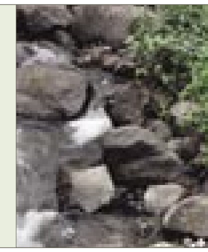
Chapter 2: Status of Salmon and Steelhead Populations



Status of ESUs

Fifty-two Evolutionarily Significant Units (ESUs) of Pacific salmon and steelhead have been identified in Washington, Oregon, California, and Idaho. An ESU is a group of individual populations of salmon or steelhead that share common genetic, ecological, and life history traits, and differ in important ways from populations in other ESUs. As of December 2003, 26 of the 52 ESUs were listed as endangered or threatened under the ESA (listings between 1990–2000). These 26 ESUs were organized by NMFS into eight recovery domains for the purpose of developing recovery plans (See Exhibit 2–1 for the geographic areas and ESUs covered by the recovery domains).

The Pacific coast is home to seven different species of Pacific salmonids (genus *Oncorhynchus*), of which five—chinook, coho, sockeye, chum, and steelhead—have ESUs listed as threatened or endangered in some portion of their range. Exhibit 2–2 displays the distribution of these species and the listed ESUs.

The status reviews of the 26 listed ESUs were recently updated by Biological Review Teams (BRTs) for NMFS' reconsideration of the ESA listing determinations. The BRT's February 2003 report, *Preliminary Conclusions Regarding the Updated Status of Listed ESUs of West Coast Salmon and Steelhead*, provides the best available comprehensive picture of salmon and steelhead listed populations for the entire Pacific Coast region (available at http://www.nwfsc.noaa.gov/trt/brtrpt.htm). Summary data from the report are presented in the following maps and graphics of domains and ESUs. This information includes the following.

- Status of each population (e.g., threatened, endangered) and the year listed.
- Historical abundance levels based on the best data available (rough estimates).
- Abundance totals over time for aggregated populations (including both hatchery and wild fish) within the ESU.[10]
- Recent percentages (last five years) of wild (natural origin) and hatchery fish returns for ESUs where this information is available.

The historical abundance estimates provide perspective on the significant declines that have occurred in some ESUs. In most cases, populations do not have to reach historic abundance levels to be considered recovered. (More information on what it means to be "recovered" and the recovery planning process is included at the end of this chapter.) As noted on the graphs, some of the ESUs have shown increases in abundance over the last few years. It is not known whether these recent

[10] The ESU-level abundance data for the North-Central California Coast, Central Valley, and Southern California Coast Recovery Domains do not exist. Where available, data for a single representative population in the ESU are shown to demonstrate abundance trends.

Exhibit 2–1: Recovery Domains and Evolutionarily Significant Units

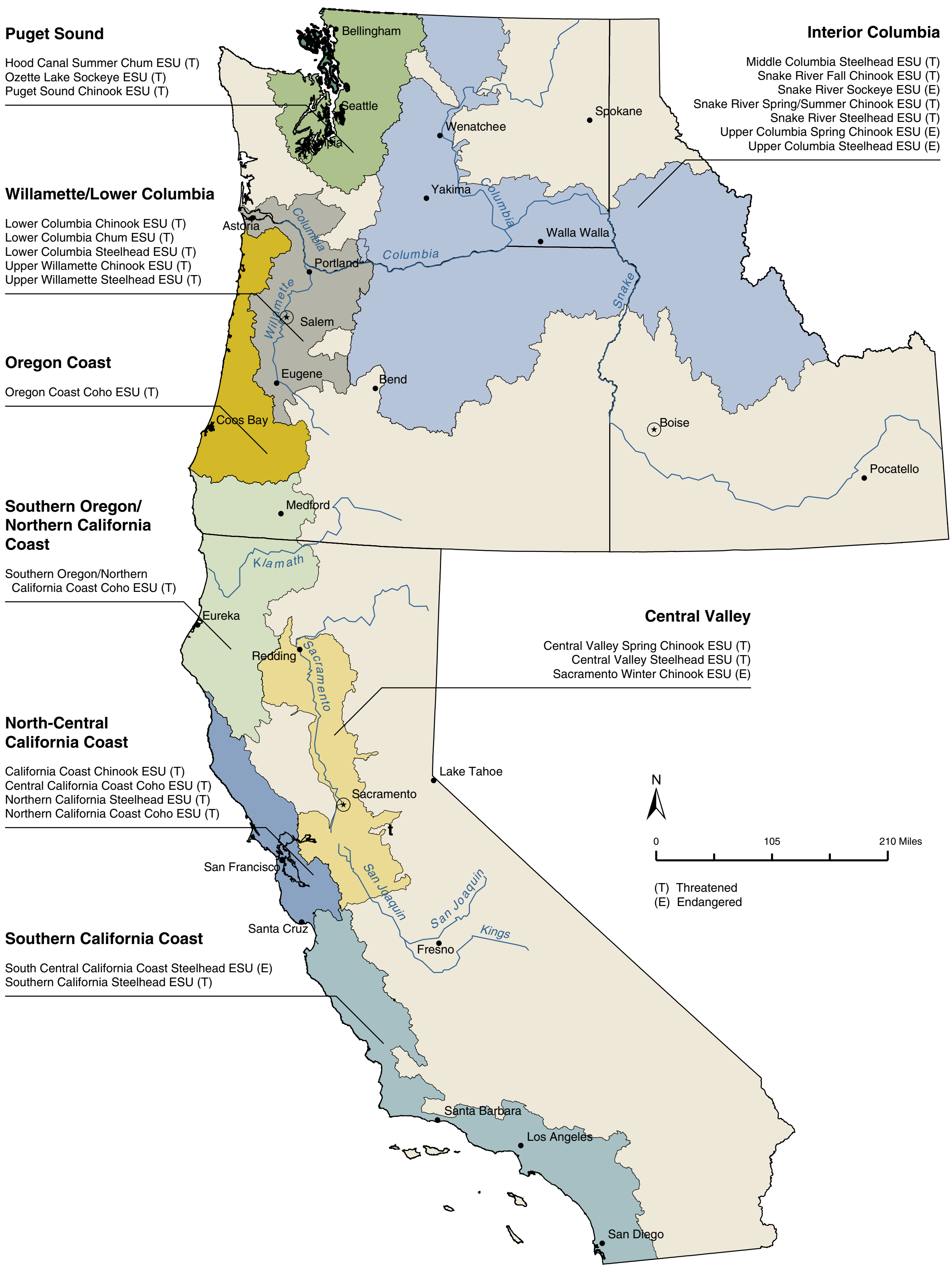
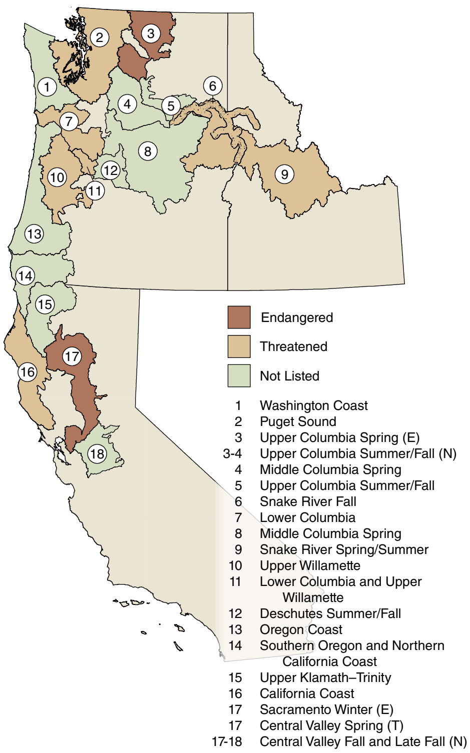
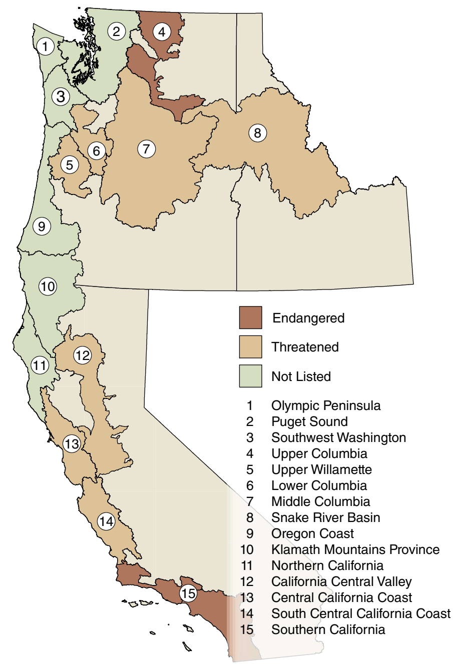


