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Endangered and Threatened Species; Threatened Status for Two Chinook Salmon Evolutionarily Significant Units (ESUs) in California; Final Rule

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

50 CFR Parts 223

[Docket No. 990303060–9231–03; I.D. 022398C]

RIN 0648–AM54

Endangered and Threatened Species; Threatened Status for Two Chinook Salmon Evolutionarily Significant Units (ESUs) in California

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

ACTION: Final rule; notice of determination.

SUMMARY: Previously, NMFS completed a comprehensive status review of west coast chinook salmon (*Oncorhynchus tshawytscha*) populations in Washington, Oregon, Idaho, and California and identified 15 ESUs within this range. After soliciting additional data to resolve scientific disagreements, NMFS now issues a final rule to list two ESUs as threatened under the Endangered Species Act (ESA). The Central Valley spring-run ESU was originally proposed as endangered, but new information indicates that the ESU should instead be considered a threatened species. The California Coastal ESU was originally proposed as threatened, as part of a larger Southern Oregon and California Coastal ESU, but new information supports a threatened listing for a revised ESU consisting of California coastal chinook salmon populations from Redwood Creek (Humboldt County) south through the Russian River. Other coastal populations to the north of this ESU (and originally proposed as threatened) are now considered part of a separate Southern Oregon and Northern California Coastal ESU that does not warrant listing at this time.

NMFS is also making final listing determinations for two other chinook salmon ESUs originally proposed as threatened. It has considered new information about the Central Valley fall and late fall-run ESU and has determined that listing is not warranted at this time, but it will consider it a candidate species. In the case of the proposed ESU expansion for threatened Snake River fall-run chinook salmon, NMFS has determined that the ESU does not include Deschutes River populations and that listing this latter population is not warranted at this time.

In the two ESUs identified as threatened, only naturally spawned populations of chinook salmon are listed. At this time, no hatchery populations are deemed essential for recovery in either of the two listed ESUs, so no hatchery populations are part of this final listing determination.

NMFS intends to issue protective regulations under section 4(d) of the ESA for these threatened ESUs. Even though NMFS is not now issuing protective regulations for the threatened ESUs, Federal agencies are required under section 7 to consult with NMFS if any activity they authorize, fund, or carry out may affect listed chinook salmon in these ESUs.

DATES: Effective November 15, 1999.

ADDRESSES: Branch Chief, NMFS, Northwest Region, Protected Resources Division, 525 NE. Oregon St., Suite 500, Portland, OR 97232–2737; Assistant Regional Administrator, Protected Resources Division, NMFS, Southwest Region, 501 West Ocean Blvd., Suite 4200, Long Beach, CA 90802-4213; Salmon Coordinator, Office of Protected Resources, NMFS, 1315 East-West Highway, Silver Spring, MD 20910.

Reference materials regarding this listing determination can also be obtained from the internet at www.nwr.noaa.gov.

FOR FURTHER INFORMATION CONTACT: Garth Griffin at (503) 231–2005, Craig Wingert at (562) 980–4021, or Chris Mobley at (301) 713–1401.

SUPPLEMENTARY INFORMATION:

Species Background

Chinook salmon are anadromous and semelparous, i.e., as adults they migrate from the marine environment into the freshwater rivers and streams of their birth (anadromous) where they spawn and die (semelparous). They are the largest of the Pacific salmon species and are distributed in freshwater and marine areas from California to Asia. The four ESUs considered in this determination spawn and rear in coastal and interior rivers in California and Oregon and forage in vast nearshore and marine zones of the North Pacific Ocean. More detailed biological information for west coast chinook salmon can be found in species' status assessments by NMFS (Matthews and Waples, 1991; Waples *et al.*, 1991; NMFS, 1995; Waknitz *et al.*, 1995; Myers *et al.*, 1998; NMFS, 1998a; NMFS, 1999a), Oregon Department of Fish and Wildlife (ODFW, 1991; Nickelson *et al.*, 1992; Kostow *et al.*, 1995), California Department of Fish and Game (CDFG)(Clark, 1929; CDFG, 1965; Hallock and Fry, 1967; Reynolds *et al.*, 1993; Yoshiyama *et al.*, 1996), and for species life history summaries (Miller and Brannon, 1982; Healey, 1991), and in previous **Federal Register** documents (56 FR 29542, June 27, 1991; 63 FR 11482, March 9, 1998).

Previous Federal ESA Actions Related to West Coast Chinook Salmon

Descriptions of previous Federal ESA actions pertaining to west coast chinook salmon are summarized in the proposed rule (63 FR 11482, March 9, 1998), and recent final rule (63 FR 14308, March 24, 1999) for several chinook salmon ESUs. NMFS initially announced its intention to conduct a coastwide review of chinook salmon status in response to a petition to list several Puget Sound chinook salmon stocks on September 12, 1994 (59 FR 46808). Having received on February 1, 1995, a more comprehensive petition from the Oregon Natural Resources Council and from Dr. Richard Nawa, NMFS reconfirmed its intention to conduct a coastwide review (60 FR 30263, June 8, 1995). During that review, NMFS requested public comment and assessed the best available scientific and commercial data, including technical information from Pacific Salmon Biological Technical Committees (PSBTCs) and from other interested parties. The PSBTCs consisted primarily of scientists (from Federal, state, and local resource agencies, Indian tribes, industries, universities, professional societies, and public interest groups) possessing technical expertise relevant to chinook salmon and their habitats. The NMFS Biological Review Team (BRT), composed of staff from NMFS' Northwest, Southwest, and Auke Bay Fisheries Science Centers, Northwest and Southwest Regions, as well as staff from the National Biological Survey, reviewed and evaluated scientific information provided by the PSBTCs and other sources. Early drafts of the BRT review were distributed to state and tribal fisheries managers and peer reviewers who are experts in the field to ensure that NMFS' evaluation was as accurate and complete as possible. The BRT then incorporated all comments into the coastwide chinook salmon status review.

Based on the results of the completed status report on west coast chinook salmon (Myers *et al.*, 1998), NMFS identified 15 ESUs of chinook salmon from Washington, Oregon, Idaho, and California, including 11 new ESUs, and 1 redefined ESU (63 FR 11482, March 9, 1998). After assessing information concerning chinook salmon abundance, distribution, population trends, and risks and after considering efforts being made to protect chinook salmon, NMFS determined that several chinook salmon ESUs did not warrant listing under the ESA. The chinook salmon ESUs not requiring ESA protection included the Upper Klamath and Trinity River ESU, Oregon Coast ESU, Washington Coast ESU, Middle Columbia River spring-run ESU, and Upper Columbia River summer- and fall-run ESU.

Also based on this evaluation, and after considering efforts being made to protect chinook salmon, NMFS proposed that seven chinook salmon ESUs warranted listing as either endangered or threatened species under the ESA. The chinook salmon ESUs proposed as endangered species included California Central Valley spring-run and Washington's Upper Columbia River spring-run chinook salmon. The chinook salmon ESUs proposed as threatened species included California Central Valley fall and late fall-run, Southern Oregon and California Coastal, Puget Sound, Lower Columbia River, and Upper Willamette River spring-run chinook salmon. Additionally, NMFS found that fall-run chinook salmon from the Deschutes River in Oregon shared a strong genetic and life history affinity to currently listed Snake River fall-run chinook. Based on this affinity, NMFS proposed to revise the existing listed Snake River fall-run ESU to include fall-run chinook salmon in the Deschutes River. The resulting revised ESU would be listed as threatened.

Following these proposed listings, NMFS conducted 21 public hearings within the range of the proposed chinook salmon ESUs in California, Oregon, Washington, and Idaho. NMFS accepted and reviewed public comments solicited during a 112-day public comment period. Also during the comment period, NMFS solicited peer and co-manager review of NMFS' proposal and received comments and new scientific information concerning the status of the chinook salmon ESUs proposed for listing. NMFS also received information regarding the relationship of existing hatchery stocks to native populations in each ESU. This new information was evaluated by NMFS' BRT and published in an updated status review for these chinook salmon entitled ''Status Review Update for West Coast Chinook Salmon (*Oncorhynchus tshawytscha*) from Puget Sound, Lower Columbia River, Upper Willamette River, and Upper Columbia River Spring-run ESUs.'' (NMFS, 1998a).

Based on these public hearings, comments, and additional technical meetings with Indian tribes and the states, NMFS found that listing was warranted for four ESUs (Upper Columbia River spring-run, Puget Sound, Lower Columbia River, and Upper Willamette River spring-run ESUs) (63 FR 14308, March 24, 1999). However, substantial scientific disagreements precluded the agency from making final determinations for California's Central Valley spring-run and Central Valley fall and late fall-run, Southern Oregon and California Coastal, and Snake River fall-run ESUs. Therefore, in accordance with section 4(b)(6)(B)(i) of the ESA, NMFS extended the period for making final determinations for these ESUs by 6 additional months (63 FR 14329, March 24, 1999).

During the 6 month period, NMFS received new scientific information concerning the boundaries, population structure, and status of the deferred ESUs and met with the affected states, Indian Tribes, and Federal co-managers. This new information was considered by NMFS' BRT, and NMFS has now completed an updated status review that analyzes this new information as well as the ESU status of existing hatchery stocks (NMFS, 1999a). Based on this updated status review and other information, NMFS now issues its final determinations for these four proposed ESUs. Copies of NMFS' updated status review reports and related documents are available upon request (see **ADDRESSES**).

Summary of Comments and Information Received in Response to the Proposed Rule

NMFS held 21 public hearings in California, Oregon, Idaho, and Washington to solicit comments on this and other salmonid listing proposals (63 FR 16955, April 7, 1998; 63 FR 30455, June 4, 1998). During the 112-day public comment period, NMFS received nearly 300 written comments regarding the west coast chinook salmon proposed rule. A number of comments addressed issues pertaining to the proposed critical habitat designation for west coast chinook salmon. NMFS will address these comments in a forthcoming **Federal Register** document announcing the agency's conclusions about critical habitat for all listed chinook salmon ESUs.

NMFS also sought new data and analyses from tribal, state, and Federal co-managers and met with them to formally discuss technical issues associated with the deferred chinook salmon ESUs. This new information and analysis were considered by NMFS' BRT in its re-evaluation of ESU boundaries and species' status; this information is discussed in an updated status review report for these chinook salmon ESUs (NMFS, 1999a).

In addition to soliciting and reviewing public comments, NMFS sought peer review of its listing proposals. On July 1, 1994, NMFS, jointly with the U.S. Fish and Wildlife Service (FWS), published a series of policies regarding listings under the ESA, including a policy for peer review of scientific data (59 FR 34270). In accordance with this policy, NMFS solicited 13 individuals to take part in a peer review of its west coast chinook salmon proposed rule. All individuals solicited are recognized experts in the field of chinook salmon biology and represent a broad range of interests, including Federal, state, and tribal resource managers and academia. Four individuals took part in the peer review of this action; new information and comments provided by the public and comments from peer reviewers were considered by NMFS' BRT and are summarized in the updated status review documents (NMFS, 1998a; NMFS, 1999a). Copies of these documents are available upon request (see **ADDRESSES**).

A summary of comments received in response to the proposed rule follows.

Issue 1: Sufficiency and Accuracy of Scientific Information and Analysis

Comment 1: Some commenters questioned the sufficiency and accuracy of data NMFS employed in the listing proposal. In contrast, peer reviewers commented that the agency's status review was both credible and comprehensive, even though they may not have concurred with all of NMFS' conclusions.

Response: Section 4(b)(1)(A) of the ESA requires that NMFS make its listing determinations solely on the basis of the best available scientific and commercial data, after reviewing the status of the species and taking into account any efforts being made to protect such species. NMFS believes that information contained in the agency's status review (Myers *et al.*, 1998), together with more recent information obtained in response to the proposed rule (NMFS, 1998a; NMFS, 1999a), represents the best scientific and commercial information presently available for the chinook salmon ESUs addressed in this final rule. NMFS has made every effort to conduct an exhaustive review of all available information and has solicited information and opinion from all interested parties, including peer reviewers as described previously. If new data become available to change these conclusions, NMFS will act accordingly.

Comment 2: Several of the comments received suggested that the ESA does not provide for the creation of ESUs and that ESUs do not correspond to species, subspecies, or distinct population segments (DPSs) that are specifically identified in the ESA. Further, NMFS' use of genetic information (allozyme- or DNA-derived) to determine ESU boundaries was criticized by several commenters. It was argued that allozyme-based electrophoretic data cannot be used to imply either evolutionary significance or local adaptation. Other commenters indicated that NMFS used genetic distances inconsistently in determining the creation of ESUs. Several commenters argued that there was insufficient scientific information presented to justify the establishment of the chinook salmon ESUs discussed. Information was lacking concerning a number of ''key'' criteria for defining ESUs, such as phenotypic differences, evolutionary significance, or ecological significance of various chinook populations. Commenters contended that NMFS did not find any life history, habitat, or phenotypic characteristics that were unique to any of the ESUs discussed. Disagreement within the BRT regarding ESU delineations was also given as a reason for challenging the proposed listing decision.

Response: General issues relating to ESUs, DPSs, and the ESA have been discussed extensively in past **Federal Register** documents as described in this paragraph. Regarding application of its ESU policy, NMFS relies on its policy describing how it will apply the ESA definition of ''species'' to anadromous salmonid species published in 1991 (56 FR 58612, November 20, 1991). More recently, NMFS and FWS published a joint policy, that is consistent with NMFS' policy, regarding the definition of ''distinct population segments'' (DPSs)(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, a 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, needs 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 NOAA Technical Memorandum entitled ''Definition of 'Species' Under the Endangered Species Act: Application to Pacific Salmon'' (Waples, 1991) and in a more recent scientific paper by Waples (1995).

The National Research Council (NRC) has recently addressed the issue of defining species under the ESA (NRC, 1995). Its report found that protecting DPSs is soundly based on scientific evidence, and recommends applying an ''Evolutionary Unit'' (EU) approach in describing these segments. The NRC report describes the high degree of similarity between the EU and ESU approaches (differences being largely a matter of application between salmon and other vertebrates), and concludes that either approach would lead to similar DPS descriptions most of the time.

ESUs were identified using the best available scientific and commercial information. As discussed in the status review, genetic data were used primarily to evaluate the criterion regarding reproductive isolation, not evolutionary significance. In some cases, there was a considerable degree of confidence in the ESU determinations; in other cases, more uncertainty was associated with this process. Similarly, the risk analysis necessarily involved a mixture of quantitative and qualitative information and scientific judgement. NMFS' process for conducting its risk assessment has evolved over time as the amount and complexity of information has changed, and NMFS continues to seek and incorporate comments and suggestions to improve this process. NMFS believes that there is evidence to support the identification of DPSs for chinook salmon. The chinook salmon status reviews describe a variety of characteristics that support the ESU delineations for this species, including ecological and life history parameters. NMFS also assessed available genetic data for the proposed ESUs and concludes that sufficient genetic differences existed between these and adjacent ESUs to support separate delineations. As described later in this notice, new information has resulted in significant changes in the configurations of some proposed ESUs.

Issue 2: Status Assessments for Chinook Salmon ESUs

Comment 3: Some comments suggested that risk assessments were made in an arbitrary manner and that NMFS did not rely on the best available science. Several commenters questioned NMFS' methodology for determining whether a given chinook salmon ESU warranted listing. In some cases, such commenters also expressed opinions regarding whether listing was warranted for a particular chinook salmon ESU.

