe conservation problem, harvest within that basin and in mixed-stock areas may be further restricted.

In the near term, Oregon proposes to limit ocean coho salmon harvest impacts (mostly incidental to the harvest of chinook salmon) to low levels. As populations achieve abundance and productivity targets, fisheries may be established to target marked, unlisted hatchery coho salmon. Ultimately, after high escapement levels have been achieved and evaluated, specific fisheries may be allowed that take some unmarked, naturally-produced coho salmon from healthy populations, as other weaker populations continue to recover. Any downturn in either the marine survival or escapement targets will result in further restrictions.

As described in OCSRI's monitoring program, harvest impacts will be regulated through established, public forums that evaluate the most recent data on natural escapements, population abundance, direct and indirect fishing mortalities, and measurements of wild and hatchery fish survival rates in ocean waters.

OCSRI Hatchery Measures

Hatchery production of coho salmon has been identified as a factor in the decline of natural coho salmon populations. Past increases in hatchery programs to enhance sport and commercial fisheries are now believed to have adversely affected natural populations: Hatchery fish competed with wild coho salmon for limited food and habitat; stray hatchery adults spawned, often in excessive numbers, with wild fish, likely reducing the fitness and productivity of the wild populations. This problem of genetic introgression was, at times, compounded by the use of non-local hatchery broodstocks.

Under the OCSRI, coho salmon smolt releases that numbered 6.4 million in 1990 (and were subsequently reduced to 3.5 million in 1996) will be reduced 64 percent by 1998, thus decreasing adverse competitive interactions. Hatchery releases will be further reduced or modified, if necessary, to keep adult stray rates to less than 10 percent, thus minimizing the effects of genetic introgression. As deemed appropriate to meet wild fish management needs, hatchery broodstocks will receive infusion of wild fish to minimize genetic divergence of the populations.

Oregon has already begun marking all hatchery coho salmon to differentiate them from naturally-produced fish. This will allow more accurate assessment of stray rates and allow for any future selective fisheries on hatchery coho salmon when conditions permit. Artificial propagation may be used to boost natural coho salmon populations or reintroduce coho salmon into vacant habitats, but only after specific management plans are developed and reviewed.

Watershed Councils

Watershed councils are voluntary groups established to improve the condition of the state's watersheds. Oregon laid the foundation for its statewide local watershed council program in 1993. That year, House Bill 2215 set up the program and established two pilot project areas. Due to the success of the program pilots, in 1995 the legislature passed House Bill 3441. This law delegates to the Governor's Watershed Enhancement Board (GWEB) the responsibility to work with local councils and to coordinate project funding. The GWEB approves funding for only those projects based on sound principles of watershed management and encourages the use of nonstructural methods to enhance riparian areas and associated uplands. The GWEB uses the expertise of state agencies according to the type of enhancement project in development, and cooperates with the Federal agencies to ensure integrated efforts.

The premise of the OCSRI is that factors for decline are, and will continue to be, identified in individual watersheds, and that one of the primary means to address those factors will be action plans implemented on a local level involving watershed councils, soil and water conservation districts (SWCDs), the Oregon State University Cooperative Extension Service, landowners, local governments, conservation groups and other grassroots stakeholders. Since 1993, over 60 watershed Councils have been formed in Oregon. The entire Oregon coast is now represented by local watershed Councils. Three of these watersheds will be used as model integration projects for the OCSRI. Two of these, the Applegate and the Coquille Councils, already have strong programs that will act as a templates for other Councils on the coast.

Watershed Councils are currently in different stages in their development of watershed action plans. The action plan is a working document that characterizes the conditions on the watershed, identifies priority areas (based on watershed analysis) for restoration and protection, sets out public involvement strategies, and identifies funding sources. Currently, Councils in the Rogue and South Coast

watersheds are participating in an effort to develop a guidance document that will address the decline of salmon in those basins. A key to this process is identification of current conditions and trends and developing an understanding of their causes. The guidance document, once fully developed, will allow the watershed Councils to update their action plans and assessments.

Councils generally request participation from local, state, Federal, and private resource professionals to participate in a Technical Advisory Committee (TAC). A TAC is a voluntary, scientific, interdisciplinary, nonpolitical group whose purpose is to provide advice and guidance on technical issues. A TAC advises Councils on how to complete a watershed assessment, develop strategic plans, set priorities, and design and implement projects and monitoring programs.