Exhibit 2–2: Distribution of Salmon and Steelhead ESUs

Chinook

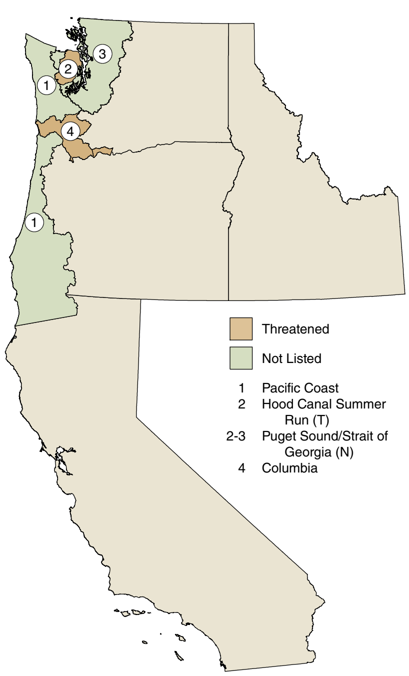


Steelhead



Sockeye

Chum



Coho

increases represent the beginning of a long-term upward trend in abundance. Recent changes in ocean conditions have contributed to the increase in the abundance levels of many populations, while improvements in land use practices and habitat conditions also have played a role in the increased numbers of returning fish. Some of these improvements are the result of investments of PCSRF funds, as well as other federal, state, and local funding.

Also identified in the following graphics for each domain are the "factors of concern." These are factors that have contributed to salmon declines or limit recovery of salmon. The factors of concern are defined in more detail in Exhibit 2–3.

Exhibit 2–3: Factors of Concern

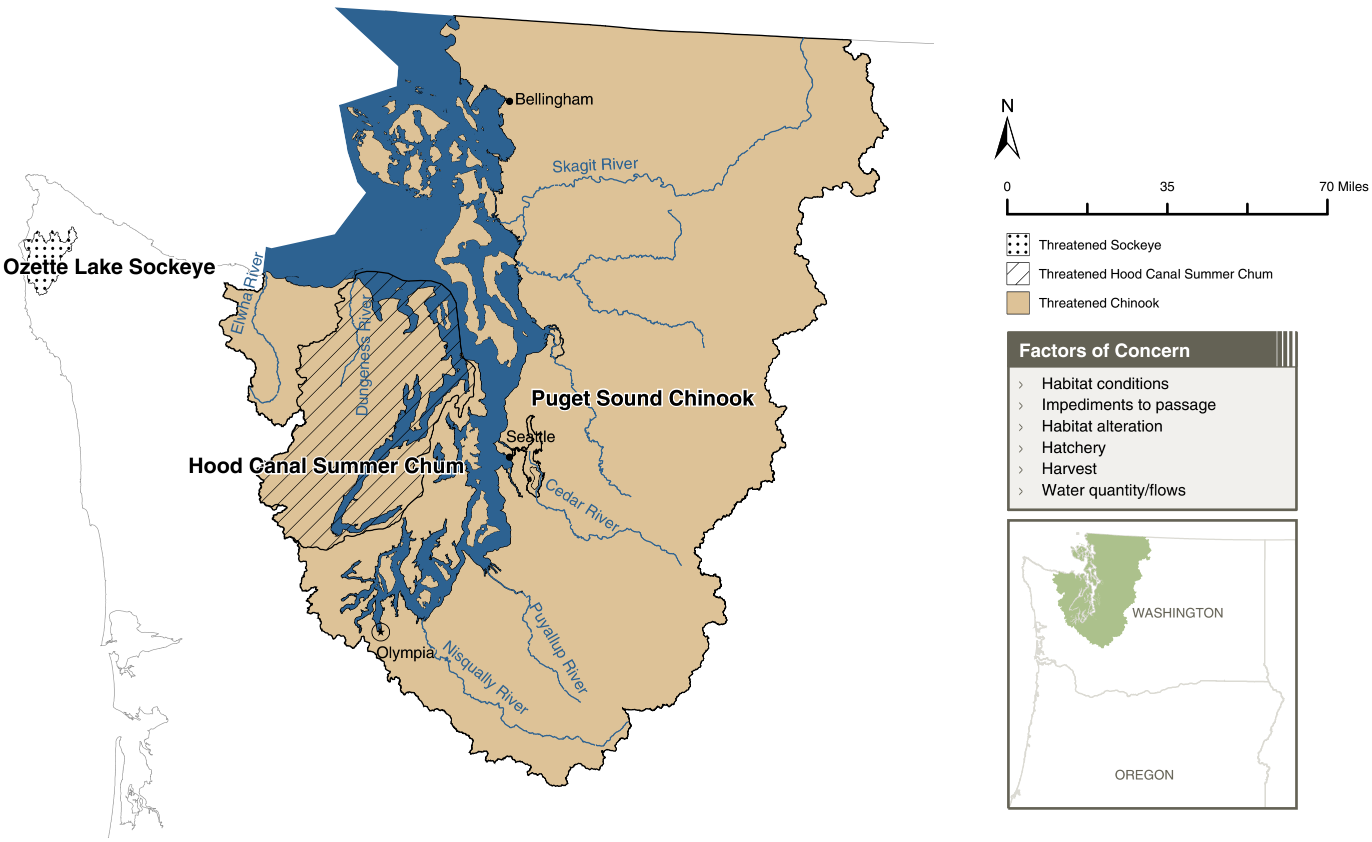
Habitat conditions	Degraded instream habitat conditions, including physical habitat, water quality, temperature, sediments, riparian condition
Impediments to passage	Impediments affecting survival of migrating fish (rather than access), including dam passage, unscreened diversions
Habitat alteration	Including channelization, urbanization
Hatchery	Negative effects of hatchery practices
Harvest	Effects of over-harvesting or harvest timing
Access	Loss of access to suitable habitat (complete impassable barriers)
Water quantity/flows	Irrigation diversions, flow impairment
Biotic factors	Exotic species, predator/competitor interactions, trophic cycling

Numerous actions have contributed to the decline of salmon and steelhead populations, especially in the four arenas most often cited: harvest, hatcheries, habitat, and hydropower. The factors that have contributed to declines were initially identified in the status reviews and are currently being reviewed by Technical Recovery Teams (TRTs) in each of the eight recovery domains. Many of the factors that led to the decline of salmon and steelhead may also hinder recovery, but the relative impact may have changed over time. For example, overharvest was a significant factor leading to the decline of some populations; however, harvest methods and rates have been adjusted and in some cases harvest is no longer a major factor limiting recovery.