Response: Throughout the status review of west coast chinook salmon, NMFS has solicited and evaluated the best available scientific and commercial data for the species. The agency believes that this review, coupled with considerable input from the public, comanagers, peer reviewers, and other species experts, clearly demonstrates that the listing determinations are not arbitrary but instead are based on an open and rigorous scientific assessment. Section 3 of the ESA defines the term ''endangered species'' as ''any species which is in danger of extinction throughout all or a significant portion of its range.'' The term ''threatened species'' is defined as ''any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.'' NMFS has identified a number of factors that should be considered in evaluating the level of risk faced by an ESU, including: (1) absolute numbers of fish and their spatial and temporal distribution; (2) current abundance in relation to historical abundance and current carrying capacity of the habitat; (3) trends in abundance; (4) natural and human-influenced factors that cause variability in survival and abundance; (5) possible threats to genetic integrity (e.g., from strays or outplants from hatchery programs); and (6) recent events (e.g., a drought or changes in harvest management) that have predictable short-term consequences for abundance of the ESU. A more detailed discussion of the status of individual ESUs is provided later in this document under Issues 5 through 8.

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

Comment 4: Some comments identified factors for decline that were either not identified in the status review or which they believed were not given sufficient weight in the risk analysis. Other commenters contended that recent declines in chinook salmon abundance were related to natural factors such as predation and changes in ocean productivity. Furthermore, these commenters contend that NMFS did not show how the present declines were significantly different from natural variability in abundance, nor that abundances were below the current carrying capacity of the marine environment and freshwater habitat.

Response: The status review did not attempt to exhaustively identify factors for decline, except insofar as they contributed directly to the risk analysis. Nevertheless, NMFS agrees that a multitude of factors, past and present, have contributed to the decline of west coast chinook salmon. Many of the identified factors were specifically cited as risk agents in NMFS's status review (Myers *et al*., 1998) and listing proposal (63 FR 11482, March 9, 1998). NMFS recognizes that natural environmental fluctuations have likely played a role in the species' recent declines. However, NMFS believes other human-induced impacts (e.g., harvest in certain fisheries, artificial propagation, and widespread habitat modification) have played an equally significant role in the decline of chinook salmon.

NMFS' status review briefly addressed the impact of adverse marine conditions and climate change, but concluded that there is considerable uncertainty regarding the role of these factors in chinook salmon abundance. At this time, we do not know whether these climate conditions represent a long-term shift in conditions that will continue into the future or short-term environmental fluctuations that can be expected to reverse soon. A recent review by Hare *et al*. (1999) suggests that these conditions could be part of an alternating 20– to 30-year long regime pattern. These authors concluded that, while at-risk salmon stocks may benefit from a reversal in the current climate/ ocean regime, fisheries management should continue to focus on reducing impacts from harvest and artificial propagation and improving freshwater and estuarine habitats.

NMFS believes there is ample evidence to suggest that the elimination and degradation of freshwater habitats have contributed to the decline of these chinook salmon ESUs. The past destruction, modification, and curtailment of freshwater habitat was reviewed in a recent NMFS coastwide assessment for steelhead (NMFS, 1996), and, more recently, for chinook salmon (NMFS, 1998b). Many of the identified risks and conclusions apply specifically to these chinook salmon. Examples of habitat alterations affecting chinook salmon include: water withdrawal, conveyance, storage, and flood control (resulting in insufficient flows, stranding, juvenile entrainment, and increased stream temperatures); and logging and agriculture (resulting in loss of large woody debris, sedimentation, loss of riparian vegetation, and habitat simplification)(NMFS, 1996; Spence *et al*., 1996; Myers *et al*., 1998; NMFS, 1998b). These human-induced impacts in freshwater ecosystems have likely reduced the species' resiliency to natural factors for decline such as drought and poor ocean conditions. A critical next step in restoring listed chinook salmon will be identifying and ameliorating specific factors for decline at both the ESU and population level.

With respect to predation issues raised by some commenters, NMFS has recently published reports describing the impacts of California sea lions and Pacific harbor seals upon salmonids and on the coastal ecosystems of Washington, Oregon, and California (NMFS, 1997 and 1999b). These reports conclude that in certain cases where pinniped populations co-occur with depressed salmonid populations, salmon populations may experience severe impacts due to predation. An example of such a situation is at the Ballard Locks, Washington, where sea lions are known to consume significant numbers of adult winter steelhead. These reports further conclude that data regarding pinniped predation are quite limited and that substantial additional research is needed to fully address this issue. Existing information on the seriously depressed status of many salmonid stocks is sufficient to warrant actions to remove pinnipeds in areas of co-occurrence where pinnipeds prey on depressed salmonid populations (NMFS, 1997 and 1999b).

Issue 4: Consideration of Existing Conservation Measures

Comment 5: Several comments expressed concerns about NMFS' reliance and characterization of the efficacy of the Northwest Forest Plan (NFP), citing significant differences in management practices between various Federal land management agencies. Numerous commenters noted that an array of state and Federal conservation measures were underway for this and other species (particularly in California) and asked that NMFS give them more consideration in its listing determination.

Response: In the listing proposal, NMFS noted that the NFP requires specific management actions on Federal lands, including actions in key watersheds in southern Oregon and northern California that comply with special standards and guidelines designed to preserve their refugia functions for at-risk salmonids (i.e., watershed analysis must be completed prior to timber harvests and other management actions, road miles should be reduced, no new roads can be built in roadless areas, and restoration activities are prioritized). In addition, 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 ACS objectives that strive 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. NMFS will continue to support the NFP strategy and address Federal land management issues via ESA section 7 consultations in concert with this strategy.

Additional consideration was given to various conservation efforts in California and elsewhere within the range of proposed chinook ESUs that have been implemented or are expected to be initiated. See ''Efforts Being Made to Protect West Coast Chinook Salmon'' later in this document.

Comment 6: Several comments expressed concern over the need to list these chinook salmon ESUs and the effects of these listings on Indian resources, programs, land management, and associated Trust responsibilities. Particular concern was expressed about the effects of listing Deschutes River chinook salmon on tribal fishing for this and other species.

Response: NMFS acknowledges that ESA listings may impact Indian resources, programs, land management and associated Trust responsibilities. NMFS will continue to work closely with affected Indian tribes through government to government consultation as harvest and other management issues arise and will continue to support the development of sound, strong tribal and state conservation efforts to restore listed chinook salmon and other west coast salmon populations.

Issue 5: ESU Delineation and Status of Central Valley Spring-run Chinook Salmon

Comment 7: Some commenters questioned this ESU's configuration and felt that NMFS was inconsistent in separating spring and fall runs in the Central Valley. A peer reviewer stated that the genetic information presented was not sufficient to justify the creation of a separate spring-run chinook salmon ESU. The majority of commenters agreed that this ESU is currently at risk, but there were disparate views as to whether the risks warranted an endangered listing under the ESA. For example, one commenter believed that Central Valley spring-run populations have remained stable (although at low levels of abundance) and that current fluctuations are consistent with natural terrestrial and ocean productivity cycles. This commenter suggested that information on cohort replacement rates, the level of interaction between fall and spring runs, and the impact of various factors relating to the survival of emigrating juveniles and returning adults need to be further investigated before a listing determination can be made. Another commenter felt that listing was warranted, but that a threatened status was more appropriate, given the relatively stable population sizes for most spring-run fish over the last 20 years and the increasing abundance found in Butte Creek.

Recent large returns to Butte Creek prompted a number of comments specific to spring-run chinook salmon in this Sacramento River tributary. One commenter suggested that the recent increases were due to high flows through the Sutter Bypass during the recent wet years. Spring-run adults returning to the upper Sacramento River would be attracted to the Bypass and routed up into Butte Creek. Therefore, the commenters contend that spring-run fish currently spawning in Butte Creek represent an amalgamation of fish from the upper Sacramento River and its tributaries. Another commenter believed that NMFS incorrectly suggested that the Butte Creek populations were the product of hatchery releases. Similarly, two commenters presented genetic information that indicates that the spring-run chinook salmon population in Butte Creek is not the result of strays from the Feather River Hatchery as was speculated by NMFS. They also noted that the 1998 abundance estimate for the Butte Creek spring run is approximately 19,000 spawners and that, if these fish are included in the total abundance estimate for the Central Valley spring-run chinook salmon ESU, there is a several fold increase in abundance.

Several commenters cited specific factors for decline that impact the fall run: predation by non-native species, dam and reservoir operations, catastrophic stranding, incorporation of naturally produced salmon into hatchery broodstocks, and competition and predation by hatchery chinook salmon and steelhead on naturally produced chinook salmon. Some contended that a variety of existing conservation efforts aimed at addressing factors for decline (e.g., the Bay-Delta Accord, CALFED, and harvest and hatchery reforms) were sufficient to prevent this ESU from becoming extinct. In addition, some commenters believed that significant benefits would accrue to spring-run chinook salmon as a result of the State of California's ESA listing for the species, as well as actions by NMFS and the Pacific Fishery Management Council (PFMC) to protect winter-run chinook salmon. Others disagreed with these contentions and asserted that efforts had clearly failed to adequately protect chinook salmon in the Central Valley.

Since the initial status review, NMFS has received new data and information which have helped resolve the scientific uncertainties associated with the proposed listing for this ESU (NMFS, 1999a), and are summarized as follows.

Response - ESU Delineation: NMFS recently analyzed new genetic data collected for California chinook salmon. In 1998 and 1999, NMFS, CDFG, FWS, and the U.S. Forest Service (USFS) collected samples of spawned adult chinook salmon from 13 rivers and hatcheries in the Central Valley and Klamath River Basin. The new samples were analyzed along with allozyme data for California and southern Oregon chinook salmon that were previously used in the NMFS coastwide status review (Myers *et al.*, 1998). The population structure revealed by the new analysis of allozyme data was consistent with the delineations of major genetic groups described in previous genetic studies of California and southern Oregon chinook salmon (Utter *et al.*, 1989; Bartley *et al.*, 1992; Myers *et al.*, 1998). The most genetically divergent group of samples was from the Central Valley. Within the Central Valley, the most genetically divergent sample was from the Coleman National Fish Hatchery (CNFH) winter-run population. Spring-run chinook salmon sampled from Deer and Butte Creeks were distinct from the winter-run fish sample and also from samples of fall- and late fall-run chinook salmon from the Central Valley. The Deer Creek and Butte Creek samples were genetically distinct from each other. The sample of spring-run chinook salmon from the Feather River Hatchery was genetically intermediate between spring- and fall-run samples and most similar to the sample of Feather River Hatchery fall-run chinook salmon. Samples of fall-run and late fall-run populations formed a diverse subcluster that included samples from both Sacramento and San Joaquin populations.

Banks *et al.* (1999) studied 5 to 11 microsatellite loci in 41 samples to assess genetic diversity among winter-, spring-, fall-, and late fall-run chinook salmon in California's Central Valley. Five homogeneous subpopulations were found: (1) wild and hatchery broodstock winter run, (2) wild spring run from Deer and Mill Creeks, (3) wild spring run from Butte Creek, (4) wild and hatchery fall run, and (5) wild and hatchery late-fall run. Winter-run samples were the most genetically divergent. Butte Creek spring-run chinook salmon were the next most divergent, followed by spring-run samples from Deer and Mill Creeks. Fall and late-fall runs were separated by a very small genetic distance. It is noteworthy that the sample of Butte Creek spring-run fish did not show evidence of introgression from Feather River hatchery fall-run stock. However, fewer alleles and lower heterozygosities in both winter-run and Butte Creek spring-run samples indicate that these populations may have experienced past reductions in population size.

Banks *et al.* (1999) used five microsatellite loci to investigate genetic relationships among 11 fall- and spring-run chinook salmon populations in the Klamath River and to compare these populations to chinook salmon from the Central Valley. Despite extensive sampling and analysis, no homogeneous population pools were found. Overall, Klamath River Basin populations were differentiated from Central Valley populations, and winter-run chinook salmon were genetically distinct and did not cluster with other populations.

Nielsen *et al.* (1994) and Nielsen (1995) examined mitochondrial DNA (mtDNA) variation in 14 samples of chinook salmon from Central Valley rivers and hatcheries and one sample from Guadalupe River, a southern tributary of San Francisco Bay. Nielsen *et al.* (1999) concluded that their data support their earlier conclusions (Nielsen *et al.*, 1994) that fall, late fall, spring, and winter runs of Central Valley chinook salmon show consistently significant differences for the mtDNA locus, indicating infrequent straying and limited gene flow among the temporal spawning runs.

Kim *et al.* (1999) examined genetic variation in winter-, spring-, fall-, and late fall-run adult chinook salmon taken from the upper Sacramento River between 1991 and 1995. An analysis of population structure indicated that winter-run chinook salmon were the most genetically distinct, while fall- and late fall-run samples were closely related to each other. Spring-run samples were genetically intermediate between the winter and fall and late-fall runs. A sample of Butte Creek spring-run chinook salmon was genetically similar to Sacramento River mainstem spring-run samples.

Ecological and life history information for this ESU was also re-evaluated, particularly historical and current information concerning Butte Creek populations. Yoshiyama *et al.* (1996) reported that spring, fall, and probably late-fall runs of chinook salmon historically utilized Butte Creek. Gold mining, logging activities, and irrigation withdrawals have all had a considerable impact on habitat quality (Clark, 1929; Hanson *et al.*, 1940). In 1917, two diversion dams were constructed by Pacific Gas and Electric. The Centerville Diversion Dam eliminated access to the upper watershed (Mills and Ward, 1996). Clark (1929) reported that the fall-run fish had declined dramatically and that summer flows in the lower river had been reduced by irrigation withdrawals. There was no mention of the status of a spring run. A survey by Hanson *et al.* (1940) reported that much of the upper watershed had been logged, and that mining operations continued to impact the river flow, and that ''none of the flow of Butte Creek except perhaps a little seepage reaches the Sacramento River during this summer.

Yoshiyama *et al.* (1996) reported that Butte Creek spring-run chinook salmon enter the creek in February through April (compared with May or June for Feather River spring-run chinook salmon). USFS monitoring (which began in 1930) indicated that flows in Butte Creek peak during the February to June period (peaks vary from 1,000 to over 10,000 cubic feet per second (cfs), with a maximum of 25,000 cfs in 1997), but are below 100 cfs during much of the remainder of the year (U.S. Geological Survey, 1999). Although Butte Creek originates in the Sierra Nevada Mountains (2000 m), spring-run adults spawn at a relatively low altitude (300 m), in part because of the absence of passage at the Centerville Dam. Yoshiyama *et al.* (1996) were uncertain if spring-run chinook salmon historically migrated above a 7.6 m waterfall located near the Centerville Dam. Spring-run chinook salmon spawn in September. Juveniles emigrate primarily as fry (December to March) and may rear in the Sacramento River Delta for extended periods (Baracco, 1996). Fall-run chinook salmon are reported to spawn further downstream, below the Parrot-Phelam Dam (Yoshiyama *et al.*, 1996).