Since 1994, coastal watershed Council TACs have helped review, design, and implement over 250 projects (including one riparian restoration project that involved over 200 private land owners). TACs have also been heavily involved in developing 11 watershed assessments and action plans for watershed Councils. The process is continuing. TACs are being created for new Councils, helping OCSRI, updating watershed Council action plans and assessments, developing new watershed Council action plans and assessments, and continuing to develop, design, and implement on-the-ground projects.

The future success of watershed Councils depends on many factors—including strong TACs. State agencies have made providing scientific and technical support for watershed Councils a priority. Under the OCSRI, state agencies and the Governor have requested new budget packages that will enable agencies to better meet the increased Council demands by adding field staff and increasing communication.

Monitoring Results and Adaptive Management

The OCSRI describes a comprehensive, aggressive, and coordinated monitoring program. Full implementation of the monitoring program is a crucial tool for adaptive management and the success of the OSCRI. State and Federal agencies and other groups have made major commitments to developing and supporting this effort. The objectives of the monitoring program are to develop accurate information on the status of salmon populations and their habitats, detect trends in abundance, determine the effectiveness of measures designed to improve conditions for salmon, and provide the analysis needed to help develop adaptive management strategies for agencies, private landowners, watershed Councils, and individuals. More specifically, monitoring and reporting at the regional, basin, or subbasin scale will include: (1) Stream biotic condition and ambient water quality assessments, (2) juvenile salmon abundance surveys, (3) stream channel and habitat assessments, (4) spawner abundance surveys, (5) genetic and life history monitoring, (6) fish propagation monitoring, (7) harvest monitoring, (8) ''core area'' and ''index area'' population and habitat monitoring, (9) ocean condition monitoring, (10) estuary and riverine wetland population and habitat monitoring, (11) Oregon Forest Practices and Northwest Forest Plan conservation strategy monitoring, and (12) cumulative effects/watershed assessment for mixed ownership.

For more localized decision making, the key monitoring and assessment data will be provided on an ongoing basis to agency managers, watershed Councils and initiative groups, and other interested participants. Regional interagency groups have been organized around state agency administrative boundaries. Participants in the regional groups are lead agency decision-makers for field operational programs. Relevant watershed assessment efforts and data will be routinely reported to this group for coordination and application purposes. The participants of this group are expected to coordinate with the watershed Councils and SWCDs to ensure they all receive the same information in a timely manner.

Watershed Councils, SWCDs, and other partners will report the results of their watershed assessment efforts to the Monitoring Program coordinator as each module is completed. These results will also be given to the involved state and Federal agencies to support their day-to-day decision making.

The interagency monitoring group will convene an annual monitoring conference at which agencies and other partners will be required to present the results of their monitoring efforts. This conference will be used to adjust monitoring efforts and protocols and describe the habitat and population trends. Annual progress of the OCSRI will be assessed by comparing these monitoring results and trends with the OCSRI's published biological objectives. The report (and results of the conference) will be sent to the IMST established by the Oregon Legislature (SB 924–B) for its use in auditing the program.

A bipartisan Joint Legislative Committee on Salmon and Stream Enhancement will receive reports from the IMST including recommendations for changes to the OCSRI. On the basis of these reports, and reports of Oregon's Salmon Restoration and Production Task Force, the Committee may recommend changes to the OSCRI. The annual Governor's report on the ''State of the Salmon'' will also include discussion and recommendations based upon the monitoring results. This report will describe how the monitoring results will be used to adjust the OSCRI's best management practices (BMPs) and program measures.

Funding for the OCSRI

The Natural Resource Investment Budget (authorized by the 69th Oregon Legislative Assembly [House Bill 5042 and 5044] for the biennium beginning July 1, 1997) provides $20 million in new grant funding to support watershed Council coordinators and other local organizations. The existing Governor's Watershed Enhancement Board will administer the grant program. The budget also provides approximately $10 million to add new technical staff to the Department of Agriculture (19 positions), the Department of Environmental Quality (19 positions), the Department of Fish and Wildlife (14 positions), the Department of Forestry (6 positions), the Water Resources Department (4 positions), and the Department of Land Conservation and Development (1 position). In addition, Oregon State Police reprogrammed 13 officers for public education and enforcement of the OCSRI.