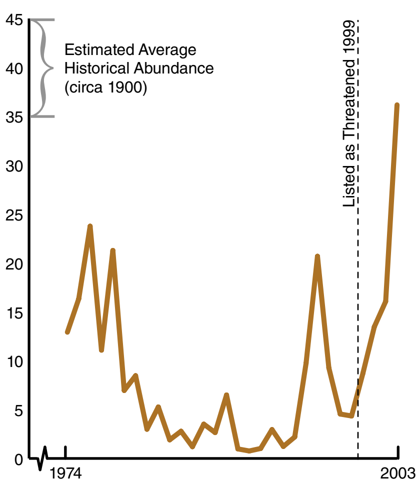
The factors that affect the recovery of salmon are called "limiting factors." The TRTs are establishing the limiting factors for recovery of listed populations in each recovery domain using information developed by watershed planning efforts throughout the region, including subbasin planning in the Columbia River basin. The identification of limiting factors is important in understanding where investments for recovery should be made. Limiting factors include conditions that limit the productivity of salmon habitat. These conditions include degraded habitat, altered stream channels and flows, barriers to fish passage, and loss of spawning and rearing grounds.

The data presented in the following graphics and maps provide the context for PCSRF investments. PCSRF exists because of the declines in salmon populations and the need to recover and conserve them. These data help describe the challenges facing that recovery.

Exhibit 2–4: Puget Sound Recovery Domain



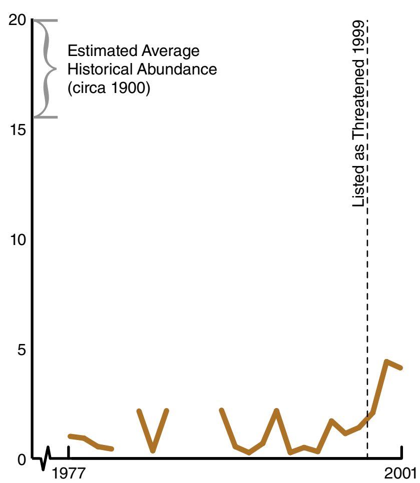
Hood Canal Summer Chum ESU



Returns (hatchery & wild) in thousands

Recent returns: 30% wild, 70% hatchery

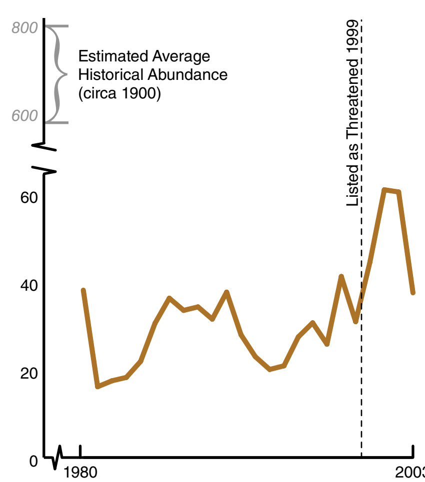
Ozette Lake Sockeye ESU



Returns (hatchery & wild) in thousands

Recent returns: 50% wild, 50% hatchery

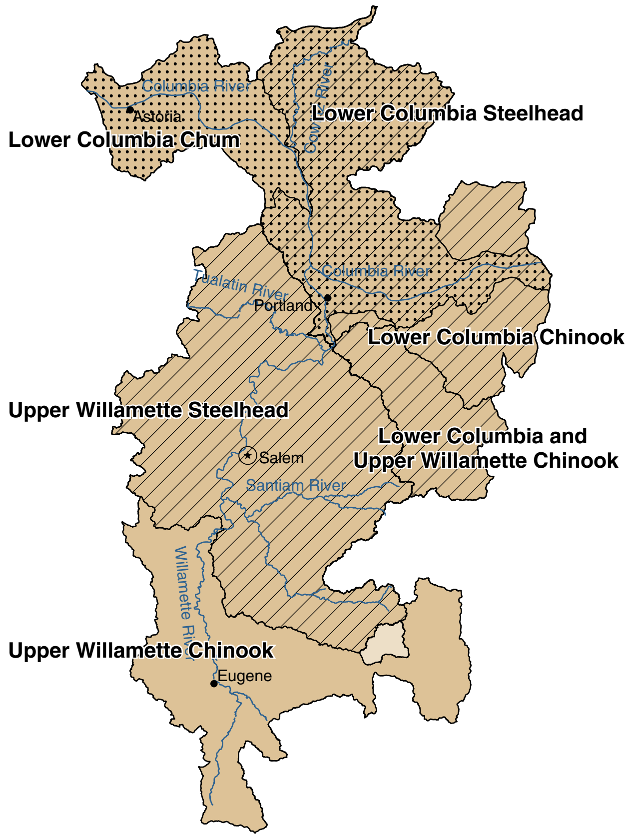
Puget Sound Chinook ESU

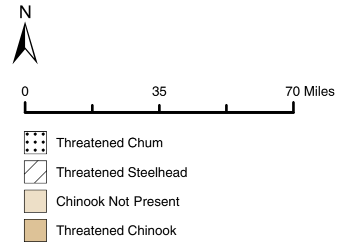


Returns (hatchery & wild) in thousands

Recent returns: 50% wild, 50% hatchery

Exhibit 2–5: Willamette/Lower Columbia Recovery Domain

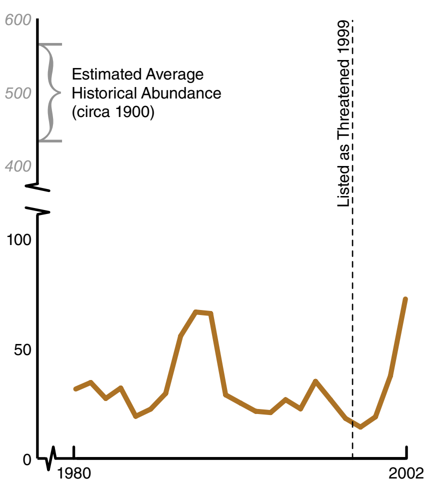




Factors of Concern

- Habitat conditions
- Impediments to passage
- Habitat alteration
- Harvest
- Access