Based on a re-assessment of information relevant to the configuration of this ESU, NMFS reiterates its previous decisions that the spring-run populations in the Central Valley constitute a distinct ESU and that the extirpated spring-run populations in the southern portion of this ESU may have constituted their own ESU (based on ecological and biogeographical data). NMFS considered several issues related to the configuration of the Central Valley spring-run chinook salmon ESU. The genetic data indicate that spring-run fish spawning in Butte Creek are not the progeny of Feather River Hatchery spring-run releases, but represent a naturally spawning population distinct from both Feather River fish and spring-run chinook salmon in Deer and Mill Creeks. Further sampling and analysis of mainstem Sacramento River spring-run fish (the only remaining known population that is not presently genetically described) are potentially important to understanding the relationship among Central Valley spring-run chinook salmon populations. Furthermore, NMFS is concerned that hatchery operations at the Feather River Hatchery may have resulted in the hybridization of spring- and fall-run fish. However, NMFS concludes that the Feather River spring run may retain ''spring-run'' life history characteristics and concludes it is still part of this ESU.

Response - ESU Status: NMFS also examined updated risk information for this ESU. Abundance of spring-run chinook salmon has increased in several streams since 1996, the most recent year considered in the previous risk evaluation by NMFS. The Feather River population abundance has been fairly constant at 3,000 to 7,000 fish per year spawning naturally. The 5-year geometric mean abundance of spring-run chinook salmon in the Feather River increased from 4,260 fish through 1996 to 5,013 through 1998. CDFG and other fisheries biologists familiar with Central Valley runs believe that the so-called spring-run fish in the Feather River are not likely to be representative of the historically wild spring-run fish because of the introgression between wild spring-run populations and hatchery spring- and fall-run chinook salmon (CDFG, 1998a). Three streams, Deer, Mill, and Butte Creeks, which contain naturally spawning populations of spring-run chinook salmon in this ESU, have also shown increases in mean abundance. The 5-year geometric mean abundance in Deer Creek increased from 564 through 1997 to 805 through 1998, and, in Mill Creek, the mean abundance increased from 252 through 1996 to 346 through 1998.

The most impressive change in status since the previous NMFS risk evaluation for this ESU was the continuing strong return of spring chinook to Butte Creek. In 1998, 20,259 spring-run chinook salmon returned to the creek, 2.7 times greater than the 1995 parental cohort of 7,500 fish resulting in a 5-year geometric mean abundance of 2,302 fish. The dissimilarity in genetic composition (Banks *et al.*, 1999; Kim *et al.*, 1999) and lack of concordance of trends in abundance (CDFG, 1998b) of Butte Creek and Feather River spring chinook suggest that the recent large escapements of spring chinook to Butte Creek are not the result of fish straying from the Feather River.

The spawning population of spring-run chinook salmon in the mainstem Sacramento River above Red Bluff Diversion Dam has continued to decline in abundance since the previous risk evaluation. The 5-year geometric mean abundance through 1998 is estimated to be around 300 fish, down from a mean of 435 through 1996. CDFG discussed sporadic reports of spring-run chinook salmon in Antelope, Cottonwood, and Big Chico Creeks, but the infrequent occurrence of these fish indicates that they do not represent self-sustaining populations (CDFG, 1998a).

After reviewing additional scientific information regarding the status of this ESU, NMFS concludes that the Central Valley spring-run chinook salmon ESU is not currently at risk of extinction but is likely to become endangered in the foreseeable future. NMFS is encouraged by the increase in abundance in Deer and Butte Creeks. Next to Butte Creek, the largest population of spring-run chinook salmon in the ESU is in the Feather River, and NMFS has concerns regarding the extensive introgression with fall-run fish in the hatchery population. The prospects for using the Feather River stock for conservation purposes in this ESU are unclear. The complete extirpation of the spring run from the San Joaquin River and the loss of historical spawning habitat above the dams in the Sacramento River Basin have resulted in a greatly reduced distribution of spring-run fish in the Central Valley. The primary reasons for the change in the risk evaluation from ''presently in danger of extinction'' previously proposed by NMFS were the increase in abundance of Butte Creek fish in recent years and the genetic evidence that the spring chinook salmon in Butte Creek are not of hatchery origin.

NMFS also notes a number of recent events that may have improved conditions for the Central Valley spring-run chinook salmon ESU, including reduced ocean and in-river harvest levels, the Federal listing of winter-run chinook salmon and Central Valley steelhead, the state listing of spring-run chinook salmon, and the habitat improvements occurring under the CALFED program. NMFS has considered the impacts of various conservation efforts affecting this ESU under the section ''Efforts Being Made to Protect West Coast Chinook Salmon'' of this document.

Issue 6: ESU Delineation and Status of Central Valley Fall and Late Fall-run Chinook Salmon

Comment 8: The vast majority of public comments on these four chinook salmon listing proposals involved NMFS' assessment of the Central Valley fall and late fall-run ESU. While some commenters agreed with NMFS' listing proposal, most did not agree that this ESU warranted listing as a threatened species. Others believed that NMFS' risk assessment may have been significantly influenced by six recent drought years. One commenter asserted that Central Valley chinook salmon populations have historically undergone extreme fluctuations in abundance due to environmental fluctuations and that NMFS did not adequately take these fluctuations (and the ability of the natural populations to recover) into account when assessing the risk of extinction. Several commenters also highlighted the high overall escapement level for this ESU and felt that there was not sufficient evidence to justify a listing. One commenter asserted that the small river systems that flow into San Francisco Bay did not historically support chinook salmon. Another did not agree that the San Joaquin River Basin constituted a significant portion of the ESU and felt that the depressed nature of San Joaquin fall-run stocks was not an adequate basis for a listing. Others believed that the ESU should be split into two ESUs. Several commenters cited specific factors for decline that impact the fall run: predation by non-native species, dam and reservoir operations, catastrophic stranding, incorporation of naturally produced salmon into hatchery broodstocks, and competition and predation by hatchery chinook salmon and steelhead on naturally produced chinook salmon.

Issues related to hatchery-produced chinook salmon in this ESU were particularly common. Many commenters felt that NMFS did not conclusively show that hatchery-produced fish were a risk to naturally-produced fish. Some felt that NMFS needed to provide a method for distinguishing hatchery and natural production, and justify the exclusion of hatchery fish from the risk determination (given that the majority of the broodstock originated from within the ESU). One commenter argued that, in many instances, hatchery and naturally spawning fish have co-mingled for generations, hence the fish are genetically indistinguishable and effectively represent one population. In many cases the persistence of naturally spawning fish has been dependent on the continued operation of the hatchery program. Under these conditions, the commenter contended, hatchery abundances should be included in the assessment of the risk of extinction for an ESU. Another suggested that, if hatchery impacts were great, NMFS should conclude that the Central Valley fall and late fall-run chinook salmon ESU was similar to the Lower Columbia River coho salmon ESU and exclude the Central Valley chinook salmon ESU from consideration for listing. One commenter argued that NMFS needed to identify which hatchery populations are in the ESU and which are not before making any conclusions on the status of this ESU. Another included data that indicated a rising proportion of coded-wire tag (CWT) fish being recovered in tributaries to the San Joaquin River; these CWT estimates did not take into account the contribution of unmarked hatchery-reared fish. In determining the risks facing this ESU, one commenter suggested that NMFS use the San Joaquin Basin populations as a benchmark. Still another called for more genetic sampling to determine whether the San Joaquin River Basin should be established as a separate ESU.

Finally, numerous commenters highlighted the importance of taking into account habitat restoration programs that are underway throughout the Central Valley and asserted that recent run sizes for the San Joaquin Basin have been increasing partly because of improvements in habitat conditions (e.g., gravel, temperature, and flows). Some believed that demonstrable habitat improvements had and would result from the CALFED program and that these results were predictable given the definitive nature of the program and the guaranteed nature of the funding. However, other commenters were skeptical that these efforts would be sufficient to reduce the risks facing this ESU. Key elements of the programs cited by commenters involved modified flow regimes, improved passage facilities, improved hatchery and harvest practices, and improved monitoring. In addition, some commenters believed that significant benefits would accrue to fall- and late fall-run chinook salmon as a result of the State of California's ESA listing for the spring run, as well as of actions by NMFS and the PFMC to protect winter-run chinook salmon.

Since the initial status review, NMFS has received new data and information which have helped resolve the scientific uncertainties associated with the proposed listing for this ESU (NMFS, 1999a), and are summarized as follows.

Response - ESU Delineation: NMFS recently analyzed new genetic data collected for California chinook salmon. In 1998 and 1999, NMFS, CDFG, FWS, and USFS collected samples of spawned adult chinook salmon from 13 rivers and hatcheries in the Central Valley and Klamath River Basin. The new samples were analyzed along with allozyme data for California and southern Oregon chinook salmon that were previously used in the NMFS coastwide status review (Myers *et al*., 1998). The population structure revealed by the new analysis of allozyme data was consistent with the delineations of major genetic groups described in previous genetic studies of California and southern Oregon chinook salmon (Utter *et al*., 1989; Bartley *et al*., 1992; Myers *et al*., 1998). The most genetically divergent group of samples was from the Central Valley. Within the Central Valley, the most genetically divergent sample was from the CNFH winter-run population. Spring-run chinook salmon sampled from Deer and Butte Creeks were distinct from the winter-run fish sample and also from samples of fall- and late fall-run chinook salmon from the Central Valley. The Deer Creek and Butte Creek samples were genetically distinct from each other. The sample of spring-run chinook salmon from the Feather River Hatchery was genetically intermediate between spring- and fall-run samples and most similar to the sample of Feather River Hatchery fall-run chinook salmon. Samples of fall- and late fall-run populations formed a diverse subcluster that included samples from both Sacramento and San Joaquin populations.

Microsatellite DNA variation has also been used in recent studies to examine genetic relationships among populations of chinook salmon in California. Nielsen *et al.* (1994) found significant heterogeneity among fall-run hatchery stocks and also among naturally spawning fall-run populations but there was no significant geographic structure at the basin level for wild fall-run chinook salmon. However, comparisons of wild fall-run carcasses and hatchery stocks suggest that naturally spawning fall-run fish in several basins retain some degree of genetic distinctiveness not found in hatcheries. Allele-frequencies for carcass collections made on the American, Tuolumne, Merced, and Feather Rivers were significantly different from samples of hatchery populations found within the same drainage. The Merced and Mokelumne Rivers were found to be most similar to hatchery populations on their respective rivers. The heterogeneity comparisons for some wild fall-run carcass collections may have been biased by small sample sizes. Fall-run hatchery populations were differentiated from populations of other run times but samples of wild fall-run populations were not compared to populations of winter, spring, or late-fall runs. Naturally spawning late fall-run fish were differentiated in allozyme analysis from all other populations including CNFH late fall-run salmon. The naturally spawning late fall-run population was most genetically similar to either winter-run fish or the CNFH late fall-run population, depending on the genetic distance measure used. Nei's measure of genetic distance indicated that late fall-run populations were most similar to hatchery fall-run populations.

Banks *et al.* (1999) used five microsatellite loci to investigate genetic relationships among 11 fall- and spring-run chinook salmon populations in the Klamath River and to compare these populations to chinook salmon from the Central Valley. Despite extensive sampling and analysis, no homogeneous population pools were found. Klamath River Basin populations were differentiated from Central Valley populations, and winter-run chinook salmon were genetically distinct and did not cluster with other populations.

Nielsen *et al.* (1994) and Nielsen (1995) examined mtDNA variation in 14 samples of chinook salmon from Central Valley rivers and hatcheries and 1 sample from the Guadalupe River, a southern tributary of San Francisco Bay. Nielsen *et al.* (1999) concluded that their data support their earlier conclusions (Nielsen *et al.*, 1994) that fall, late-fall, spring, and winter runs of Central Valley chinook salmon show consistently significant differences for the mtDNA locus, indicating infrequent straying and limited gene flow among the temporal spawning runs. Nielsen *et al.* (1999) concluded that additional sampling is needed to test for significant genetic differences among natural spawning and hatchery populations of fall-run chinook salmon. A sample of chinook salmon from Guadalupe River showed significant haplotype frequency differences from samples of the four spawning runs in the Central Valley, primarily due to a haplotype (CH9) found in 2 fish in the Guadalupe River. This haplotype has not been observed in fish from the Central Valley but has been found in samples of Russian River chinook salmon. The remaining 27 samples from the Guadalupe River could not be differentiated from the chinook salmon in the Merced and Feather River hatcheries through the use of mtDNA.

Kim *et al.* (1999) examined genetic variation in winter-, spring-, fall-, and late fall-run adult chinook salmon taken from the upper Sacramento River between 1991 and 1995. An analysis of population structure indicated that winter-run chinook salmon were the most genetically distinct, while fall- and late fall-run samples were closely related to each other. Spring-run samples were genetically intermediate between the winter and fall/late- fall runs. A sample of Butte Creek spring-run chinook salmon was genetically similar to Sacramento River mainstem spring-run samples.

NMFS also re-examined ecological and life history information for this ESU. The San Joaquin River Basin includes the Mokelumne, Consumnes, Calaveras, Stanislaus, Tuolumne, and Merced Rivers. Historically, salmon also utilized the Kings River during years of high precipitation (Yoshiyama *et al.*, 1996). Ecologically, the Consumnes and Calaveras are distinct from the other San Joaquin River Basin tributaries in that their flows are influenced by rainfall rather than snow melt. Historically, fall-run chinook salmon were present in all of the basins, and there is some evidence that a late-fall run may have existed in the Mokelumne River (Yoshiyama *et al.*, 1993). Furthermore, Reynolds *et al.* (1993) described a ''winter-run'' population that spawned in the Calaveras River from 1972 to 1984; however, this population appears to have been extirpated, and its relationship with other temporal runs in the Central Valley was never established. Impassible dams and water withdrawals have severely reduced the quantity and quality of salmon habitat. Presently, only 45 percent of the total historical chinook salmon habitat is accessible (not including habitat in the Kings River Basin). Much of the habitat lost would have been utilized by spring-run chinook salmon; however, water conditions in the remaining habitat have degraded. Ecologically, rivers in the San Joaquin (including the Mokelumne River) and American River Basins experience peak flows in May, fed primarily by snow melt from the Sierra Nevada Range. Geologically, the Sierra Nevada Range is very different from the volcanic structure of the Cascades that constitute the headwaters for most rivers in the northern portion of the Central Valley.

There is little historical information concerning the life history characteristics of fall-run chinook salmon in the San Joaquin River Basin. Fall-run chinook salmon in the San Joaquin River Basin enter fresh water in late September or October (depending on water conditions) and spawn in November and December, with some spawning continuing into January. The mean date of entry (for the years 1974 to 1995) into the trap at the Merced River Fish Facility is October 21. In 1939, Hatton (1940) reported that the date of river entry for the fall run varied from early and mid-October for the Tuolumne and Merced Rivers, early November for the Mokelumne River, and early December for the Consumnes River. The majority of juveniles emigrate during their first winter (January to March). The run and spawn timing currently exhibited by fall-run fish in the San Joaquin River Basin may not reflect historical timing due, in part, to changes in river flow and temperature conditions over the last century. However, it is clear that the environmental conditions in the San Joaquin River represent the extreme of chinook salmon temperature tolerance. In the 1870s, salmon were observed migrating through the San Joaquin River in July and August (which were probably the historical spring-run chinook salmon) when water temperatures were in excess of 26 degrees Centigrade (U.S. Fish Commission, 1876). Despite an apparent tolerance to high water temperature conditions, San Joaquin River Basin chinook salmon populations continued to deteriorate until only the late portion of the fall run was able to ascend the tributaries (Clark, 1929).