Memorandum of Agreement (MOA) between NMFS and Governor of Oregon

NMFS welcomed adoption of the OCSRI by Oregon and believed it would provide significant protections for Oregon Coast ESU in a number of areas. In particular, the harvest and hatchery measures will continue to contribute to improved spawning escapement and the near-term population stability of the ESU. NMFS was concerned, however, that the habitat measures contained in the OCSRI will not secure adequate high quality habitat over the long term to ensure coho survival under a range of environmental conditions. To address this concern, NMFS entered into a MOA in April 1997 with the Governor of Oregon (MOA 1997). Under the MOA, NMFS will provide the state of Oregon guidance on those specific measures it considers adquate and necessary for habitat protection. If these or equivalent measures are not adopted by Oregon within 2 years, NMFS will promptly

change the ESA status of this ESU to the extent warranted. The MOA further commits the parties to full implementation of all elements of the OCSRI, including harvest and hatchery measures and provisions for monitoring and scientific review.

III. California Efforts. In 1995, the California Resources Agency initiated its Coastal Salmon Initiative (CSI), a community-oriented planning effort designed to produce a conservation program based on voluntary measures and incentives to protect fish and wildlife habitat in a manner that would protect the economic interests of communities within the range of coho salmon. The CSI planning process progressed slowly and was suspended in late 1996, before a comprehensive state conservation plan for coho salmon in California was developed.

Recently, however, the State of California has proposed instead to develop and implement a state conservation plan known as the California Watersheds Protection Program based on the State's Natural Communities Conservation Planning (NCCP) Act. This conservation program is intended to provide for the long-term protection and conservation of coho salmon and other anadromous salmonids on non-Federal lands in California's coastal watersheds, as well as a means for incidental take authorization for activities on non-Federal lands. As part of this conservation effort, the State would convene a Scientific Review Panel to develop conservation guidelines for the implementation of the Watershed Protection Program. These guidelines would include conservation strategies and monitoring protocols necessary to protect salmonid habitat in coastal watersheds. The State would subsequently adopt these conservation guidelines under the California Fish and Game Code and then begin the development of individual watershed protection plans.

The Governor of California has proposed a $3.8 million Watershed Initiative to assist in the development and implementation of the California Watersheds Protection Program. The Governor's Budget specifically proposes: (1) $1.5 million for CDFG to participate on inter-agency watershed management team, lead wildlife standard teams, provide guidance and technical assistance to community-based watershed groups, and make grants for habitat restoration, (2) $1.0 million for the state Water Resources Control Board and Regional Boards, for watershed coordinators who will facilitate prioritization of regulatory functions on a watershed basis, integrate resources in priority watersheds, and maximize community involvement in the development and implementation of water quality control plans, (3) $900,000 for the Department of Conservation for inter-agency watershed management teams and for grants to Resource Conservation Districts, and (4) $400,000 for the Department of Forestry and Fire Protection to lead inter-agency watershed teams, conduct watershed assessments, and provide geographic information data base support.

In California, the Range Management Advisory Committee has developed a Rangeland Water Quality Management Plan for inclusion in the State's Nonpoint Source Management Plan. Its purpose is to maintain and improve the quality and associated beneficial uses of surface water as it passes through and out of rangeland resources in the State. The programmatic emphasis is on a voluntary, cooperative approach to water quality management. This includes appropriate technical assistance, planning mechanisms, program incentives, and regulatory authorities. This Plan has been favorably received by the State Water Resources Control Board, EPA, and the BOF.

The state agencies identified in the Governor's Watershed Initiative have developed budget plans, but the likelihood of funding and implementation are unknown at this time. Implementation of the Watershed Initiative will depend on the State Legislature's approval of the budget request. Specific deficiencies of the Watershed Initiative are that no funding past the current fiscal cycle is proposed, and landowner participation in the program is voluntary. NMFS believes that stakeholder-based solutions at the watershed level are essential to recovering coho salmon but that adequate long-term funding and full participation by all stakeholder groups will be necessary for the state's program to succeed.

Local and private efforts are also underway in California. At least eight industrial timber landowners are in the process of developing HCPs that cover approximately 1.2 million acres of privately owned land in Del Norte, Humboldt, Siskiyou, Trinity, and Mendocino counties. This acreage includes ownership in the river basins: Smith River, Klamath River, Redwood Creek, Little River, Mad River, Eel River, and several smaller coastal streams. NMFS anticipates these landowners will be submitting applications for ESA section 10 incidental take permits within the next 6–12 months. These efforts are critical to the conservation of coho salmon in the Southern Oregon/Northern California Coast ESU because nearly 50 percent of the land is privately owned.