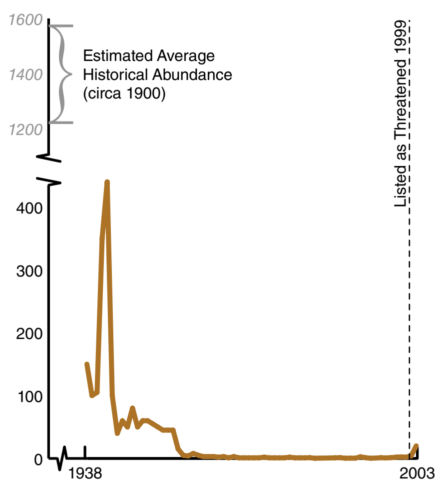
Lower Columbia Chinook ESU



Returns (hatchery & wild) in thousands

Recent returns: 50% wild, 50% hatchery

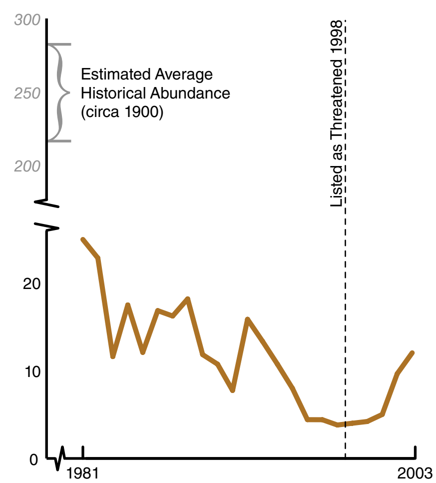
Lower Columbia Chum ESU



Returns (hatchery & wild) in thousands

Recent returns: 100% wild

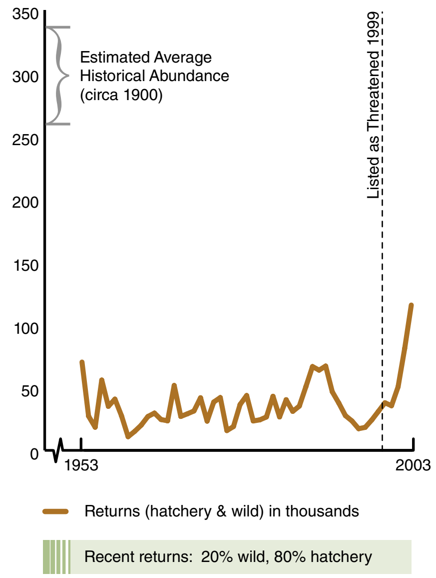
Lower Columbia Steelhead ESU



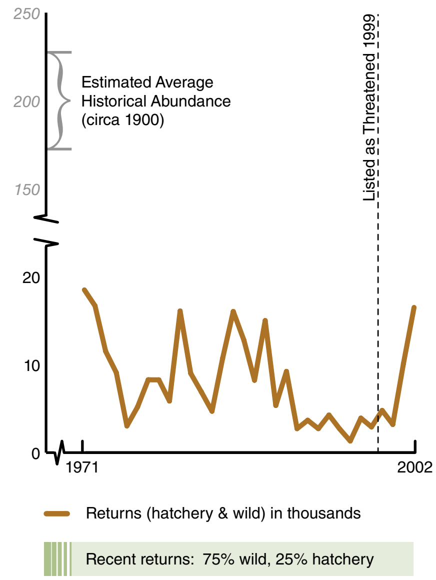
Returns (hatchery & wild) in thousands

Recent returns: 70% wild, 30% hatchery

Upper Willamette Chinook ESU



Upper Willamette Steelhead ESU



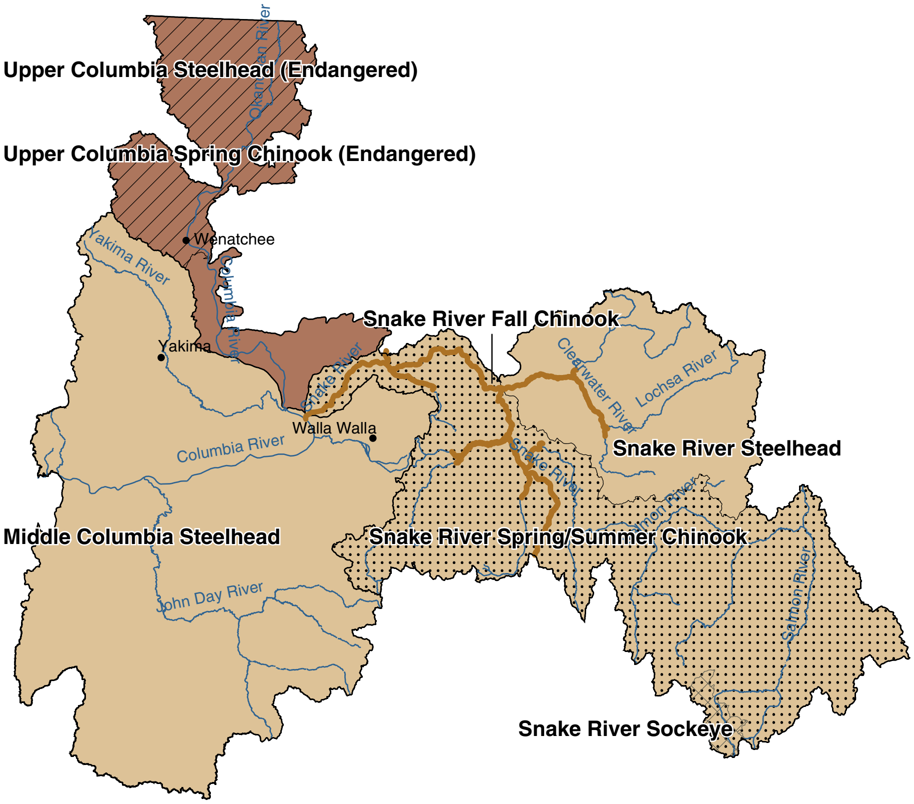
Participants in the Seaside Estuary and Watershed Discovery Program

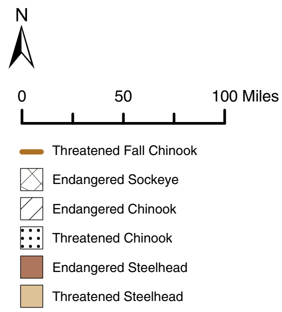
Outreach and Education

Oregon—Seaside Estuary and Watershed Discovery Program

The City of Seaside has an inventive way of communicating the wonders and challenges of its coastal environment to residents and visitors while giving its citizens the information they need to participate in important land use decisions. Since its inception in 1996, the city's Estuary and Watershed Discovery Program has developed a comprehensive education program that includes sites for hands-on activities around the Necanicum watershed. The program includes a walking trail with interpretive signs in the 50-acre Neawanna Natural History Park, canoe tours, plankton and invertebrate sampling stations, and onsite and classroom presentations. These activities educate participants about the salmon and other resources in the watershed, from upland forests to salt marshes. By providing the scientific information required to make informed decisions about growth and development in the region, the City of Seaside is achieving several state and local planning goals. The goals target effective citizen involvement, protection and restoration of natural resources, and cooperation among local jurisdictions in managing the estuary. PCSRF funds allowed Seaside to expand the program from several days a week during the summer, to a year-round program that will reach 2,000 participants in formal school settings and 3,000 participants through its informal education and outreach program. For more information see http://www.seaside.k12.or.us/steward/index.htm.