The age at maturation for fall-run chinook salmon varies considerably from year to year due to differential survival of emigrating juveniles and returning adults related to water conditions. Most notably, a number of female San Joaquin River fall-run chinook salmon mature after only 2 years (Myers *et al*., 1998).

Based on a re-assessment of information relevant to the configuration of this ESU, NMFS maintains that the original description proposed for the Central Valley fall and late fall-run chinook salmon ESU is valid. NMFS believes that the new genetic information on spring-run and winter-run populations in the Central Valley further reinforces the previous decision to establish ESUs for the winter and spring runs distinct from the fall- and late-fall run (Myers *et al*., 1998). NMFS also maintains the agency's previous conclusion that Central Valley fall and late- fall runs are in the same ESU.

NMFS considered the possible existence of a distinct fall/late fall-run ESU in the southern portion of the existing ESU (i.e., San Joaquin River and tributaries). The agency believes that ecological differences in the northern and southern Central Valley were large enough to have historically supported two ESUs of fall- and late fall-run chinook salmon, with fish from the American, Mokelumne, Stanislaus, Tuolumne, Merced, and San Joaquin River Basins in the southern ESU and fish from areas north of the American River in a northern ESU. Allozyme analysis indicated that samples of hatchery and naturally spawning fall-run chinook salmon from the American River and San Joaquin River Basin formed a cluster within the general grouping of Central Valley chinook salmon populations.

The status of chinook salmon spawning in tributaries to San Francisco Bay was also considered. The presence of chinook salmon adults and juveniles (including observed spawning activities) has been recorded in a number of rivers and creeks draining into San Francisco Bay (Leidy, 1984; Myers *et al*., 1998; San Francisco Estuary Project, 1998; Jones, 1999, unpubl. data). However, NMFS was unable to establish if any of these populations were self-sustaining. Although the historical relationship between chinook salmon spawning in San Francisco Bay tributaries and the coastal and Central Valley ESUs is not known, present day adults may have originated from the numerous off-site releases of Central Valley hatchery fall-run chinook salmon into the delta or San Francisco Bay. Additional information on genetic and life history traits for San Francisco Bay chinook salmon and their relationships with Central Valley and coastal chinook salmon populations is necessary to resolve this issue.

Response - ESU Status: NMFS also examined updated risk information for this ESU. Trends in abundance of fall- and late fall-run chinook salmon in this ESU continue to be mixed, but natural spawning abundance is quite high (5-year geometric mean was 190,000 natural spawners for the Sacramento River Basin). The number of mainstem fall-run spawners continues to decline in the upper Sacramento River, as indicated by counts at Red Bluff Diversion Dam (5-year geometric mean abundance through 1996 was 78,996 fish, and mean abundance through 1998 was 26,092 fish). The dam counts represent the total number of fall-run chinook salmon returning to that portion of the river, including hatchery fish. Available evidence suggests that at least 20 to 40 percent of these natural spawners are of hatchery origin (Heberer, 1999). The other Sacramento River Basin streams showing continued declines in abundance of fall-run chinook salmon are Deer and Mill Creeks (short-term trend in abundance through 1998 was –10 percent per year for Mill Creek, long-term trend in abundance through 1998 was –2.8 percent per year for Deer Creek). All other streams for which there are abundance data show increases in abundance over the past 10 years. As discussed in the BRT report (Myers *et al*., 1998), many of the streams with high abundance of fall-run chinook salmon in this ESU are influenced by hatchery programs (especially the Feather and American Rivers and Battle Creek), so the contribution of those populations to the overall persistence of the wild component of the ESU is not clear.

The late-fall component of the Sacramento River run continues to have low, but perhaps stable abundances. Recent estimates up to 1992, when Red Bluff Diversion Dam counts were still accurate, ranged from 6,700 to 9,700. Estimates from 1993 to 1997 were essentially incomplete due to the inability to monitor fish at the Red Bluff Diversion Dam. Beginning in 1998, carcass surveys again allowed a reasonable estimate to be made, and the 1998 abundance estimate (9,717 fish) seems comparable to the early 1990s. Nevertheless, there is considerable uncertainty in estimating the recent trend in abundance due to changes in estimation methods.

Populations of fall-run chinook salmon in the San Joaquin River Basin have exhibited synchronous population booms and busts and currently appear to be on an upward trend in abundance. Aside from a negative short-term trend in abundance in the Stanislaus River (–6.2 percent per year through 1998), the other tributaries to the San Joaquin River are exhibiting increases in abundance over the most recent 10 years. Lindley (NMFS, unpubl. data) developed a series of models relating recruitment of fall chinook in the Tuolomne and Stanislaus Rivers to various factors to see if there was a simple explanation for the high variability in recruitment. Explanatory variables examined included spring river flow, ocean harvest, hatchery releases, sea surface temperature, and spawning stock. The model providing the best fit to empirical data was a logistic growth (stock-recruit) model with the carrying capacity parameter a linear function of river flow during the downstream juvenile migration period (Lindley, NMFS, unpubl. data). The apparent dependency of stock-recruitment relationships on flow does not rule out the potential influences of other factors (e.g., hatchery production) on variability in recruitment (Lindley, NMFS, unpubl. data).

The influence of hatchery fish on natural production in the San Joaquin River Basin is not clear. As in the rest of the Central Valley, the nature of CWT applications and insufficient sampling of natural spawners make quantitative estimation of hatchery influence difficult.

After reviewing additional scientific and commercial information regarding the status of this ESU, NMFS concludes that the Central Valley fall and late fall-run chinook salmon ESU is not presently in danger of extinction, nor is it likely to become so in the foreseeable future. The change in the risk evaluation was due primarily to the increases in abundance in Central Valley streams. The number of natural spawners is quite high (190,000 fish) and numerous streams have seen increases during the past 10 years, with some exceptions. The recent upward trends in fall-run chinook salmon populations in the San Joaquin tributaries are also encouraging, but NMFS is concerned about the high variation in abundance and its strong correspondence with human and naturally impacted flow regimes. The late fall-run chinook salmon escapement appears to be higher than it has been in recent years, but NMFS is concerned about the uncertainty in the escapement estimates.

The major sources of continued threats to the chinook salmon in this ESU are habitat degradation (primarily water withdrawals and stream shifts), water quality, loss of riparian and estuarine habitat, and the influence of hatchery fish. NMFS believes that several recent actions are likely to mitigate the threats facing chinook salmon in the Central Valley fall and late fall-run chinook salmon ESU, including harvest reductions, the listing of winter-run chinook salmon and steelhead under the Federal ESA, the listing of spring-run chinook salmon under the California ESA (CESA), improvements in water flow and habitat conditions resulting from development and implementation of restoration projects as part of the CALFED and Central Valley Project Improvement Act (CVPIA) programs, implementation of the Vernalis Adaptive Management Plan (VAMP) in the San Joaquin River Basin, and the recently initiated comprehensive review of hatchery programs in the Central Valley by CDFG and FWS. NMFS has considered the impacts of various conservation efforts affecting this ESU under the section ''Efforts Being Made to Protect West Coast Chinook Salmon'' of this document.

Issue 7: ESU Delineation and Status of Southern Oregon and California Coastal Chinook Salmon

Comment 9: Many commenters, disputing the proposed boundaries for this ESU, questioned NMFS' rationale for a separate Upper Klamath and Trinity River chinook salmon ESU within the range of the larger Southern Oregon and California Coastal ESU. For example, one commenter disputed the southern border of the ESU and asserted that there is no definitive proof that chinook salmon populations existed in any of the San Francisco Bay tributaries. Furthermore, they stated that native chinook salmon were now extinct in the Russian River and that the ESU's boundary should extend no farther south than to the limit of extant chinook salmon populations. Another commenter believed that the chinook salmon population in the Russian River was never historically abundant. Several commenters suggested that this ESU be divided into two ESUs, but the suggested configurations varied. Some believed that the existing ESU should be split south of the Klamath River while others believed that the split should be north of the Klamath River. Still another believed that the ESU should be split north of the Eel River. Finally, some commenters believed that NMFS should adopt ESU configurations more similar to those for coho salmon or steelhead, both of which have multiple ESUs within the range of the Southern Oregon and California Coastal chinook salmon ESU. Most commenters suggesting alternative ESU configurations believed that chinook salmon in the ''transboundary'' region of Oregon and California would not require protection under the ESA.

Some commenters and peer-reviewers felt that, in a number of cases where spring- and fall-run chinook salmon were included in the same ESU, separate ESUs should have been established. These recommendations were substantiated with information on ecological differences in spring- and fall-run spawning and juvenile rearing habitat. Furthermore, it was argued that separation in spawning time and location provided a significant amount of reproductive isolation, even in those systems where dams had restricted access to historical spring-run spawning habitat. Several of the commenters highlighted these ecological and life history differences in those ESUs where genetic data were limited or lacking. Furthermore, the commenters stated that the lumping of different runs was inconsistent, given the creation of distinct fall- and spring-run ESUs in the Central Valley of California.

Several commenters highlighted the benefits from various restoration programs underway in the range of the proposed ESU (e.g., the NFP and Oregon Coastal Salmon Restoration Initiative), while others expressed little confidence in the adequacy of existing conservation efforts. One commenter described risks to chinook salmon in the Eel River Basin by the introduction of the Sacramento pikeminnow (*Ptychocheilus grandis*) in the late 1970s, noting increases in the number of pikeminnow in the Eel River Basin which corresponded with declines in chinook salmon during the 1980s and 1990s. Another commenter suggested that NMFS had underestimated the impact of predators (such as cormorants) on chinook salmon populations in the range of the proposed ESU.

Since the initial status review, NMFS has received new data and information which have helped resolve the scientific uncertainties associated with the proposed listing for this ESU (NMFS, 1999a), and are summarized as follows.

Response - ESU Delineation: NMFS recently analyzed new genetic data for California chinook salmon. In 1998 and 1999, NMFS, CDFG, FWS, and USFS collected samples of spawned adult chinook salmon from 13 rivers and hatcheries in the Central Valley and Klamath River Basin. The new samples were analyzed along with allozyme data for California and southern Oregon chinook salmon that were previously used in the NMFS coastwide status review (Myers *et al*., 1998). The population structure revealed by the new analysis of allozyme data was consistent with the delineations of major genetic groups described in previous genetic studies of California and southern Oregon chinook salmon (Utter *et al*., 1989; Bartley *et al*., 1992; Myers *et al*., 1998). The most genetically divergent group of samples was from the Central Valley. The remaining samples formed two large genetic groups composed of samples from the Klamath River Basin and those from coastal rivers. The single sample from the lower Klamath River, Blue Creek, was included in the cluster of coastal samples. The samples from coastal rivers were further differentiated into two subclusters of samples from rivers south of the Klamath River and from those to the north (including Blue Creek).

Several subclusters appeared within the samples of chinook salmon from the Klamath River Basin. The sample from Blue Creek in the lower Klamath River was the most genetically distinct of all the samples from the Klamath River Basin. Samples from the Trinity and Salmon Rivers (both fall- and spring-run populations) clustered separately from samples from rivers farther upstream.

Nielsen *et al*. (1994) reported that mtDNA haplotypes from some of the fall-run chinook salmon smolts captured in 1993 and 1994 from the Russian River did not match haplotypes from the Russian River hatchery (Warm Springs Hatchery) population; in fact, there was a rare haplotype that was found only in chinook salmon from the Russian and Guadalupe (San Francisco Bay) Rivers. In 1999, several naturally produced chinook salmon juveniles were collected in the Russian River Basin by the Sonoma County Water Agency, and a subset of these were genetically analyzed by the Bodega Bay Marine Laboratory (Banks, 1999, unpubl. data).

Banks *et al*. (1999) used five microsatellite loci to investigate genetic relationships among 11 fall- and spring-run chinook salmon populations in the Klamath River and to compare these populations to chinook salmon from the Central Valley. Results revealed two large clusters with Klamath River Basin populations differentiated from Central Valley populations. Within the Klamath River Basin, Blue Creek from the lower Klamath River was the most genetically divergent population and was found to be more similar to southern Oregon and California coastal chinook populations than to upper Klamath/Trinity River populations. The most upstream populations from the Klamath River (Scott River, Shasta River, and Iron Gate Hatchery) were differentiated from subclusters of fall- and spring-run populations in the Trinity and Salmon Rivers.

Little new information on life history traits is available for this ESU. Comparisons of the timing of adult chinook salmon passage over dams on the Mad River (Sweasey Dam) and South Fork Eel River (Benbow Dam) in 1948 to 1949 (Murphy and Shapovalov, 1950) does not reveal a shift in run timing when compared with recent information presented in Myers *et al.* (1998), indicating that introductions of out-of-basin stocks have had little observable impact. A review of ocean distribution information collected from 1986 to 1989 (Gall *et al.*, 1989) suggests that there may be geographic and timing differences in the ocean distribution of chinook salmon from the Smith River and southern Oregon relative to Eel River and other coastal stocks.

There was little information available on the southern limit of self-sustaining chinook populations in this ESU. Cobb (1930) discussed the existence of fall-run populations in the Noyo and Mattole Rivers; furthermore, the Noyo River fall-run population was large enough to sustain a small fishery early in this century. Clark (1940) estimated that the salmon catch in the Eel River during 1916 was nearly 450,000 kg, and 32,000 kg in the Mad River during 1918. Snyder (1908) described the presence of chinook salmon in the Russian River; however, Shapavalov (1944) made no mention of the presence of chinook salmon in the Russian River. In October of 1972, a number of salmon (no identification of the species was possible) were observed spawning in the Russian River below Dry Creek (Holman, 1972).

Within San Francisco Bay there are a number of streams where chinook salmon have been observed (Jones, 1999). Spawning chinook salmon or redds have been observed in the Guadalupe River, Napa River, Petaluma River, Walnut Creek, and Green Valley Creek (Jones, 1999). There is very little information on the origin or sustainability of chinook salmon ‘‘populations’’ in these systems. South of San Francisco Bay, chinook salmon have historically been documented in the San Lorenzo and Pajaro Rivers (Snyder, 1913) and in the Ventura River (Jordan and Gilbert, 1881). However, it is unclear if coastal populations south of the Russian River were historically persistent or if they were merely colonized by more northerly populations on an intermittent basis during favorable climatic periods (Myers *et al.*, 1998). Recently, adult chinook salmon have also been observed in Scott Creek, but in low numbers and only on an intermittent basis (Streig, Monterey Bay Salmon & Trout Project, pers. comm.). Currently, there are no known persistent populations of chinook salmon on the coast south of San Francisco Bay.

Based on a re-assessment of information relevant to the configuration of this ESU, NMFS concludes that the proposed Southern Oregon and California Coastal chinook salmon ESU should be split into two ESUs: a Southern Oregon and Northern California Coastal chinook salmon ESU, extending from Euchre Creek through the Lower Klamath River (inclusive), and a California Coastal chinook salmon ESU, extending from Redwood Creek south through the Russian River (inclusive). This new ESU boundary is similar to that designated between Klamath Mountains Province and Northern California steelhead ESUs. At this time, NMFS concludes that the Russian River Basin presently contains the most southern persistent population of chinook salmon on the California coast.

NMFS reconsidered the reconfiguration of this proposed ESU based on a number of issues. The acquisition of new genetic samples from the Central Valley, California coastal streams, and Upper Klamath and Trinity Rivers made possible a new analysis indicating distinct clusters of coastal populations north and south of the Klamath River. The genetic distances between these clusters correspond roughly to the differences observed between Central Valley spring- and fall and late fall-run chinook salmon ESUs, and the Washington and Oregon coast chinook salmon ESUs.

