upper Fraser River). Genetic and CWT data both show substantial differences between coho salmon from this region and those from the Columbia River and more southern coasts, and more modest differences between coho salmon from this region and populations from the Olympic Peninsula. Coho salmon samples from Puget Sound and the Strait of Georgia form a coherent genetic cluster. The few samples NMFS has examined from Alaska and the upper Fraser River are substantially different genetically from all Washington, Oregon, and California populations. This region is drier than the rain forest area of the western Olympic Peninsula and is dominated by western hemlock forests. Streams are similar to those of the Olympic Peninsula, being characterized by cold water, high average flows, and a relatively long duration of peak flows, including a second snow-melt peak.

Drainages entering the Strait of Georgia from both sides share many of the physical and environmental features that characterize the Puget Sound area. From Vancouver Island south, coho salmon typically smolt at age 1, whereas 2-year old smolts are common from southeast Alaska north. Between the north end of Vancouver Island and southeast Alaska is a transition zone for this life history trait. At about this point (north end of Vancouver Island), the British Columbia mainland assumes more of the physical and environmental characteristics of the outer coast of Vancouver Island. However, genetic and life-history data for populations between the Strait of Georgia and Queen Charlotte Strait are insufficient to identify relationships between coho salmon in this area and those to the north and south. Therefore, NMFS has concluded that, at least until further information is developed, the geographic boundaries of this ESU extend into Canada to include drainages from both sides of the Strait of Georgia as far as the north end of the Strait.

Extinctions Within the Historical Range

Historically, coho salmon have been reported to occur in U.S. waters that are outside of the geographic areas covered by the proposed ESUs. There are few early records documenting coho salmon in the Sacramento River Basin, but it is believed that at least some populations may have existed there prior to 1850 (Brown and Moyle 1991, Bryant 1994). After that time, placer mining, dams, water diversions, and other perturbations caused extreme habitat degradation throughout the basin, and any coho salmon living there would have become extinct. In recent decades,

attempts have been made to reintroduce coho salmon to the basin, but these attempts have not been successful. Intermittent reports of small numbers of coho salmon in the Sacramento River are generally attributed to strays or remnants of these stocking programs. NMFS found no evidence that coho salmon eligible for ESA consideration (i.e., indigenous, naturally-reproducing fish) presently occur in the Sacramento River.

Although several tributaries in the upper Columbia River Basin, including the Snake River, once supported coho salmon runs, NMFS is not aware of any native coho salmon production in the upper basin at the present time. Consequently, although the petitioners included Idaho coho salmon in the petition, there are no coho salmon in Idaho that would qualify for listing under the ESA. Columbia River stock summary reports (CIS 1992) identify no coho salmon of native origin in this region, except in the Hood and Deschutes Rivers in Oregon. According to Nehlsen et al. (1991), all coho salmon above Bonneville Dam are extinct, except those spawning in the Hood River. Both the Hood and Deschutes Rivers have had extensive planting of hatchery coho salmon, and no recent natural production estimates are available. Therefore, NMFS has determined that the available evidence indicates that there are no coho salmon populations above Bonneville Dam eligible for ESA consideration at this time.

Status of the Coho Salmon ESUs

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

(e.g., from strays or outplants from hatchery programs); and (6) recent events (e.g., a drought or changes in harvest management) that have predictable short-term consequences for abundance of the ESU.

During the coastwide status review for coho salmon, NMFS evaluated both qualitative and quantitative information to determine whether any proposed ESU is threatened or endangered according to the ESA. Quantitative assessments were based on historical and recent run-size estimates and time series of freshwater spawner and juvenile survey data, angler catch estimates, harvest rate estimates, and counts of adults migrating past dams. Qualitative evaluations considered recent, published assessments by agencies or conservation groups of the status of coho salmon stocks (Nehlsen et al. 1991, Higgins et al. 1992, Nickelson et al. 1992, WDF et al. 1993). A summary of general findings from qualitative assessments follows; specific results will be discussed for each ESU.

Nehlsen et al. (1991) considered salmon stocks throughout Washington, Idaho, Oregon, and California and enumerated all stocks that they found to be extinct or at risk of extinction. They considered 15 coho salmon stocks to be extinct, 2 possibly extinct, 15 at high risk of extinction, 16 at moderate risk of extinction, and 2 of special concern. Coho salmon stocks that do not appear in their summary were either not at risk of extinction or there was insufficient information to classify them. Higgins et al. (1992) used the same classification scheme as Nehlsen et al. (1991), but provided a more detailed review of northern California salmon stocks. Of the 20 coho salmon stocks Higgins et al. identified as being at some risk of extinction, seven were classified as at high risk of extinction and the remainder were classified as of concern. Nickelson et al. (1992) rated coastal (excluding Columbia River Basin) Oregon salmon stocks on the basis of their status over the past 20 years, classifying stocks as ''depressed'' (spawning habitat underseeded, declining trends, or recent escapements below long-term average), ''healthy'' (spawning habitat fully seeded and stable or increasing trends), or ''of special concern'' (300 or fewer spawners or a problem with hatchery interbreeding). Of 55 coastal populations identified, 6 were classified as ''healthy'', 2 as ''special concern'', 41 as ''depressed'', and 6 as ''unknown.'' WDF et al. (1993) categorized all salmon stocks in Washington on the basis of stock origin (''native,'' ''non-native,'' ''mixed,'' or ''unknown''), production