Exhibit 2–6: Interior Columbia Recovery Domain

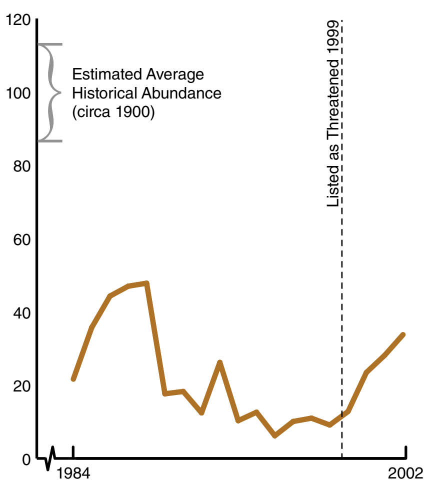




Factors of Concern

- Habitat conditions
- Impediments to passage
- Habitat alteration
- Hatchery
- Harvest
- Access
- Water quantity/flows
- Biotic factors

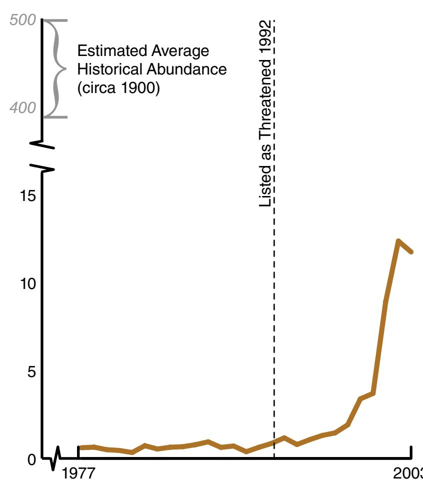
Middle Columbia Steelhead ESU



Returns (hatchery & wild) in thousands

Recent returns: 70% wild, 30% hatchery

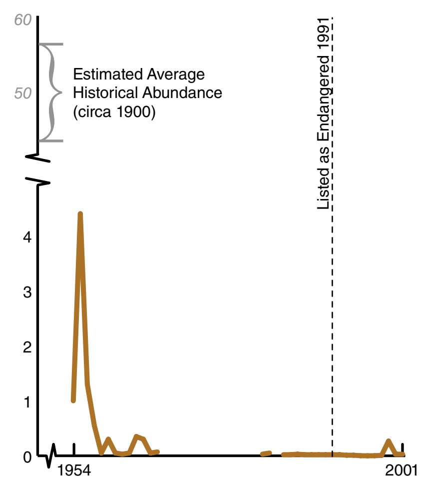
Snake River Fall Chinook ESU



Returns (hatchery & wild) in thousands

Recent returns: 40% wild, 60% hatchery

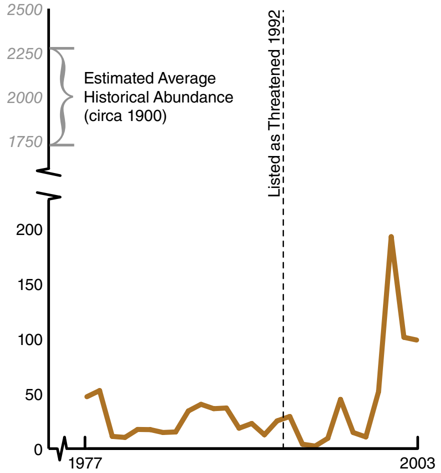
Snake River Sockeye



Returns (hatchery & wild) in thousands

Recent returns: 100% hatchery

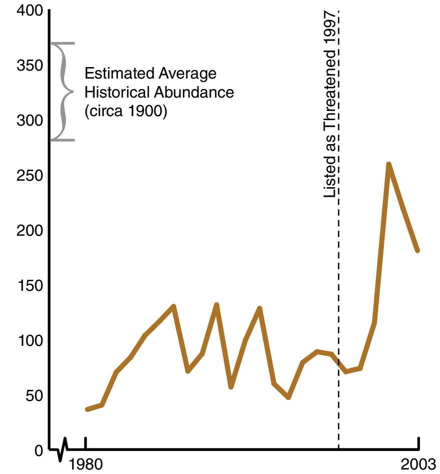
Snake River Spring/Summer Chinook ESU



Returns (hatchery & wild) in thousands

Recent returns: 20% wild, 80% hatchery

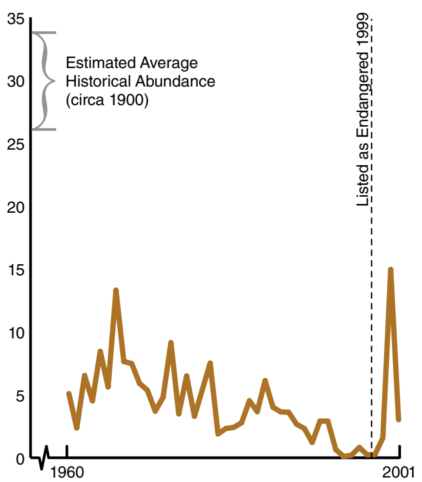
Snake River Steelhead ESU



Returns (hatchery & wild) in thousands

Recent returns: 15% wild, 85% hatchery

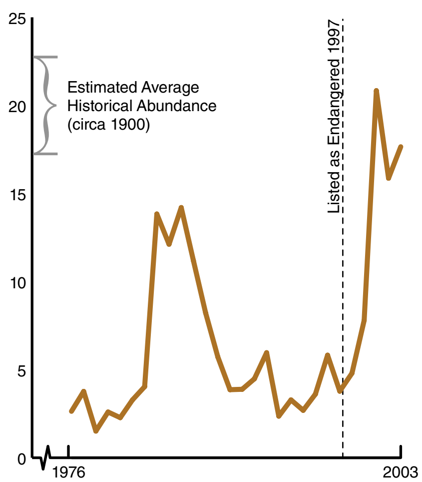
Upper Columbia Spring Chinook ESU



Returns (hatchery & wild) in thousands

Recent returns: 50% wild, 50% hatchery

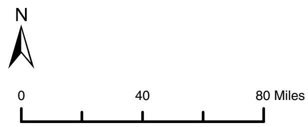
Upper Columbia Steelhead ESU



Returns (hatchery & wild) in thousands

Recent returns: 20% wild, 80% hatchery

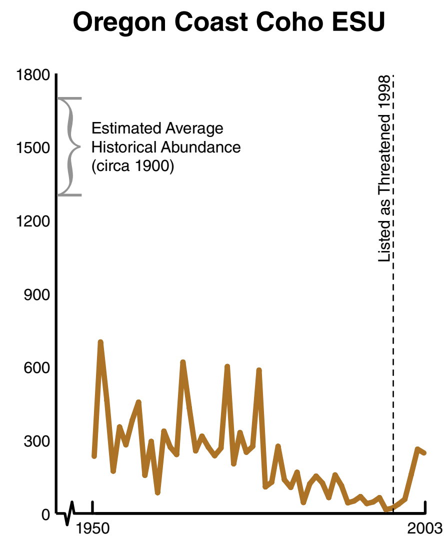
Exhibit 2–7: Oregon Coast Recovery Domain