Long-term sustained gravel mining plans have been, or are being, developed by three northern California counties (Del Norte, Humboldt, and Mendocino) which comprise a substantial portion of the Southern Oregon/Northern California Coast ESU's range in California. The approach that is being used is to evaluate the impacts of all gravel extraction projects within a watershed as part of a long-term gravel mining plan, and then obtain a Letter of Permission (LOP) from the COE to approve graveling mining projects at the county level. The LOPs would be issued for a period of 3 years and would require annual monitoring reports on gravel recruitment, river geomorphology, and fisheries. Humboldt County currently has an LOP in-place and Del Norte and Mendocino Counties are in the process of obtaining their LOPs. NMFS will be working with the counties and the COE to ensure that any LOPs issued for gravel mining are protective of coho salmon.

Timber, farming, and fishing interests formed the Fish, Forests, and Farms Community (FFFC) organization in California in an effort to address land management and fisheries issues related to salmon and steelhead listings in California. The FFFC has focused its efforts in: (1) Promoting research projects to improve the scientific knowledge regarding salmonid life histories and habitat requirements in coastal watersheds, and (2) developing standardized protocols for biological and physical assessment and monitoring of anadromous fish habitat and populations in coastal watersheds. The FFFC has made important progress to date, and it should be recognized for its efforts to bring together multiple and diverse interests. More importantly, FFFC is attempting to fill a void for standardizing data collection and to quantify technical processes that should eventually lead to a better scientific understanding of coho salmon.

In 1996, the California Forestry Association established the Forest Science Project (FSP) at Humboldt State University. The purpose of the industry-sponsored FSP is to acquire, compile, and disseminate baseline biological and habitat information being developed by private timber companies operating within the California portion of the Southern Oregon/Northern California Coast ESU. The timber industry expects to continue this on-going effort to compile and synthesize biological,

habitat, and other types of data, and has expressed interest in developing a process with NMFS that would assure that such data are available for future decision making.

Local habitat restoration and planning efforts are also currently ongoing in several watersheds that should contribute to the conservation of coho salmon in the Southern Oregon/ Northern California Coast ESU. These include efforts by the Scott River Watershed Committee and French Creek Watershed Advisory Group in the Scott River watershed, the Shasta River Project (Shasta River watershed), the South Fork Trinity River (South Fork Trinity River), and the Mattole Restoration Council (Mattole River). In several counties within the range of the Southern Oregon/Northern California Coast ESU, there are county-based Resource Conservation Districts (RCDs) that are providing the focus for agricultural and local conservation groups to use Federal grants to develop and prioritize restoration plans.

An extensive network of RCDs exists within the range of coho salmon in the Southern Oregon/Northern California Coast ESU. These RCDs represent an important vehicle through which the agricultural community can voluntarily address and correct management practices that impact coho salmon and its habitat, and their potential is significant. Working with individual landowners or through organizations such as the California Farm Bureau, these RCDs can assist landowners in developing and implementing best management practices that are protective of salmonids, including coho salmon. NMFS believes that the conservation and recovery of coho salmon in California will require the active participation of the agriculture community.

Finding and Withdrawal

Based on its assessment of the best available information, NMFS has determined that the Southern Oregon/ Northern California Coast and the Oregon Coast coho salmon ESUs constitute distinct ''species'' under the ESA. NMFS has further determined that the Oregon Coast ESU does not warrant listing at this time, and that the Southern Oregon/Northern California Coast ESU does warrant listing as a threatened species. Accordingly, NMFS is listing the Southern Oregon/Northern California Coast coho salmon ESU as threatened. NMFS will consider the Oregon Coast coho salmon ESU to be a candidate species and will review its listing status in 3 years (or earlier if warranted by new information). NMFS will publish shortly in the **Federal Register** protective regulations, pursuant to ESA section 4(d), which will apply the ESA section 9(a) prohibitions to the listed ESU, with certain exceptions. NMFS does not expect those regulations to become effective before July 1, 1997.

Oregon Coast Coho Salmon ESU

Section 4(b)(1)(A) of the ESA provides that the Secretary shall make a listing determination solely on the basis of the best scientific and commercial data available, after conducting a review of the species' status and ''after taking into account those efforts * * * being made by any state or foreign nation * * * to protect such species, whether by predator control, protection of habitat and food supply, or other conservation practices, within an area under its jurisdiction.'' NMFS has carefully considered the conclusions of the scientists on NMFS' Biological Review Team (BRT) regarding the species' status and has taken into account the OCSRI, the NFP and other actions that protect coho in this ESU.