Ecological differences between the northern and southern portions of the Southern Oregon and California Coastal chinook salmon ESU were also discussed. Rivers to the north (especially the Rogue River) tended to be larger than those to the south. River flows in the northern portion tend to peak in January, while those to the south peak in February (Myers *et al.*, 1998). Annual precipitation is considerably higher in the northern portion than in the south. These geographic and ecological differences may be responsible for the presence of a limited proportion of yearling outmigrants (less than 10 percent) in the northern portion of the ESU compared with the apparent absence of yearling outmigrants in the southern portion. Furthermore, soils in the southern portion are highly erodible, causing high silt loads that result in berms which close off the mouths of many of the rivers during summer low flows. River conditions in most of these coastal basins, especially in the south, have very limited temporal windows for adult access and juvenile emigration. Given these conditions, it is unlikely that substantial differences in the life history traits normally measured (e.g., run timing, spawn timing, juvenile emigration) could evolve among most rivers in the northern and southern portions of the proposed ESU. However, NMFS did consider the presence of spring-run chinook salmon in the northern portion of the ESU, Rogue and Smith Rivers, as a further indicator of geographic and life history differences (although there may have historically been a spring run in the Eel River). Finally, there was some ocean harvest information that indicated differences in the migration pattern of populations from the northern (Rogue and Smith Rivers) and southern (Eel River) portions of the proposed ESU (Gall *et al.*, 1989).

Response - ESU Status: New abundance information was provided by several commenters and co-managers for a number of streams in the Southern Oregon and Northern California Coastal chinook salmon ESU (Howard and Albro, 1997; Howard, 1998 and 1999; USFS, 1997 and 1999; Waldvogel, 1997 and 1999; Yurok Tribal Fisheries Program, 1997 and 1999; ODFW, 1999). Recent total estimated escapement of fall- and spring-run chinook salmon in Oregon streams is close to 100,000 fish. The largest run of fall chinook salmon in the ESU occurs in the Rogue River, and ODFW recently has revised its estimates of abundance to average over 51,000 fish in the run during the most recent 5 years. In addition, ODFW estimated that the escapement of fall chinook to the Chetco River in 1995 and 1996 was 8,500 and 3,500 fish, respectively. In spite of the high estimated abundances in the Chetco River, between 31 and 58 percent of those naturally spawning fish were estimated to be of hatchery origin.

Although trends in abundance are mixed over the long term, most short-term trends in abundance of fall chinook salmon are positive in the smaller coastal streams in the ESU. Spawning ground surveys from a number of smaller coastal and tributary streams from Euchre Creek to the Smith River show declines in abundance from the late 1970s through the early 1990s, but recently, the peak counts predominantly show increases. In addition to adult counts, downstream migrant trapping generally shows increases in production in fall chinook juveniles over the last 4 years in the Pistol and Winchuck Rivers and in Lobster Creek, a tributary to the lower Rogue River. Short- and long-term trends in abundance for the Rogue River fall chinook are declining, but as mentioned above, the overall run size is still large.

Northern coastal California streams support small, sporadically monitored populations of fall-run chinook salmon. Trends in fall chinook salmon abundance in those California streams that are monitored are mixed; in general, the trends tend to be more negative in streams that are farther south along the coast (i.e., populations in the Eel, Mattole, and Russian Rivers). Estimates of absolute population abundance are not available for most populations in the California portion of the region encompassing this ESU.

The release of hatchery fall chinook salmon into some southern Oregon coastal streams recently has been reduced or discontinued. Releases of fall chinook salmon into the lower Rogue River were reduced to 75,000 smolts and 75,000 unfed fry, and the Chetco River program recently was reduced to 150,000 smolts. ODFW also has provided NMFS with new estimates of the percentage of hatchery fall chinook salmon spawning naturally in the Chetco River. In 1995 and 1996, the percentage of naturally spawning hatchery fish was 31 and 58 percent, respectively. During those same years, the estimated numbers of naturally spawning adults returning to the Chetco River were 8,530 and 3,561 fall chinook salmon, respectively.

Most spring-run chinook salmon in this ESU continue to be distributed in a few populations that are declining in abundance. The run size of spring-run chinook salmon in the Rogue River above Gold Ray Dam has averaged 7,709 over the last 5 years, and the estimated percentage of hatchery fish in the run has ranged from 25 to 30 percent over that time period. The Smith River contains the only known populations of spring-run chinook salmon on the California coast, and those runs continue to decline in the Middle Fork, but are increasing in the South Fork. ODFW believes that spring-run chinook populations in the Smith River probably have always been small, based on in-river fishery landings, historical cannery records, and the judgement of local biologists.

In the California Coastal chinook salmon ESU, fall chinook salmon occur in relatively low numbers in northern streams and, only sporadically, in streams in the southern portion of the ESU's range. Estimates of absolute population abundance are not available for most populations in this ESU. The 5-year geometric mean abundance of fall chinook passing Cape Horn Dam on the upper Eel River is 36 fish, but those counts are considered to be a small and variable fraction of the run in the Eel River.

Trends in fall chinook salmon abundance in those California streams that are monitored are mixed; in general, the trends tend to be more negative in streams that are farther south along the coast (i.e., populations in the Eel, Mattole, and Russian Rivers). Trends in abundance in several tributaries in the Redwood Creek drainage have been monitored since 1995; these numbers will be useful in assessing the status of chinook salmon in those streams in the future. Trends in abundance in the Mad River Basin have been declining over the long term, but they are showing signs of increase in recent years. Peak index counts and carcass surveys have been conducted since the mid-1960s in Sprowl and Tomki Creeks, both tributaries to the Eel River. The long-term trend in abundance in Sprowl Creek is –4.4 percent per year, but recent years show increases. In contrast, both the long- and short-term trends in abundance in Tomki Creek are severely declining. Shorter-term monitoring has occurred in other Eel River tributaries since the late 1980s; abundance in Hollow Tree and Redwood Creeks has been declining precipitously. Recent monitoring of index areas in the Mattole and Russian River Basins indicates declining trends in abundance, with the exception of the increasing abundance at the Coyote Valley Fish Facility on the Russian River from 1992 to 1998. Hatchery chinook salmon occur in the Russian and North Fork Mad Rivers, but the contribution of hatchery fish to natural spawning escapements is not known.

After reviewing additional scientific and commercial information regarding the status of these revised ESUs, NMFS concludes that the revised California Coastal chinook salmon ESU is likely to become endangered in the foreseeable future. Most of NMFS' concerns regarding the status of this ESU are related to abundance and trends/productivity risks. NMFS believes that widespread declines in abundance of chinook salmon relative to historical levels and the present distribution of small populations with sometimes sporadic occurrences contribute to the risks faced by this ESU. Overall, NMFS is concerned about the paucity of information on the presence or abundance of chinook salmon in the geographic area encompassing this ESU. The abundance data series are short-term for most of the streams in this ESU, and there are no current data for the long time series at Benbow Dam for the population that may have been historically the largest (South Fork Eel River).

NMFS believes that habitat degradation and water withdrawals in the river drainages in coastal California have contributed to the continued reduction in abundance and distribution of chinook salmon in this ESU. Smaller coastal drainages, such as the Noyo, Navarro, Garcia, and Gualala Rivers, likely supported chinook salmon runs historically, but they contain few or no fish today. The Russian River probably contains some natural production, but the origin of those fish is not clear because of a number of non-native introductions of hatchery fish over the last century. NMFS is concerned about the possible extinction of the spring run in the upper Eel River, which represents an important loss of life history diversity in this ESU.

NMFS believes that the following factors are likely to have improved the conditions for chinook salmon in the California Coastal chinook salmon ESU: Reductions in the Klamath Management Zone (KMZ) and Central Valley harvest index, the listing of coho salmon and steelhead under the Federal ESA, changes in harvest regulations by the States of Oregon and California to protect coho salmon and steelhead, improvements in stream water quality due to enhanced enforcement of Clean Water Act standards, and changes in timber and land-use practices resulting from completed Habitat Conservation Plans (HCPs).

In contrast, NMFS concludes that chinook salmon in the revised Southern Oregon and Northern California Coastal chinook salmon ESU are not presently in danger of extinction, nor are they likely to become so in the foreseeable future. NMFS is encouraged by the overall numbers of chinook salmon in this ESU and by the recent increases in abundance in many of the smaller coastal streams. In addition to the large runs returning to the Rogue River, chinook salmon appear to be well distributed in a number of coastal streams throughout the geographic region encompassing this ESU. Although many of the new data sets received by NMFS are of short duration, NMFS is encouraged by recent efforts by the co-managers to improve monitoring of chinook salmon in this region. Risks associated with the presence of hatchery fish in this ESU are relatively low; nevertheless, NMFS is concerned about the high percentages of naturally spawning hatchery fish in the Chetco River and in the spring-run chinook salmon population in the Rogue River. In addition, the restricted distribution of spring-run chinook salmon to the Rogue and Smith River Basins and their significant decline in the Rogue River could represent an important threat to the total diversity of fish in this ESU.

NMFS believes several factors are likely to have improved the conditions for chinook salmon in the Southern Oregon and Northern California Coastal chinook salmon ESU, including reductions in the KMZ troll fishery, the ESA listing of coho salmon, changes in harvest regulations by the States of Oregon and California to protect naturally produced coho salmon and steelhead, and changes in timber and land-use practices on Federal public lands resulting from the NFP. NMFS has considered the impacts of various conservation efforts affecting this ESU under the section ''Efforts Being Made to Protect West Coast Chinook Salmon'' of this document.

Issue 8: ESU Delineation and Status of Snake River Fall Chinook Salmon

Comment 10: Several commenters, including state and tribal co-managers, disagreed with the inclusion of the Deschutes River fall-run chinook salmon in this ESU. They argued that the Deschutes River and Snake River Basins are ecologically distinct. Furthermore, the geographic distance between these basins would preclude any significant genetic exchange, especially if one considers the historical spawning distribution of Snake River chinook salmon. There were a number of scenarios given to explain the genetic similarity between the Deschutes River and Snake River fall-run populations. One scenario suggested that, with the loss of the majority of their historical spawning habitat, the existing Snake River fall-run chinook salmon ESU no longer represented the historical population. An alternative view was that the genetic differences among all ocean-type chinook salmon above the Dalles Dam were relatively small and that the clustering of populations was subject to possible bias depending on the procedures used. It was also stressed that the existing allozyme information was acquired after the Columbia River Basin had undergone considerable alterations (mainstem dam construction) and many of the native populations had been extirpated. It was also suggested that the marine CWT recovery information for the Deschutes River fall run was potentially biased due to the limited number of tags recovered and the limited number of broodyears that were tagged. Two commenters asserted that an ocean-type summer run existed (and may still exist) in the Deschutes River, and this would evolutionarily link the Deschutes River ocean-type fish more closely with ocean-type fish in the Upper Columbia River summer- and fall-run chinook salmon ESU. Some reviewers suggested that all ocean-type chinook salmon above the historical location of Celilo Falls should be considered one ESU. The most commonly suggested alternative ESU configuration included the Deschutes River and the now extinct populations that were in the John Day, Umatilla, and Walla Walla Rivers as a separate ESU.

Several other commenters challenged the NMFS exclusion of hatchery fish abundances from the risk assessment. They argued that, in many instances, hatchery and naturally spawning fish have co-mingled for generations. These fish are genetically indistinguishable and effectively represent one population. In many cases, the persistence of naturally spawning fish has been dependent on the continued operation of the hatchery program. Under these conditions, they contend, hatchery abundances should be included in the risk assessment for an ESU.

Since the initial status review, NMFS has received new data and information which have helped resolve the scientific uncertainties associated with the proposed listing for this ESU (NMFS, 1999a), and are summarized as follows.

Response - ESU Delineation: The Confederated tribes of the Warm Springs Reservation (CTWSRO) provided NMFS with a preliminary report of genetic studies of fall-run chinook salmon in the Deschutes River (CTWSRO, 1999). Both allozyme and mtDNA loci were used to determine if the Deschutes fall chinook population is more genetically and demographically related to the Snake River fall chinook populations than to any other population in the Columbia Basin. The authors concluded from the mtDNA and allozyme data that there is little or no geographic organization of the fall-run genetic data and no compelling evidence to support adding the Deschutes River to the Snake River fall-run chinook salmon ESU.

The similarity in life history traits between the Deschutes and Snake River fall-run populations was an important factor in the proposed ESU designation incorporating these two geographically separated basins into one ESU. Since the time of the proposed rule, NMFS has reviewed additional information on ecological and life history traits for this ESU and a CTWSRO analysis of information previously reviewed by the BRT (CTWSRO, 1999). Similarities in ocean distribution, as reflected by CWT recoveries, were observed for wild Deschutes River fall-run and Snake River fall-run chinook salmon. Analysis by CTWSRO (1999) indicates that there was a strong correlation (0.95) in the ocean distributions of Deschutes River and Snake River fish; however, there were equally strong similarities between Deschutes River fish and fall-run fish from a number of lower Columbia River basins. The correlation between the distribution of ocean recoveries for the Deschutes River fall-run and that for upriver ''bright'' fall-run chinook salmon (i.e. Hanford Reach, Priest Rapids) was much weaker (0.61). Because only 35,000 Deschutes River fall-run fish were tagged during each of 3 broodyears (1977 to 1979), and of these only 79 tags were recovered in the ocean fishery, CTWSRO (Patt, 1999) cautioned the use of this information to establish the ESU configuration.

Age structure information was also used in the initial NMFS decision to group fall-run chinook salmon in the same ESU. In the Coastwide Status Review (Myers *et al.*, 1998) similarities were observed between the Deschutes River and Snake River fall-run populations, relative to Hanford Reach and other upper Columbia River fall-run populations. Age structure for the Deschutes River, Snake River (using Lyons Ferry return data), and Hanford Reach fall-run fish was determined using scale data from several broodyears in the late 1970s and 1980s. CTWSRO (Patt, 1999) also presented run reconstructions provided by Howard Schaller (ODFW). For the Deschutes and Hanford Reach data series, this information, based on scales recovered from returning adults, age-length indices, and CWT recoveries, represented a more complete description of the populations concerned than was presented in Myers *et al.* (1998). However, the Snake River age structure data were not based on the direct measurement of Snake River fish, but rather derived from an index of upriver bright stocks. It was advised that considerable caution be used in employing the Snake River age structure data in any comparisons (Schaller, ODFW, pers. comm.).

Spawn timing differences presented by CTWSRO (1999) indicated that Deschutes River fish spawn primarily in October (in contrast to the November peak spawning cited in Myers *et al.*, 1998), rather than in early and mid-November for fall-run chinook salmon in the Snake River and Hanford Reach of the Columbia River (Myers *et al.*, 1998). This earlier timing may be related to water conditions in the Deschutes River or may be an indicator of the integration of a historical summer run into the fall run. A review of historical information indicated that fall-run chinook in the Snake River near Salmon Falls (Rkm 922) arrived on the spawning grounds in late August and September and that ripe fish were caught in the fishery in early October (Evermann, 1896). Spawning was nearly complete by the end of October. Differences in the spawning time of present day and historical Snake River fall-run chinook salmon populations may be a response to different temperature and flow regimes in the lower river (the current accessible habitat) or may indicate the extirpation of the earlier, upriver, spawning populations from the ESU.