Threatened Coho ESU

Factors of Concern

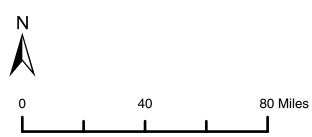
- Habitat conditions
- Habitat alteration
- Harvest



Returns (hatchery & wild) in thousands

Recent returns: 95% wild, 5% hatchery

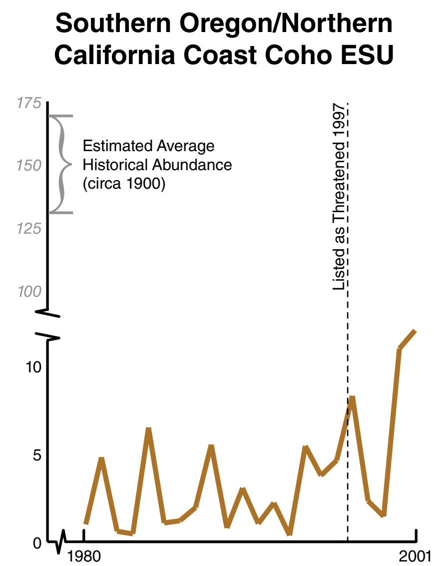
Exhibit 2–8: Southern Oregon/Northern California Coast Recovery Domain



Threatened Coho ESU

Factors of Concern

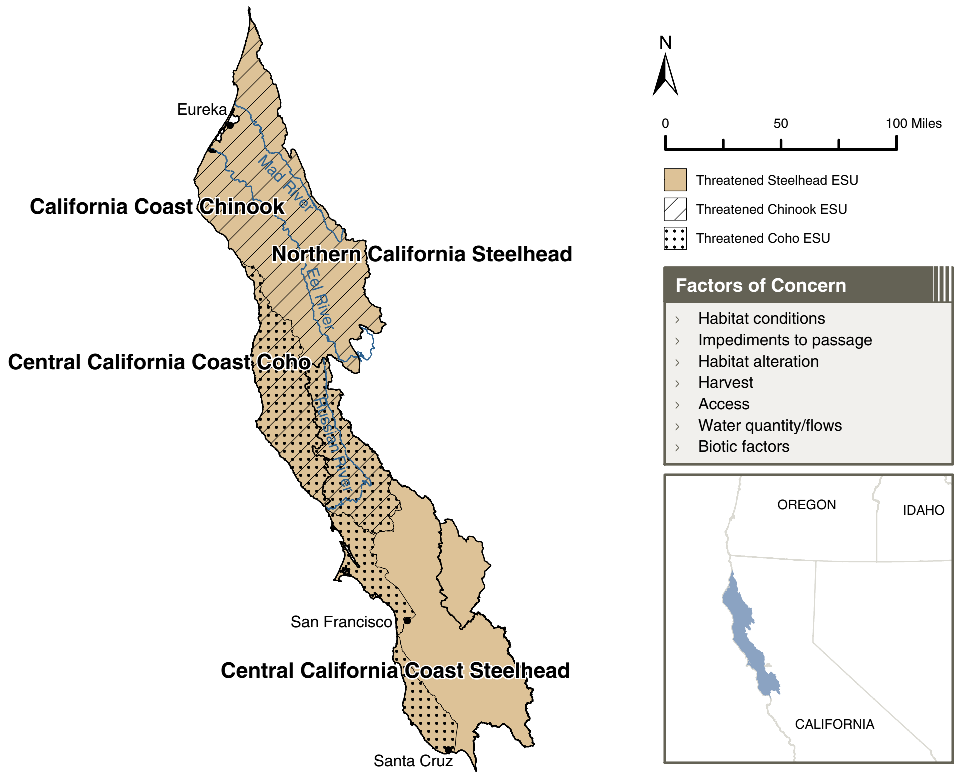
- Habitat conditions
- Harvest



Returns (hatchery & wild) in thousands

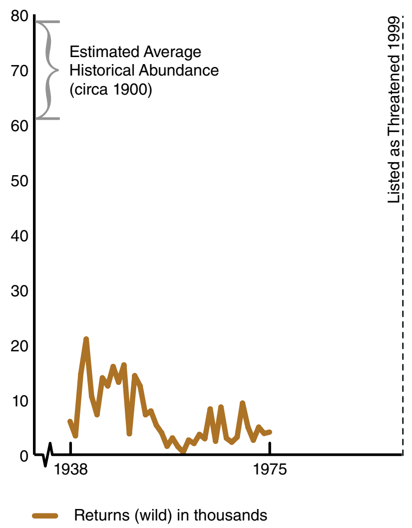
Recent returns: percentages unknown

Exhibit 2–9: North-Central California Coast Recovery Domain



Note: There are no time series ESU abundance data for the four ESUs within this recovery domain. For the California Coast Chinook ESU and the Northern California Steelhead ESU shown below, data from dam counts on the South Fork Eel River from 1938–1975 represent the best proxy for the ESU as a whole and are shown here. This basin was a major producer of chinook salmon and steelhead.

California Coast Chinook ESU



Northern California Steelhead ESU

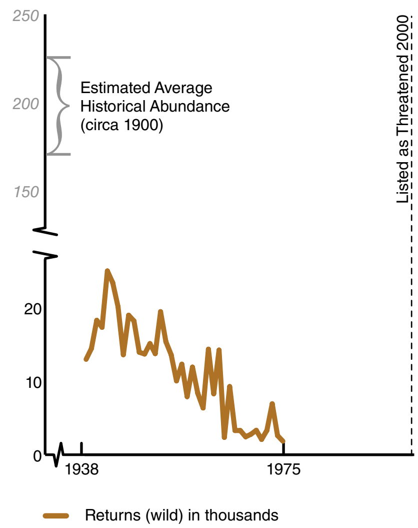
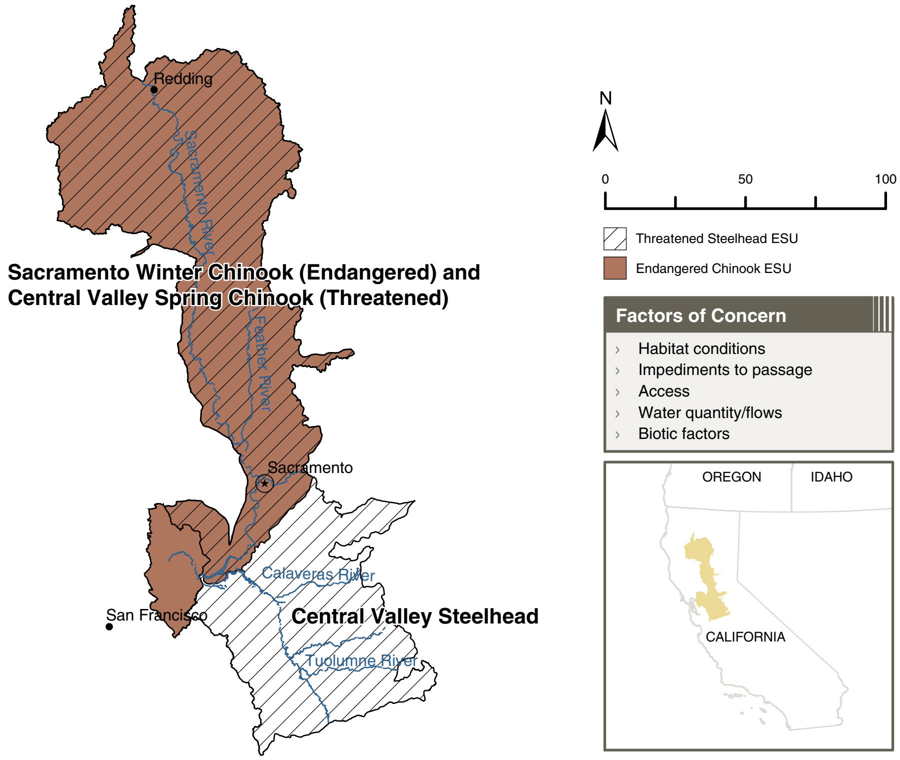