The scientists on the BRT generally agreed that implementation of the harvest and hatchery measures of the OCSRI would have a positive effect on the status of the ESU. Previous harvest rate reductions on Oregon coastal coho, as refined and continued in the OCSRI, will continue to contribute to improved spawning escapement and near-term population stability of the Oregon coast ESU. The BRT expressed the view that these harvest and hatchery reforms may substantially reduce the short-term risk of extinction. The BRT was about evenly split as to whether the effects of these reforms would be substantial enough to move the ESU out of the ''likely to become endangered'' category. Some members felt that, in addition to the extinction buffer provided by the estimated 80,000 naturally produced spawners in 1996, the reforms would promote higher escapements and alleviate genetic concerns enough that the ESU would not be at significant risk of extinction or endangerment in the foreseeable future. Other members were not convinced that the hatchery and harvest reforms by themselves would be sufficient to alleviate risk due to declining productivity and habitat degradation.

Habitat degradation was one of the primary concerns of the BRT in evaluating long-term risks to this ESU. The BRT concluded that while the harvest and hatchery improvements may substantially reduce the short-term risk of extinction, habitat protection and restoration are key to ensuring the long-term survival of the ESU, especially under variable and unpredictable future climate conditions. There were two primary concerns with respect to habitat: First, that the habitat capacity for coho salmon within the range of the ESU has significantly decreased from historical levels; and, second, that preliminary results of the Nickelson-Lawson model predicted that, during poor ocean survival periods, only high quality habitat is capable of sustaining coho populations, and subpopulations dependent on medium and low quality habitats would be likely to go extinct. Both of these concerns caused the BRT to consider risks from habitat loss and degradation to be relatively high for this ESU.

The previous section of this document describes the Federal NFP and the OCSRI adopted by Oregon to protect and restore Oregon coastal coho salmon stocks. The NFP, which covers 35 percent of the geographic range of this ESU, will provide a high level of protection for coho habitat into the future. The OCSRI also contains many programs that will improve habitat conditions. The forest practices regulations adopted by Oregon in 1995 provide improvements over past practices, and the measures regarding agricultural practices should result in improvements in water quality. Overall, however, the habitat measures of the OCSRI do not currently provide the protections NMFS considers essential to creating and maintaining the high quality habitat needed to sustain Oregon Coast coho over the long term across a range of environmental conditions.

The OCSRI contains the tools necessary to ensure that adequate habitat measures are ultimately adopted and implemented: a comprehensive monitoring program, scientific review, and an adaptive management program. Natural escapement has been increasing markedly in recent years and reached 80,000 fish in 1996. On the basis of the harvest and hatchery improvements together with the habitat protections in the NFP and given the improving trends in escapement, the Oregon Coast coho is not likely to become endangered in the interval between this decision and the adoption of improved habitat measures by the State of Oregon. Under the April 1997 MOA between NMFS and the Governor of Oregon (MOA, 1997), described in the previous section, NMFS will propose to Oregon additional forest practices modifications necessary to provide adequate habitat conditions for coho. If these or other comparable protections are not adopted within 2 years, NMFS will act promptly

to change the ESA status of this ESU to whatever extent may be warranted.

Because the determination not to list the Oregon Coast ESU relies heavily on continued implementation of the OCSRI (in accordance with the MOA), including the enactment of improved habitat protective measures, NMFS intends to review this listing determination no later than the conclusion of 3 years (which represents one full life cycle and 3 year classes of coho salmon) or at any time sooner if substantive new information warrants consideration. During the interim, NMFS is designating the Oregon Coast ESU as a candidate species under the ESA and will continue to monitor the ESU's status as well as the efficacy of the OCSRI and other conservation measures.

Southern Oregon/Northern California Coast Coho Salmon ESU

Coho salmon populations are very depressed in this ESU, currently numbering fewer than 10,000 naturally-produced adults. The threats to this ESU are numerous and varied as described elsewhere in this document. Several human-caused factors, including habitat degradation, harvest, and artificial propagation, exacerbate the adverse effects of natural environmental variability brought about by drought, floods, and poor ocean conditions. NMFS has determined that existing regulatory mechanisms over the ESU as a whole are either inadequate or not implemented well enough to conserve this ESU. While conservation efforts are underway for some populations in this ESU, particularly in the Oregon portion of the ESU, they are not considered sufficient to reduce the risk that the ESU as a whole will become endangered in the foreseeable future. Accordingly, NMFS concludes that this ESU warrants listing as threatened. NMFS will issue shortly protective regulations that will apply the section 9(a) prohibitions to this ESU, with certain exceptions.