Fecundity estimates provided an additional life history trait for comparison. Myers *et al.* (1998) cited average fecundity values for Deschutes River fall-run chinook salmon of 4,439 eggs per female, and for Lyons Ferry Hatchery fish (Snake River) 3,102 eggs per female (adjusted to 4,011 eggs per female at a standard length of 740 mm). Fecundity estimates (Howell *et al.*, 1985) for wild Snake River fall-run chinook salmon (trapped at Oxbow Dam) of 4,276 (1961 to 1969) and 4,185 eggs per female (1977 to 1983) were similar to Deschutes River fish, but do not include spawner sizes and are difficult to compare.

Meristic data were also reviewed to assess the similarities of the fall-run stocks under consideration. Of the traits analyzed by Schreck *et al.* (1986), only lateral line scale counts were potentially useful in discriminating among the Deschutes, Snake, and mainstem Columbia River (Hanford Reach) populations. Deschutes River fall-run chinook salmon exhibited a lower mean lateral scale count (136.6) compared with the fall-run fish from Hanford Reach (140.6) and the Snake River (Lyons Ferry Hatchery) (143.3). The Deschutes River lateral line scale counts most closely resembled those from several fall-run populations in the Lower Columbia River (below the location of Celilo Falls); however, these differences may not be statistically significant.

Little documentation is available on the existence of a summer run in the Deschutes River Basin. This issue is relevant to the discussion on ESU configuration due to the ocean-type life history expressed by summer-run fish in the Upper Columbia River and the stream-type life history expressed by summer-run fish in the Snake River Basin. If, as has been asserted by Patt (1999), the summer run in the Deschutes River Basin exhibited an ocean-type life history, it would provide an evolutionary link with the upper Columbia River ocean-type stocks. Information presented by CTWSRO (1999) indicates that there was a significant temporal separation in the arrival of spring-run and summer/fall-run adults at the Pelton Dam Trap (River kilometer (Rkm) 161). Jonasson and Lindsay (1988), Beaty (1996), and Lichatowich (1998) have suggested that summer-run fish existed in the Deschutes River. Whether these summer-run fish historically spawned above the present site of Pelton Dam or above Sherars Falls, which reportedly was impassable during low summer flows early in this century, is not known although both scenarios would have provided for the geographic separation of summer and fall runs. In the 1960s, three returning adults that were tagged while passing Bonneville Dam during July were later recovered in the Metolius River, tributary to the Deschutes River at Rkm 178 (Galbreath, 1966). However, Nehlsen (1995) cited several personal communications which indicate that fall spawning fish were not observed in the Deschutes River Basin above the site of Pelton Dam. Analysis of downstream juvenile migrants (1959 to 1962) through the Pelton project did not detect any subyearling migrants (which would be consistent with the presence of ocean-type fish). Analysis of mtDNA variability from fish sampled at Sherars Falls and the Pelton Dam Trap suggests that genetic differences exist among adults collected at the two sampling locations (CTWSRO, 1999). It has been suggested that the genetic differences are indicative of a vestigial run of summer-run fish that have retained the propensity to migrate farther upstream than do fall-run fish. However, Jonasson and Lindsey (1988) state that there is no correlation between the date of ascending Sherars Falls and the date or location of subsequent spawning. Furthermore, analysis of scales from adults sampled at Sherars Falls in 1978 indicated that stream-type fish constituted 31.2, 25, 4.4, and 2.2 percent of the run passing the Falls in July, August, September, and October, respectively (Aho *et al.*, 1979). During 1979, the percentage of stream-type fish sampled at Pelton Trap during this same period dropped to 14 and 5.5 percent for July and August, respectively. The possibility exists that many of the fish sampled in the mtDNA study (especially at the Pelton Trap) were stream-type fish; further analysis of allozyme variation may resolve this issue.

Ecological differences among the Deschutes River Basin, the upper Columbia River Basin, and the Snake River Basin (especially historical fall-run spawning areas in the upper mainstem Snake River) were reviewed previously (Waples *et al.*, 1991; Myers *et al.*, 1998). Although the mainstem Columbia River and the lower reaches of its tributaries (including the Snake River) are all in the Columbia River Basin Ecoregion (Omernick and Gallant, 1986), the upper Snake River (above the Hells Canyon Dam complex) flows through three different ecoregions. Irving and Bjornn (1981) indicated that prior to 1958 the major spawning area for Snake River fall-run chinook salmon was in a 30–mile section between Swan Falls Dam and Marsing, Idaho, and historically, fall-run chinook salmon spawning extended as far upstream as Shoshone Falls (Howell *et al.*, 1985). Historically, most of the fall-run chinook spawning would have taken place in the Snake River Basin/High Desert Ecoregion.

Fall-run chinook salmon populations in the John Day, Umatilla, and Walla Walla Rivers were thought to have been extirpated (Kostow, 1995). However, there have been recent reports of chinook salmon spawning in the lower mainstem John Day River, but there is no information to establish the source of these fish or whether they were reproductively successful.

Based on its re-assessment of information relevant to the configuration of this ESU, NMFS believes that the proposed ESU configuration, combining ocean-type fish in the Snake and Deschutes River Basins into one ESU, was not supported by the information available. The agency concludes that the Deschutes River summer- and fall-run fish should be considered in a separate ESU, rather than be grouped with either the Snake River fall-run or Upper Columbia River summer- and fall-run chinook salmon ESUs. There is considerable uncertainty on the historical configuration of this new ESU, specifically whether it included fall-run populations in the John Day, Umatilla, and Walla Walla Rivers.

In reaching this conclusion, NMFS considered several scenarios for the configuration of the Snake River fall-run chinook salmon ESU and the potential reconfiguration of the Upper Columbia River summer- and fall-run chinook salmon ESU. NMFS identified four potential configurations: (1) The grouping of all ocean-type chinook salmon above the historical site of Celilo Falls into one ESU, (2) the configuration in the proposed rule, with Deschutes River summer- and fall-run chinook salmon being grouped with the existing Snake River fall-run chinook salmon ESU and a separate Upper Columbia River summer- and fall-run chinook salmon ESU, (3) the grouping of Deschutes River summer- and fall-run chinook salmon with other ocean-type mainstem and tributary spawners in the Upper Columbia River summer- and fall-run chinook salmon ESU and a separate Snake River fall-run chinook salmon ESU, and (4) the creation of a new Deschutes River chinook salmon ESU, which may or may not have included the extirpated populations that existed in the John Day, Umatilla, and Walla Walla Rivers, along with the existing Snake River fall-run and Upper Columbia River summer- and fall-run chinook salmon ESUs.

There is considerable uncertainty regarding the importance of ecological and geographic factors in providing the basis for reproductive isolation and local adaptation. For example, because the mainstem Columbia River (above Celilo Falls) and the lower reaches of its tributaries are all in the Columbia River Basin Ecoregion, there is an ecological link for the majority of the existing spawning populations of ocean-type fish. Historically, mainstem and tributary spawners may have formed a continuum of populations throughout the upper Columbia River and, to a lesser extent, the Snake River. Furthermore, genetic and life history differences are modest (or the interpretations of the existing data are ambiguous) among ocean-type chinook salmon populations above Celilo Falls, suggesting that perhaps all of the populations are part of a single ESU. Another viewpoint is that the three lines of evidence (genetics, ecology, life history) used in the 1991 status review (Waples *et al*., 1991) to determine that Snake and Upper Columbia fall chinook salmon are in separate ESUs are still valid. In addition, the historical spawning distribution of most of the Snake River fall-run populations was well separated from Columbia River fall-run chinook salmon (Irving and Bjornn, 1981). NMFS considered all of these factors and believes that none of the new information gives sufficient cause to group all upriver bright fall-run chinook salmon into one ESU.

NMFS reviewed the evidence for including Deschutes River fall-run chinook salmon in the Snake River fall-run chinook salmon ESU. Data provided by co-managers on genetics and ocean recoveries of CWTs were important elements of this review. NMFS is uncertain of the assertion made by CTWSRO (1999) that genetic samples from the Grande Ronde and Clearwater Rivers were representative of Snake River populations. Spawning surveys indicated that prior to 1990, redd counts in the Grande Ronde River were at or near zero, with counts in the Clearwater River numbering in the low tens of redds (Irving and Bjornn, 1981; Howell *et al*., 1985; Garcia *et al*., 1999). Recent increases in redd counts in the Snake River Basin, above Lower Granite Dam, have coincided with a large influx of non-Snake River fish (Production Advisory Committee, 1998). NMFS believes that the weight of the genetic evidence, from a number of different sources, indicates a closer relationship of Deschutes River fish with Snake River fish than with Columbia River fish. Data from CWT studies also show Deschutes River fall-run chinook salmon have an ocean distribution and age at capture more similar to Snake River (both Lyons Ferry Hatchery fish and wild Snake River fish) than to Columbia River upriver bright fall-run populations. Additionally, if (as has been suggested by ODFW) the Deschutes River fall-run population was part of a larger historical ESU that included the John Day, Umatilla, and Walla Walla Rivers, these intermediate populations could have provided a link between the Deschutes and Snake River Basins. However, the ecological distinctiveness of the historical Snake River, Umatilla and Walla Walla Rivers, and Deschutes River spawning habitats argues against their being included in the same ESU; for example, the Deschutes River is a spring-fed stream with relatively stable water temperature, which is very different from the mainstem Snake River.

NMFS' re-consideration on the grouping of Deschutes River and Upper Columbia River summer- and fall-run populations focused on the historical distribution of mainstem spawners in the Columbia River, which extended more or less continuously from Celilo Falls to Kettle Falls, thus providing a link between different tributary populations, including the Deschutes River. In contrast, the center of fall-run spawning activity in the Snake River Basin was far removed from the confluence of the Snake and Columbia Rivers. Environmental features of the Deschutes and upper Columbia Rivers are more similar over this entire area than either is to the upper Snake River Basin. Tributary spawners in the Yakima, Wenatchee, and Okanogan Rivers are already included in the Upper Columbia River summer- and fall-run chinook salmon ESU, so it is possible to include Deschutes River ocean-type chinook salmon with the other upper river tributaries as well. NMFS also considered the possible ocean-type life history of the Deschutes River summer run. If that is the case, then the relationship between summer- and fall-run fish in the Deschutes River would resemble the Upper Columbia River, where summer- and fall-run fish are in the same ESU, rather than that in the Snake River, where the summer- and fall-run fish are from different evolutionary lineages.

After weighing the best available information, NMFS reaffirms the conclusion of previous status reviews that found that Snake River and Upper Columbia River ocean-type fish are in separate ESUs. There is remaining uncertainty about the ESU affinities of the Deschutes River population. The scenario with the Deschutes River population in a separate ESU from the Snake River fall-run and Upper Columbia River summer- and fall-run chinook salmon ESUs is probably the most compelling, but arguments can also be made for including the Deschutes River in the Upper Columbia or Snake River chinook salmon ESUs. One of the factors that influenced NMFS to identify three separate ESUs was the lack of conclusive evidence for including the Deschutes River in either of the existing ESUs.

Under the assumption that the Deschutes River population is in a separate ESU from Upper Columbia or Snake River fish, NMFS was unable to resolve the historical extent of that ESU. The major uncertainty centers on the ESU status of historical populations from the John Day, Umatilla, and Walla Walla Rivers, which have been extirpated. The lack of biological information for these historical populations makes a determination of their ESU status difficult. The Deschutes River is distinctive enough ecologically to have supported its own ESU; however, it is reasonable to believe that the historical ESU also included ocean-type populations in tributaries at least as far upstream as the confluence with the Snake River. NMFS believes it is highly likely that all mainstem Columbia River spawners above Celilo Falls historically were part of what is now termed the Upper Columbia River summer- and fall-run chinook salmon ESU. The agency also believes that all ocean-type chinook salmon in the Deschutes River (in particular, any vestigial summer-run fish that may exist) are part of the same ESU as the Deschutes River fall-run population.

Response - ESU Status: As discussed previously, NMFS concludes that the Snake River fall-run chinook salmon ESU should remain unchanged, but is unable to conclude with certainty the ESU affinity of the Deschutes River population. Updated information on the abundance of fall-run chinook salmon in the Deschutes River indicates that the run continues to increase in number—the most recently estimated 5-year geometric mean abundance is over 16,000 fish, and the short-term trend in abundance has been increasing by 18 percent per year (Pacific States Marine Fisheries Commission, 1999). However, there is considerable uncertainty associated with the run-size estimates of chinook salmon in the Deschutes River (Beaty, 1996). The population estimate is based on aerial redd surveys above and below Sherars Falls and on a mark-recapture survey for fish passing above Sherars Falls. The expansion estimate is based on an estimate of the number of adults per redd for the entire river, calculated using the mark-recapture data for fish above the falls. Since the late 1970s, the distribution of spawners has shifted from the bulk of the spawning occurring from above to below Sherars Falls. The total number of redds below the falls has not significantly declined since 1972, but the redd counts above the falls have declined dramatically over that time period (Beaty, 1996). The shift in relative abundance of spawning adults above and below Sherars Falls has resulted in an expansion estimate based on mark-recapture studies on an increasingly small proportion of the total population in the river. The errors in run-size estimation for the Deschutes River have become so high that the overall estimate of run size is not reliable. Because of the problems associated with the run-size estimates, NMFS considered the trends in redd counts to be a relatively more reliable indicator of the status of the Deschutes River chinook salmon population. Nevertheless, there is reportedly high inter-annual variation in the quality of redd counts due to visibility problems during aerial surveys (Beaty, 1996), so even the redd count data are not completely reliable.

Counts of chinook salmon at Pelton trap on the Deschutes River have declined since the late 1950s. The 5-year geometric mean abundance of fish at the trap is 81, and the short term trend in abundance is declining by over 6 percent per year. These fish may be representative of a remnant summer run of chinook salmon (CTWSRO, 1999). The percentage of hatchery chinook salmon in the Deschutes River continues to be very low, as reported in more detail in the historical information obtained at the time of the original NMFS status review (Myers *et al.*, 1998).

The estimated abundance of fall-run chinook salmon in the Snake River has been increasing over the most recent 10 years (5-year geometric mean abundance was 565 naturally produced fish, increasing by 13.7 percent per year.) Redd counts from streams in the Snake River Basin starting in the mid 1980s to 1990s show mostly increasing trends in abundance, although the estimated population sizes continue to be very small.

NMFS believes that the new information does not substantially change the risk assessments for the Snake River and Upper Columbia River chinook salmon ESUs, and the status of these ESUs was not reconsidered. Evaluation of the status of the ESU that includes the Deschutes River is difficult because the historical and current extent of the ESU is not well characterized. For this reason, NMFS did not attempt a formal extinction risk analysis for this ESU. However, the agency did review abundance, trend, and other information for the Deschutes River population and concludes that ocean-type chinook salmon in the Deschutes River do not appear to be in danger of extinction, nor are they likely to become so in the foreseeable future.