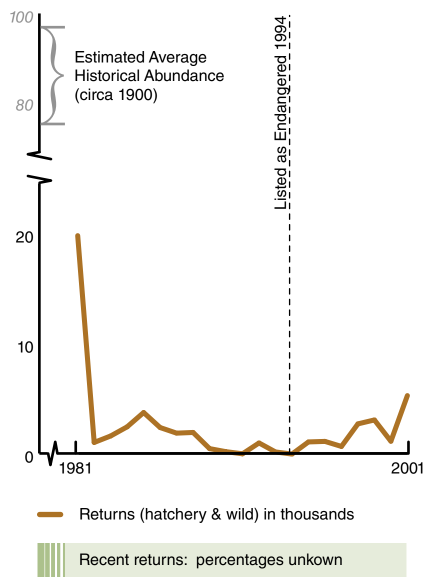
Exhibit 2–10: Central Valley Recovery Domain



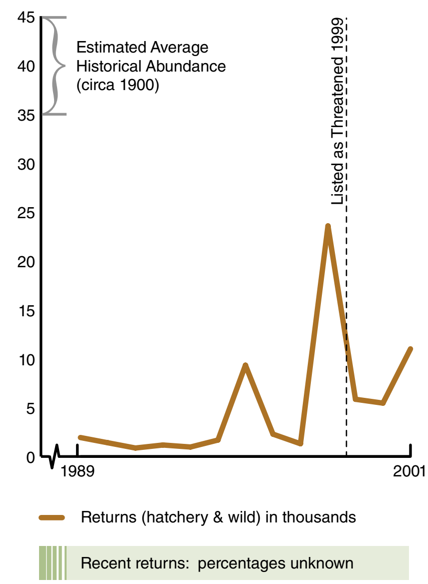
Factors of Concern

- Habitat conditions
- Impediments to passage
- Access
- Water quantity/flows
- Biotic factors

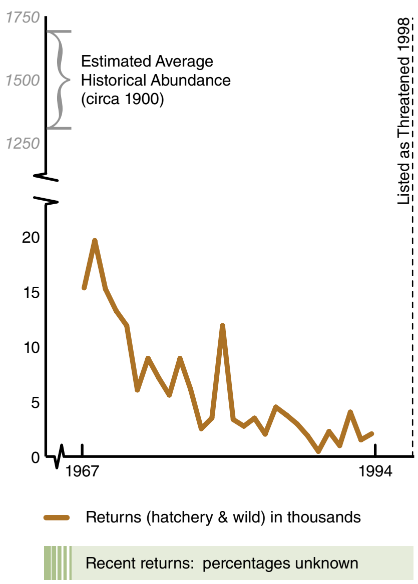
Sacramento Winter Chinook ESU



Central Valley Spring Chinook ESU

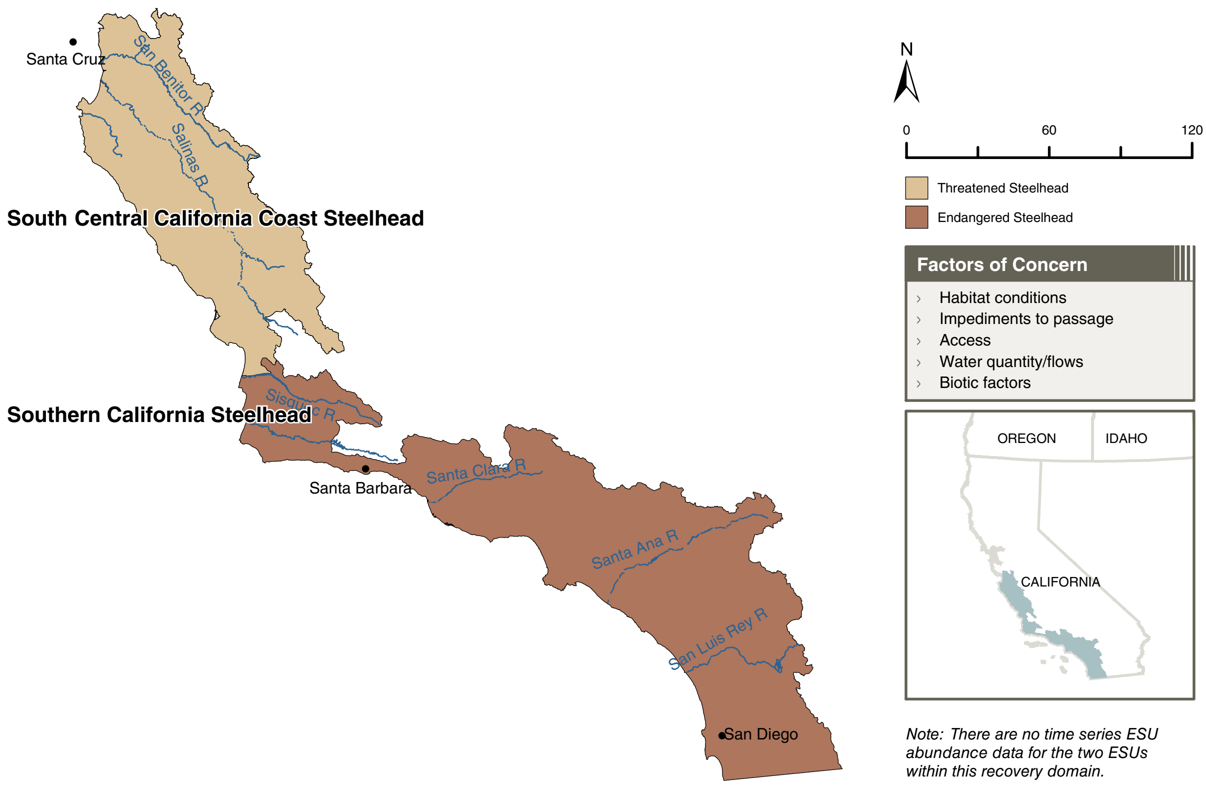


Central Valley Steelhead ESU



Note: The data set represents dam counts at the Red Bluff Diversion Dam fish ladders, providing information on only a representative portion of the ESU.