As described in the BRT status reviews (Weitkamp et al., 1995; NMFS, 1997a) and the proposed listing determination for west coast coho salmon (July 25, 1995, 60 FR 38011), NMFS defines the Southern Oregon/ Northern California Coast coho salmon ESU to include all naturally spawned populations of coho salmon (and their progeny) that are part of the biological ESU and reside below long-term, naturally impassible barriers in streams between Punta Gorda (CA) and Cape Blanco (OR). NMFS has also evaluated the status of seven hatchery stocks of coho salmon presently reared and released within the range of this ESU (NMFS, 1997a). Two of these hatchery stocks from California are either not considered part of the ESU (Mad River Hatchery) or are of uncertain relationship to the ESU (Iron Gate Hatchery). In contrast, NMFS has concluded that fish from four California hatchery populations (Mattole River, Eel River, Trinity River, and Rowdy Creek) and Oregon's Rogue River hatchery stock should be included in the definition of this ESU. None of these five hatchery stocks considered part of this ESU are presently deemed ''essential'' for its recovery, hence these hatchery fish are not being listed at this time. However, NMFS has determined that two of the hatchery populations may play an important role in recovery efforts: Mattole River, because the natural population is very depressed, and the Trinity River, because there appears to be essentially no natural production in the basin. It is important to note that the determination that a hatchery stock is not ''essential'' for recovery does not preclude it from playing a role in recovery. Any hatchery population that is part of the ESU is available for use in recovery if conditions warrant. In this context, an ''essential'' hatchery population is one that is vital to fully incorporate into recovery efforts (for example, if the associated natural population(s) were extinct or at high risk of extinction). Under these circumstances, NMFS would consider taking the administrative action of listing the existing hatchery fish.

NMFS' ''Interim Policy on Artificial Propagation of Pacific Salmon Under the Endangered Species Act'' (58 FR 17573, April 5, 1993) provides guidance on the treatment of hatchery stocks in the event of a listing. Under this policy, ''progeny of fish from the listed species that are propagated artificially are considered part of the listed species and are protected under the ESA.'' In the case of Oregon's Rogue River hatchery (Cole Rivers), the protective regulations that NMFS will issue shortly will exempt take of naturally spawned listed fish for use as broodstock as part of an overall conservation program. According to the interim policy, the progeny of these hatchery-wild crosses would also be listed. NMFS has determined in this case, however, not to consider hatchery-reared progeny of intentional hatchery-wild crosses as listed. The Rogue River natural population is relatively abundant, the take of naturally spawned fish for broodstock purposes is specifically limited, and the BRT concluded that this hatchery population was not essential for recovery, nor does it have an important role to play in recovery. NMFS therefore concludes that it is not inconsistent with NMFS' interim policy, nor with the policy and purposes of the ESA, to consider these progeny as part of the ESU but not listed.

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. NMFS has completed its analysis of the biological status of the Southern Oregon/Northern California Coast ESU but has not completed the analysis necessary for the designation of critical habitat. NMFS has decided to proceed with the final listing determination now and to proceed with the designation of critical habitat in a separate rulemaking. Section 4(b)(6)(C)(ii) provides that, where critical habitat is not determinable at the time of final listing, NMFS may extend the period for designating critical habitat by not more than 1 additional year. Congress further stated in the 1982 amendments to the ESA, ''where the biology relating to the status of the species is clear, it should not be denied the protection of the Act because of the inability of the Secretary to complete the work necessary to designate critical habitat.'' (H. Rep. No. 567, 97th Cong., 2d Sess. 19, 1982). NMFS believes that proceeding with this final listing determination, even though critical habitat has not been designated, is appropriate and necessary to protect this ESU and is consistent with congressional direction.