NMFS remains concerned about the uncertainty in the abundance estimates for fall- and summer-run chinook salmon in the Deschutes River. Uncertainty about the true population status centers primarily around different indicators of status emerging from the analysis of redd counts (declining sharply in the upper basin; stable in the lower basin) and run size estimates based on expansion of mark-recapture studies (which indicate a relatively large and increasing population). The only conclusion NMFS can make from the data is that the numbers of chinook salmon above Sherars Falls have been severely declining since the mid-1970s, while the population below the falls appears to be stable. The shift in the proportion of the total Deschutes River fall-run chinook salmon run spawning above and below Sherars Falls has resulted in unreliable expansion estimates for escapement both above and below the falls. In addition, the change in the estimated ratio of the number of adults per redd over time represents a significant problem for interpreting the expansion procedure used to generate the abundance estimates. NMFS is hopeful that recent efforts by the CTWSRO and ODFW to conduct more extensive mark-recapture studies in the lower river will improve escapement estimates.

NMFS also was concerned about the severe decline and possible extinction of the summer-run chinook salmon in the Deschutes River. The significant reduction in this life history form would represent an important loss to the historical diversity in this ESU. The uncertainty associated with the geographic boundaries containing the historical ESU added to the overall uncertainty in the risk evaluation. The historical run sizes of fall-run chinook salmon in the Umatilla, John Day, and Walla Walla Rivers are not well known, and the numbers of fall-run chinook salmon present today are very low and do not represent naturally self-sustaining runs. If fall-run chinook salmon that historically occurred in those streams are considered to be part of the Deschutes River chinook salmon ESU, a higher extinction risk may be appropriate for the current ESU because extinction of the ESU would have occurred over a significant portion of its range.

Summary of Factors Affecting Chinook 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 spawned chinook salmon throughout its range are numerous and varied. The present depressed condition is the result of several long-standing, human-induced factors (e.g., habitat degradation, water diversions, harvest, 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 chinook salmon. A summary of various risk factors and their roles in the decline of west coast chinook salmon was presented in NMFS' March 9, 1998, proposed rule (63 FR 11482), as well as in several ''Factors for Decline'' reports published in conjunction with proposed rules for steelhead and for chinook salmon (NMFS, 1996 and 1998b).

Efforts Being Made to Protect West Coast Chinook Salmon

Under section 4(b)(1)(A) of the ESA, the Secretary is required to make listing determinations solely on the basis of the best scientific and commercial data available and after taking into account efforts being made to protect a species. During the status review for west coast chinook salmon and for other salmonids, NMFS reviewed protective efforts ranging in scope from regional strategies to local watershed initiatives; some of the major efforts are summarized in the March 9, 1998, proposed rule (63 FR 11482). Since then, NMFS has received some new information regarding these and other efforts being made to protect chinook salmon. Notable efforts within the range of the chinook ESUs to be listed continue to be the NFP, PACFISH, Oregon Plan for Salmon and Watersheds (OPSW), CVPIA, CALFED Bay-Delta Program implementation and development, development and implementation of VAMP, Klamath and Trinity Basin restoration programs and flow re-evaluations, CDFG's Salmonid Restoration Program for coastal watersheds, NMFS and state funded multi-county conservation planning efforts in California, and the ongoing ESA section 7 and habitat conservation planning efforts within the range of currently listed species.

In California's Central Valley and coastal watersheds within the range of the chinook ESUs to be listed, several important conservation efforts have recently been implemented or initiated. In the Central Valley, the CALFED Bay-Delta Program and Ecosystem Restoration Plan are continuing to be implemented while a long-term implementation plan continues to be developed. The CALFED program and its implementation through 1997 is described in detail in previous **Federal Register** notices (63 FR 11482, March 9, 1998; 63 FR 13347, March 19, 1998). In 1998, CALFED funded 71 restoration projects totaling $27.5 million throughout the Central Valley dealing with fish passage assessment, fish passage and/or screening projects, floodplain management/habitat restoration, watershed planning, and other activities. In 1999, CALFED funded 13 projects totaling $52.5 million in the Central Valley. Nearly $40 million of these funds were directed at major salmon and steelhead habitat restoration activities on Battle Creek in the upper Sacramento River and fish passage improvements at the Anderson-Cottonwood Irrigation District in the upper Sacramento River. Substantial new funding is anticipated in 2000.

Several important projects have been initiated or implemented in the Central Valley since 1998 as a result of CALFED and/or CVPIA funding. In the Sacramento River Basin, significant efforts are underway to restore habitat in the Battle Creek drainage in the upper Sacramento River. NMFS, FWS, and CDFG have reached agreement with the Pacific Gas and Electric Company to restore access to nearly 42 miles of high quality spawning and rearing habitat. Water acquisitions are ongoing, and most restoration actions should be completed by 2002. This effort in Battle Creek will primarily benefit spring-run chinook salmon. Significant habitat restoration efforts are also underway in Butte, Deer, Mill and Clear Creeks which are tributaries to the upper Sacramento River to remove barriers, improve stream flows, and improve riparian habitat conditions which are expected to benefit both spring and fall chinook salmon. Major new fish screen projects have also recently been initiated or completed. Construction on the Glenn-Colusa Irrigation District fish screen was implemented and is scheduled for completion in late 1999. This is the single largest diversion on the upper Sacramento River (3,000 cfs) and will include a $1.0 million evaluation and monitoring program. New screens have been installed on four additional major diversions in the Sacramento River which total a combined diversion of nearly 2,000 cfs. In the San Joaquin River Basin, important habitat restoration projects have been implemented in the Tuolumne and Stanislaus Rivers to improve instream and riparian habitat and flow conditions. These efforts will benefit San Joaquin fall-run chinook salmon. Additional habitat restoration efforts were funded in the Delta region which should benefit all anadromous salmonids in the Central Valley.

In the San Joaquin Basin, collaboration between water interests and state and Federal resource agencies has also led to the development of a scientifically based adaptive fisheries management effort known as VAMP. The VAMP is intended to (1) improve protection of fall-run chinook salmon smolt passage from the San Joquin River Basin, (2) gather scientific information on the effects of various flows and Delta facilities operations on the survival of salmon smolts through the Delta, and (3) provide environmental benefits in the San Joaquin River tributaries, the lower San Joaquin River, and the Delta. The 12-year plan will be implemented in 1999 through a combination of increasing experimental flow releases from tributary streams in the San Joaquin Basin and through such operational changes as the reduction of exports at the Delta export pumping plants during the peak smolt outmigration period (approximately April 15 to May 15). Additional attraction flows are targeted for adult fall-run chinook upstream passage in October. In coordination with VAMP, the California Department of Water Resources (CDWR) will install and operate a barrier at the head of Old River to improve the survival of juvenile fall chinook emigrating from the lower San Joaquin River. By selecting a combination of flows and export rates, VAMP represents a long-term commitment to evaluate the effects of San Joaquin River flows and Delta export rates on San Joaquin Basin fall-run chinook salmon and to provide improved interim protections.

In June 1998, the State of California listed Sacramento River (Central Valley) spring-run chinook salmon as a threatened species under the CESA based on a status review conducted by CDFG. Since the state listing of Central Valley spring-run chinook, CDFG and NMFS have engaged in a joint ESA/CESA consultation/conference with the CDWR and the U.S. Bureau of Reclamation (BOR) to assess the effects the State Water Project's and the Central Valley Project's operations are having on Sacramento River spring-run chinook salmon. This consultation/conference focuses on a 1-year operation period through the spring of 2000, at which time it is anticipated that a plan for implementation of Stage 1 for the CALFED Bay-Delta Program and a Federal Record of Decision (ROD) will be completed. Pursuant to CDFG's 1994 Fish Screening Policy, all diversions that are located within the essential habitat of a CESA-listed species require screening. Accordingly, many unscreened diversions in the principal spring-run chinook salmon tributaries, particularly Butte Creek, have been identified and assigned a high priority for implementing corrective actions and receiving restoration funding.

NMFS identified state and Federal hatchery practices within the Central Valley as a serious risk factor to fall- and spring-run chinook populations at the time of the listing proposal. In an effort to address these concerns, both the State of California and FWS have recently initiated several actions to address hatchery practice concerns. First, CDFG has obtained funding from CALFED to develop a statistically designed marking/tagging and recovery program for Central Valley hatchery-produced chinook salmon to address questions about the relative contribution of hatchery and natural production in naturally-spawning adult populations, fisheries, and at Central Valley salmon hatcheries, and to develop a methodology for evaluating the desirability of selective fisheries. Second, CDFG, in conjunction with NMFS, has initiated a comprehensive review of anadromous salmonid hatchery practices in California. As part of this effort, CDFG has completed an internal review of its hatchery operating criteria at Iron Gate, Trinity River, Feather River, Nimbus, Mokelumne, and Merced hatcheries and, in some instances, modified operations. A major objective of this joint evaluation is to review these hatchery operating criteria and identify further modifications that are appropriate for natural stock integrity, while maintaining the mitigation and/or supplementation objectives of individual facilities. Finally, FWS, in conjunction with NMFS, has undertaken a reassessment of the mitigation goals and operational criteria for the CNFH, which is the only Federal hatchery in California. This assessment was initiated in early 1999 and may be integrated with the CDFG/ NMFS review of state hatchery practices. In conjunction with its ongoing re-evaluation of CNFH hatchery programs, FWS has substantially reduced its future target for the production and release of fall-run chinook salmon fry in order to reduce the potential impacts on naturally spawning fall-run populations.

In the 1998 fiscal year, CDFG's Salmonid Restoration Program established a Watershed Initiative element aimed at supporting local, community-based watershed planning and landowner-based timber harvest planning for coastal regions of California. That same fiscal year, CDFG funded $2.65 million in projects for the restoration of coastal salmon and anadromous trout habitat through its Salmon and Steelhead Trout Restoration Account. CDFG entered into 102 contracts, through the Fishery Restoration Grants Program, with public agencies, nonprofit groups, recognized Native American Tribes, and individuals to restore habitats lost or degraded as a result of past land use practices. During the 1999 and 2000 fiscal years, CDFG's Fishery Restoration Grants Program has increased funding for this program for coastal restoration project grants to approximately $7 million annually. In addition to funding these restoration programs, CDFG has substantially increased its program staff (36.2 additional personnel-years) to improve anadromous salmonid management efforts in coastal watersheds.

Pursuant to a March 1998 Memorandum of Agreement between NMFS and the State of California, NMFS and the State committed to an expedited review of California's forest practice rules, their implementation, and enforcement. This effort has been ongoing over the past year and has resulted in proposals to improve forestry practices in California. These proposals are currently undergoing further review prior to being submitted to the Board of Forestry for action. The current schedule calls for implementing measures adopted by the Board in January 2000. NMFS believes this effort is critically important for improving habitat conditions in coastal watersheds for anadromous salmonids, including chinook salmon.

An additional Federal effort affecting the Snake River fall-run chinook salmon ESU, the Interior Columbia Basin Ecosystem Management Project (ICBEMP), was not addressed in the proposed rule. ICBEMP addresses Federal lands in this region that are managed under USFS and Bureau of Land Management (BLM) Land and Resource Management Plans or Land Use Plans amended by PACFISH. PACFISH provides objectives, standards, and guidelines that are applied to all Federal land management activities, such as timber harvest, road construction, mining, grazing, and recreation. USFS and BLM implemented PACFISH in 1995 intending to provide interim protection to anadromous fish habitat while a longer term, basin scale aquatic conservation strategy was developed by ICBEMP. It is intended that ICBEMP will have a Final Environmental Impact Statement and ROD by early 2000.

For other ESUs already listed in the Interior Columbia Basin (e.g., Snake River chinook salmon, Snake River steelhead, Upper Columbia River steelhead, and Upper Columbia River spring-run chinook salmon), NMFS' ESA section 7 consultations have required several components that are in addition to the PACFISH strategy (NMFS, 1995; NMFS, 1998c). NMFS, USFS, and BLM intend these additional components to bridge the gap between interim PACFISH direction and the long-term strategy envisioned for ICBEMP. NMFS anticipates that these components will also be carried forward in the ICBEMP direction. These components include, but are not limited to, implementation monitoring and accountability, a system of watersheds that are prioritized for protection and restoration, improved and monitored grazing systems, road system evaluation and planning requirements, mapping and analysis of unroaded areas, multi-year restoration strategies, and batching and analyzing projects at the watershed scale.

In the range of these chinook salmon ESUs, several notable efforts have recently been initiated. Harvest, hatchery, and habitat protections under state control are evolving under OPSW. The OPSW is a long-term effort to protect all at-risk wild salmonids through cooperation between state, local, and Federal agencies, tribal governments, industry, private organizations, and individuals. Parts of the OPSW are already providing benefits including an aggressive program by the Oregon Department of Transportation to inventory, repair, and replace road culverts that block fish from reaching important spawning and rearing areas. The OPSW also encourages efforts to improve conditions for salmon through non-regulatory means, including significant efforts by local watershed councils. An Independent Multi disciplinary Science Team provides scientific oversight to OPSW components and outcomes. A recent Executive Order from Governor Kitzhaber reinforced his expectation that all state agencies will make environmental health improvement and salmon recovery part of their mission.

NMFS and FWS are also engaged in an ongoing effort to assist in the development of multiple species HCPs for state and privately owned lands in Oregon, Washington, and California. While section 7 of the ESA addresses species protection associated with Federal actions and lands, Habitat Conservation Planning under section 10 of the ESA addresses species protection on private (non-Federal) lands. HCPs are particularly important since more than 85 percent of the habitat in the range of the Central Valley spring-run and California Coastal ESUs is in non-Federal ownership. The intent of the HCP process is to ensure that any incidental taking of listed species will not appreciably reduce the likelihood of survival of the species, will reduce conflicts between listed species and economic development activities, and will 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. Implementation of the recently approved Pacific Lumber HCP, which covers 210,000 acres in

California's coastal watersheds, has begun in earnest with review of timber harvest plans and formalization of watershed analysis and monitoring programs. The foundation of this HCP rests on watershed analysis which is used to tailor site-specific prescriptions for salmon conservation on a watershed-specific basis. The initial watershed analysis is proceeding and is expected to establish a framework for similar analyses in the Pacific Lumber HCP and other HCP efforts which are under development in California.

NMFS will continue to evaluate state, tribal, and non-Federal efforts to develop and implement measures to protect and begin the recovery of chinook salmon populations within these ESUs. Because a substantial portion of land in these ESUs is in state or private ownership, conservation measures on these lands will be key to protecting and recovering chinook salmon populations in these ESUs. NMFS recognizes that strong conservation benefits will accrue from specific components of many non-Federal conservation efforts.

While NMFS acknowledges that many of the ongoing protective efforts are likely to promote the conservation of chinook salmon and other salmonids, some are very recent and few address salmon conservation at a scale that is adequate to protect and conserve entire ESUs. NMFS concludes that existing protective efforts are inadequate to preclude a listing for the Central Valley spring-run and California Coastal chinook salmon ESUs. However, NMFS will continue to encourage these and future protective efforts and will work with Federal, state, and tribal fisheries managers to evaluate, promote, and improve efforts to conserve chinook salmon populations.

Determinations

Section 3 of the ESA defines the term ''endangered species'' as any species that is in danger of extinction throughout all or a significant portion of its range. The term ''threatened species'' is defined as any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

After reviewing the best available information, including public and peer review comments, biological data on the species' status, and an assessment of protective efforts directed at the four chinook ESUs proposed for listing, NMFS has concluded that only two ESUs—the Central Valley spring-run ESU and California Coastal ESU—warrant protection under the ESA. NMFS has determined that both ESUs are at risk of becoming endangered in the foreseeable future throughout all or a significant portion of their range. While NMFS has determined that the Central Valley fall and late fall-run ESU does not warrant listing at this time, the agency remains concerned about the status of this ESU and will consider it a candidate species. The agency will reevaluate the status of the Central Valley fall and late fall-run ESU as new information becomes available to determine whether listing may be warranted.