NMFS further concludes that critical habitat is not determinable at this time, because information sufficient to perform the required analysis of the impacts of the designation is lacking. NMFS has solicited information necessary to designate critical habitat in its proposed rule (60 FR 38011, July 25, 1995) and will consider such information in the proposed designation. Specifically, designation requires a determination of those physical and biological features that are essential to the conservation of the species and that may require special management considerations or protection. It further requires the consideration of an economic analysis of the impacts of the designation. These analyses have not yet been completed, and, therefore, critical habitat is not determinable at this time. NMFS is extending the period for the designation of critical habitat by not more than 1 additional year.

Available 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.

With respect to the Southern Oregon/Northern California Coast coho salmon ESU, several efforts are underway (described previously) that may slow or reverse the decline of coho salmon in this ESU. The NMFS intends to move rapidly during the next year to work with Federal, state, and tribal entities to develop and implement a comprehensive strategy to halt the decline and begin the recovery of coho salmon populations within this ESU. Because a substantial portion of land in this ESU is in private ownership (approximately 46 percent), conservation measures on private lands will be key to protecting and recovering coho salmon in this ESU.

Section 4(d) of the ESA directs the Secretary to implement regulations ''to provide for the conservation of [threatened] species,'' that may include extending any or all of the prohibitions of section 9 to threatened species. Section 9(a)(1)(g) also prohibits violations of protective regulations for threatened species implemented under section 4(d). NMFS will issue shortly protective regulations pursuant to section 4(d) for the conservation of the species.

For listed species, section 7(a)(2) of the ESA 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 most likely to be affected by listing this ESU include COE section 404 permitting activities under the CWA, COE section 10 permitting activities under the River and Harbors Act, FERC licensing and relicensing for non-Federal development and operation of hydropower, EPA implementation of TMDLs and 303(c) water quality standards, and NRCS funded activities. These actions will likely be subject to ESA section 7 consultation requirements that may result in conditions designed to achieve the intended purpose of the project and avoid or reduce impacts to coho salmon and its habitat within the range of the listed ESU.

There are likely to be Federal actions ongoing in the range of the Southern Oregon/Northern California Coast ESU at the time that this listing becomes effective. Therefore, NMFS will review all on-going actions that may affect the listed species with the Federal agencies and will complete formal or informal consultations, where requested or necessary, for such actions as appropriate, pursuant to ESA section 7(a)(2).

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 (see regulations at 50 CFR 222.22 through 222.24). Section 10(a)(1)(A) scientific research and enhancement permits may be issued to entities (Federal and non-Federal) conducting research that involves directed take of listed species.

NMFS has issued section 10(a)(1)(A) research or enhancement permits for other listed species (e.g., Snake River chinook salmon, Sacramento River winter-run chinook salmon) for a number of activities, including trapping and tagging to determine population distribution and abundance, and collection of adult fish for artificial propagation programs. NMFS is aware of several sampling efforts for coho salmon in the Southern Oregon/Northern California Coast ESU, including efforts by Federal and state fisheries agencies, and private landowners. These and other research efforts could provide critical information regarding coho salmon distribution and population abundance.

Section 10(a)(1)(B) incidental take permits may be issued to non-Federal entities to authorize take of listed species incidental to otherwise lawful activities. The types of activities potentially requiring a section 10(a)(1)(B) incidental take permit include the operation and funding of hatcheries and release of artificially propagated fish by the state, state or university research not receiving Federal authorization or funding, the implementation of state fishing regulations, and timber harvest activities on non-Federal lands.

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 the environmental assessment requirements of NEPA (48 FR 4413, February 6, 1984).

As noted in the Conference Report on the 1982 amendments to the ESA, economic considerations have no relevance to determinations regarding the status of the species. Therefore, the economic analysis requirements of the Regulatory Flexibility Act are not applicable to the listing process. Similarly, this final rule is exempt from review under E.O. 12866.

References

The complete citations for the references used in this document can be obtained by contacting Garth Griffin or Craig Wingert, NMFS (see **ADDRESSES**).

List of Subjects in 50 CFR Part 227

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

Dated: April 25, 1997.

Rolland A. Schmitten,

Assistant Administrator for Fisheries, National Marine Fisheries Service.

For the reasons set out in the preamble, 50 CFR part 227 is amended as follows:

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, paragraph (i) is added to read as follows:

§ 227.4 Enumeration of threatened species.

* * * * *

(i) Southern Oregon/Northern California Coast coho salmon (*Oncorhynchus kisutch*). Includes all coho salmon naturally reproduced in streams between Cape Blanco in Curry County, OR, and Punta Gorda in Humboldt County, CA.

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