In the listed ESUs, only ''naturally spawned'' populations of chinook salmon are listed. NMFS' intent in listing only these populations is to protect chinook salmon stocks that are indigenous to (i.e., part of) the ESUs. In this listing determination, NMFS has identified various non-indigenous populations that co-occur with fish in the California Coastal ESU. NMFS recognizes the difficulty of differentiating between indigenous and non-indigenous fish, especially when the latter are not readily distinguishable with a mark (e.g., fin clip). Also, matings in the wild of either type would generally result in progeny that would be treated as listed fish (i.e., they would have been naturally spawned in the geographic range of the listed ESUs and have no distinguishing mark). Therefore, to reduce confusion regarding which chinook salmon are considered listed within the ESUs, NMFS will treat all naturally spawned fish as listed for purposes of the ESA. Efforts to determine the conservation status of an ESU would focus on the contribution of indigenous fish to the listed ESU. It should be noted that NMFS will take actions necessary to minimize or prevent non-indigenous chinook salmon from spawning in the wild unless the fish are specifically part of a recovery effort.

NMFS has evaluated the relationship between hatchery and natural populations of chinook salmon in the listed ESUs (NMFS, 1999a). In the Central Valley spring-run ESU, spring-run chinook salmon (and their progeny) from the Feather River Hatchery stock are considered part of the ESU. However, they are not considered to be essential for its recovery and are not listed at this time. In the California Coastal ESU, chinook salmon (and their progeny) from the following hatchery stocks are considered part of the ESU: Redwood Creek, Hollow Tree Creek, Freshwater Creek, Mad River Hatchery, Van Arsdale Station, Yager Creek, and Mattole River fall-run stock. However, they too, are not considered to be essential for the ESU's recovery and are not listed at this time. In addition, NMFS concludes that fall-run chinook salmon from the following stocks are not part of the California Coastal ESU (thus, not listed): Warm Springs Hatchery stock and fall-run fish of Feather River or Nimbus Hatchery origin that are released in this ESU.

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 incorporate into recovery efforts (for example, if the associated natural populations were extinct or at high risk of extinction). Under such circumstances, NMFS would consider taking the administrative action of listing 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 hatchery chinook populations considered to be part of the Central Valley spring-run ESU or California Coastal ESU, NMFS' protective regulations may not apply the take prohibitions to naturally spawned listed fish used as broodstock as part of an overall conservation program. According to the interim policy, the progeny of these hatchery-wild or wild-wild crosses would also be listed. Given the requirement for an acceptable conservation plan as a prerequisite for collecting broodstock, NMFS determines that it is not necessary to consider the progeny of intentional hatchery-wild or wild-wild crosses as listed (except in cases where NMFS has listed the hatchery population as well).

In addition, NMFS believes it may be desirable to incorporate naturally spawned fish into these unlisted hatchery populations to ensure that their genetic and life history characteristics do not diverge significantly from the natural populations. 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.

NMFS is not now issuing protective regulations under section 4(d) of the ESA for these ESUs. NMFS will propose such protective measures it considers necessary for the conservation of chinook salmon ESUs listed as threatened in a forthcoming **Federal Register** document. Even though NMFS is not now issuing protective regulations for these ESUs, Federal agencies possess a duty under section 7 of the ESA to consult with NMFS if any activity they authorize, fund, or carry out may affect listed chinook salmon ESUs. The effective date for this requirement is November 15, 1999.

Prohibitions and Protective Measures

Section 9 of the ESA prohibits certain activities that directly or indirectly affect endangered species. These prohibitions apply to all individuals, organizations, and agencies subject to U.S. jurisdiction. Section 4(d) of the ESA 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 intends to issue protective regulations pursuant to section 4(d) for the Central Valley spring-run and California Coastal ESUs, as well as for other threatened chinook salmon ESUs.

In the case of threatened species, NMFS also has flexibility under section 4(d) of the ESA to tailor the protective regulations based on the adequacy of available conservation measures. Even though existing conservation efforts and plans are not sufficient to preclude the need for listings at this time, they are, nevertheless, valuable for improving watershed health and restoring salmon populations. In those cases where well-developed and reliable conservation measures or plans exist, NMFS may choose to incorporate them into the recovery planning process starting with protective regulations. NMFS has already adopted ESA section 4(d) protective regulations that ''except'' a limited range of activities from section 9 take prohibitions. For example, the interim rule for Southern Oregon/Northern California Coast coho salmon (62 FR 38479, July 18, 1997) does not apply the take prohibitions to habitat restoration activities conducted in accordance with approved plans and fisheries conducted in accordance with an approved state management plan. In the future, such rules may contain limits on take prohibitions applicable to such activities as forestry, agriculture, and road construction when such activities are conducted in accordance with approved conservation plans.

These are all examples where NMFS may apply the modified ESA section 9 prohibitions in light of the protections provided in a conservation plan that is adequately protective. There may be other circumstances as well in which NMFS would use the flexibility of section 4(d) of the ESA. For example, if a healthy population exists within an overall ESU that is listed, it may not be necessary to apply the full range of prohibitions available in section 9. NMFS intends to use the flexibility of the ESA to respond appropriately to the biological condition of each ESU and to the strength of the efforts to protect them.

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

Examples of Federal actions likely to affect chinook salmon in the listed ESUs include authorized land management activities of the USFS, BLM, and National Park Service, as well as operation of hydroelectric and storage projects of the BOR and U.S. Army Corps of Engineers (COE). Such activities include timber sales and harvest, hydroelectric power generation, and flood control. Federal actions, including the COE section 404 permitting activities under the Clean Water Act, COE permitting activities under the River and Harbors Act, National Pollution Discharge Elimination System permits issued by the Environmental Protection Agency, highway projects authorized by the Federal Highway Administration, Federal Energy Regulatory Commission (FERC) licenses for non-Federal development and operation of hydropower, and Federal salmon hatcheries, may also require consultation. 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 while avoiding or reducing impacts to chinook salmon and their habitat within the range of the listed ESU.

There are likely to be Federal actions ongoing in the range of the listed ESUs at the time the listing becomes effective. Therefore, NMFS will review all ongoing actions that may affect the listed species with Federal agencies and will complete formal or informal consultations, when necessary, for such actions 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. Section 10(a)(1)(A) scientific research and enhancement permits may be issued to entities (Federal and non-Federal) conducting research that involves a directed take of listed species.

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

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

Take Guidance

On July 1, 1994, (59 FR 34272) NMFS and FWS published a policy committing the Services to identify, to the maximum extent practicable at the time a species is listed, those activities that would or would not constitute a violation of section 9 of the ESA. The intent of this policy is to increase public awareness of the effect of a listing on proposed and ongoing activities within the species' range. NMFS believes that, based on the best available information, the following actions will not result in a violation of section 9: (1) Possession of chinook salmon from the listed ESUs acquired lawfully by permit issued by

NMFS pursuant to section 10 of the ESA, or by the terms of an incidental take statement pursuant to section 7 of the ESA; and (2) federally funded or approved projects that involve such activities as silviculture, grazing, mining, road construction, dam construction and operation, discharge of fill material, stream channelization or diversion for which a section 7 consultation has been completed, and when such an activity is conducted in accordance with any terms and conditions provided by NMFS in an incidental take statement accompanied by a biological opinion pursuant to section 7 of the ESA. As described previously in this notice, NMFS may adopt ESA section 4(d) protective regulations that ''except'' other activities from section 9 take prohibitions for threatened species.

Activities that NMFS believes could potentially harm, injure, or kill chinook salmon in the listed ESUs and result in a violation of section 9 of the ESA include, but are not limited, to the following: (1) Land-use activities in riparian areas and areas susceptible to mass wasting and surface erosion, which may disturb soil and increase sediment delivered to streams, such as logging, grazing, farming, and road construction; (2) destruction or alteration of chinook salmon habitat in these listed ESUs, such as removal of large woody debris and ''sinker logs'' or riparian shade canopy, dredging, discharge of fill material, draining, ditching, diverting, blocking, or altering stream channels or surface or ground water flow; (3) construction or operation of dams or water diversion structures with inadequate fish screens or fish passage facilities in a listed species' habitat; (4) construction or maintenance of inadequate bridges, roads, or trails on stream banks or unstable hill slopes adjacent to or above a listed species' habitat; (5) discharges or dumping of toxic chemicals or other pollutants (e.g., sewage, oil, gasoline) into waters or riparian areas supporting listed chinook salmon; (6) violation of discharge permits; (7) pesticide and herbicide applications; (8) interstate and foreign commerce of chinook salmon from the listed ESUs without an ESA permit, unless the fish were harvested pursuant to legal exception; (9) collecting or handling of chinook salmon from listed ESUs (permits to conduct these activities are available for purposes of scientific research or to enhance the propagation or survival of the species); and (10) release of non-indigenous or artificially propagated species into a listed species' habitat or where they may access the habitat of listed species. This list is not exhaustive. It is intended to provide some examples of the types of activities that might or might not be considered by NMFS as constituting a take of listed chinook salmon under the ESA and its regulations. Questions regarding whether specific activities will constitute a violation of this rule and general inquiries regarding prohibitions and permits should be directed to NMFS (see **ADDRESSES**).

Effective Date of Final Listing

Given the cultural, scientific, and recreational importance of chinook salmon and the broad geographic range of these chinook salmon ESUs, NMFS recognizes that numerous parties may be affected by the listings. Therefore, to permit an orderly implementation of the consultation requirements and take prohibitions associated with this action, the final listings will take effect on November 15, 1999.

Conservation Measures

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

Several conservation efforts are underway that may reverse the decline of west coast chinook salmon and other salmonids. NMFS is encouraged by these significant efforts, which could provide all stakeholders with a less regulatory approach to achieving the purposes of the ESA—protecting and restoring native fish populations and the ecosystems upon which they depend. NMFS will continue to encourage and support these initiatives as important components of recovery planning for chinook salmon and other salmonids.

To succeed, protective regulations and recovery programs for chinook salmon will need to focus on conserving aquatic ecosystem health. NMFS intends that Federal lands and Federal activities play a primary role in preserving listed populations and the ecosystems upon which they depend. However, throughout the range of the listed ESUs, chinook salmon habitat occurs and can be affected by activities on state, tribal, or private land.

Conservation measures that could be implemented to help conserve the species are listed here (the list is generalized and does not constitute NMFS' interpretation of a recovery plan under section 4(f) of the ESA). Progress on some of these is being made to different degrees in specific areas.

1. Measures could be taken to promote practices that are more protective of (or restore) chinook salmon habitat across a variety of land and water management activities. Activities affecting this habitat include timber harvest; agriculture; livestock grazing and operations; pesticide and herbicide applications; construction and urban development; road building and maintenance; sand and gravel mining; stream channelization; dredging and dredged spoil disposal; dock and marina construction; diking and bank stabilization; dam construction/operation; irrigation withdrawal, returns, storage, and management; mineral mining; wastewater/pollutant discharge; wetland and floodplain alteration; habitat restoration projects; and woody debris/structure removal from rivers and estuaries. Each of these activities could be modified to ensure that watersheds and specific river reaches are adequately protected in the short- and long-terms.

2. Fish passage could be restored at barriers to migration through the installation or modification of fish ladders, upgrade of culverts, or removal of barriers.

3. Harvest regulations could be modified to protect listed chinook salmon populations affected by both directed harvest and incidental take in other fisheries.

4. Artificial propagation programs could be modified to minimize negative impacts (e.g., genetic introgression, competition, disease, etc.) upon native populations of chinook salmon.

5. Predator control/relocation programs could be implemented in areas where predators pose a significant threat to chinook salmon.

6. Measures could be taken to improve monitoring of chinook salmon populations and their habitat.

7. Federal agencies such as the USFS, BLM, NPS, FERC, COE, U.S. Department of Transportation, and BOR could review their management programs and use their discretionary authorities to formulate conservation plans pursuant to section 7(a)(1) of the ESA.

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

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. 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 no more than one additional year.

In the proposed rule (63 FR 11482, March 9, 1998), NMFS described the areas that may constitute critical habitat for these chinook salmon ESUs. Since then, NMFS has received numerous comments from the public concerning the process and definition of critical habitat for these and other listed salmonids. The agency needs additional time to complete the needed biological assessments and evaluate special management considerations affecting critical habitat. Therefore, critical habitat is not yet determinable for these ESUs, and NMFS extends the deadline for designating critical habitat for no more than 1 year until the required assessments can be made.

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 the National Environmental Policy Act (NEPA) under NOAA Administrative Order 216–6.

As noted in the Conference Report on the 1982 amendments to the ESA, economic impacts cannot be considered when assessing the status of a species. Therefore, the economic analysis requirements of the Regulatory Flexibility Act (RFA) are not applicable to the listing process. In addition, this final rule is exempt from review under E.O. 12866.

This rule has been determined to be major under the Congressional Review Act (5 U.S.C. 801 *et seq.*)

At this time NMFS is not promulgating protective regulations pursuant to ESA section 4(d). In the future, prior to finalizing its 4(d) regulations for the threatened chinook salmon ESUs, NMFS will comply with all relevant NEPA and RFA requirements.

References

A complete list of all references cited herein is available upon request (see **ADDRESSES**) and can also be obtained from the internet at www.nwr.noaa.gov.

Change in Enumeration of Threatened and Endangered Species

In the proposed rule issued on March 9, 1998 (63 FR 11482), the Central Valley spring-run chinook salmon was added as an endangered species to paragraph (a) in § 222.23, while several threatened chinook salmon ESUs (including populations in the California Coastal chinook salmon ESU) were enumerated under § 227.4. Since that time NMFS has issued a final rule consolidating and reorganizing existing regulations regarding implementation of the ESA (64 FR 14052, March 23, 1999). In this reorganization, § 222.23 has been redesignated as § 224.101, and § 227.4 has been redesignated as § 223.102. Given these reorganized regulations, as well as the Central Valley spring-run ESU's revised status as threatened, both the Central Valley spring-run and the California Coastal chinook salmon ESUs are now designated in this final rule as paragraphs (a)(20) and (a)(21) and added under § 223.102, respectively.

List of Subjects in 50 CFR Part 223

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

Dated: September 9, 1999.

Andrew A. Rosenberg,

Deputy Assistant Administrator for Fisheries, National Marine Fisheries Service.

For the reasons set out in the preamble, 50 CFR part 223 is amended as follows:

PART 223—THREATENED MARINE AND ANADROMOUS SPECIES

1. The authority citation for part 223 is revised to read as follows:

Authority: 16 U.S.C. 1531 *et seq.*; 16 U.S.C. 742a *et seq.*; 31 U.S.C. 9701.

2. In § 223.102, paragraphs (a)(20) and (a)(21) are added to read as follows:

§ 223.102 Enumeration of threatened marine and anadromous species.

* * * * *

(a) * * *

(20) Central Valley spring-run chinook salmon (*Oncorhynchus tshawytscha*). Includes all naturally spawned populations of spring-run chinook salmon in the Sacramento River Basin, and its tributaries, California.

(21) California coastal chinook salmon (*Oncorhynchus tshawytscha*). Includes all naturally spawned populations of chinook salmon from Redwood Creek (Humboldt County, California) through the Russian River (Sonoma County, California).

* * * * *

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