Exhibit 2–11: Southern California Coast Recovery Domain



Note: There are no time series ESU abundance data for the two ESUs within this recovery domain.

Recovery Planning

The ESA requires that recovery plans be developed and implemented for listed species to address actions needed to prevent the species from becoming extinct and actions needed to recover the species. TRTs have been convened for each recovery domain to develop the technical basis for recovery plans, including recommending recovery criteria and evaluating the threats or factors limiting recovery. TRTs consist of six to nine experts in salmon biology, population dynamics, conservation biology, ecology, and other relevant disciplines. TRTs also include at least one member with experience in and knowledge of the specific geographic area and the salmonid species that inhabit the area. TRTs advise recovery planners on the relationships between habitat and fish productivity (number of returning adults produced by the parent spawner), the spatial distribution of fish and their habitats, and aspects of diversity including the expression of different life history traits (run timing, relative habitat use, age structure, size). These four elements—abundance, productivity, spatial distribution, and genetic diversity—must all be considered when developing recovery plans and determining whether a species is recovered.

An important first step in the recovery planning process is development of preliminary recovery goals for individual fish populations within an ESU. The TRTs in each recovery planning domain have completed, or are in the process of completing, the technical work necessary to establish these goals. These preliminary goals are a starting point, designed to give recovery planners and scientists a sense of the magnitude of population increase needed to move from current abundance and productivity levels to levels that support self-sustaining populations over time. Recovery goals will also address spatial distribution and genetic diversity. The TRTs are working with federal, state, and tribal biologists to ensure the most current and accurate technical information is used in developing and refining these goals.

Recovery goals are set population by population within an ESU. Since most TRTs are still in the process of developing recommended recovery goals, it is not possible to provide ESU-wide information demonstrating current abundance in relation to both historical estimates and recovery goals. Examples of two chinook populations within the Puget Sound recovery domain, where recovery planning goals have been set, are shown in Exhibits 2–12 and 2–13.

Exhibit 2–12 shows the Upper Skagit chinook population where current abundance is relatively close to the recovery goal. The historic spawner abundance for this population is estimated to average 35,000, while the recovery planning range for this population is 15,600–26,000.

Exhibit 2–12: Recovery Goal for Upper Skagit Chinook

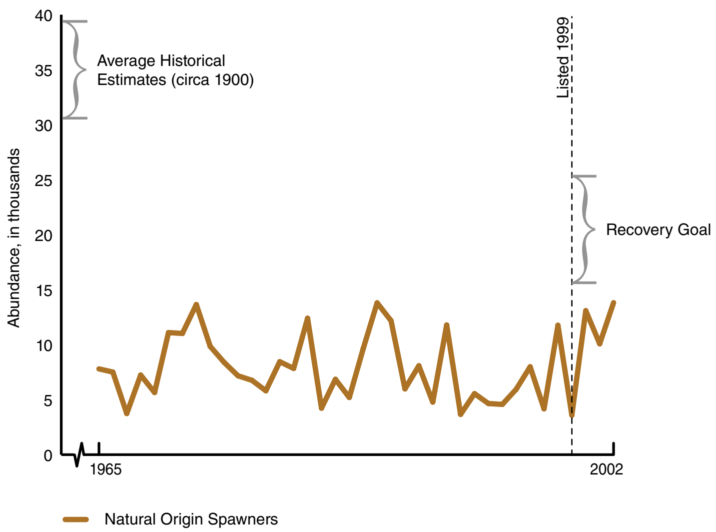
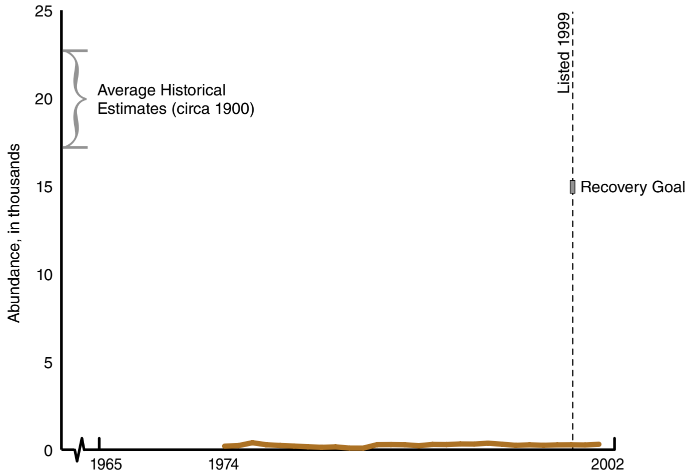


Exhibit 2–13 depicts the South Fork Stillaguamish chinook population where current abundance indicates significant improvements are needed to achieve recovery. Historical spawner abundance for this population is estimated to average 20,000 fish. The recovery planning target is 15,000 fish. The most recent spawner abundance is indicated by the green line (less than 300 fish) and provides a sense of the magnitude of change needed to achieve recovery.

Exhibit 2–13: Recovery Goal for South Fork Stillaguamish Chinook



The status and productivity of populations, recovery goals, current condition of the habitat, factors affecting recovery, and actions necessary to resolve or eliminate those factors are the necessary components of recovery plans. Recovery planning occurs at many levels and through a multitude of coordinated efforts. In the Columbia River basin, for example, $15.2 million of Bonneville Power

Airlifting a conifer tree toward the Upper Umatilla River

Habitat Protection and Restoration

Columbia River Tribes—Wood Placement in the Upper Umatilla River and its Tributaries

Whole conifer trees, ranging from 38–50 feet in length and 18 inches in diameter, with rootwad intact, were airlifted by helicopter from stockpile points on watershed ridge tops and placed in the Buckaroo and Iskuulpa Creek flood plains. Trees were placed on gravel bars in complexes of 2–5 trees. Twenty-five trees were placed in Buckaroo Creek and 126 trees were placed in Iskuulpa Creek. The Iskuulpa and Buckaroo watersheds provide critical spawning habitat for threatened summer steelhead. Land acquisitions and other improvements within these watersheds have been a major focus of the Umatilla Tribes using PCSRF funds.

Completed in the winter of 2003, the project resulted in a significant increase in large wood frequency within both creeks. In Buckaroo Creek, large wood frequency increased from 8 pieces per mile to an average of 23 pieces per mile. In Iskuulpa Creek, large wood frequency increased from 4 per mile to a minimum of 18.3 per mile. The trees will provide an immediate roughness element in the channel that will create localized areas of reduced stream flow energy, provide areas of fine sediment accumulation and retention, and allow for subsequent riparian shrub, hardwood, and coniferous tree development.

Administration ratepayer funds has been provided to 62 local subbasin groups[11] to develop subbasin plans in accordance with regional guidelines (http://www.nwcouncil.org/library/2001/2001-20.pdf). The PCSRF is augmenting these planning efforts, having provided nearly $80 million in funding to planning groups throughout the region. These regional planning groups have been established to help prepare recovery plans that build consensus on recovery actions and integrate many smaller plans into larger recovery plans. Even as these plans are under development, local conservation groups, agencies, tribes, industry, and individuals are acting to protect and restore productive salmon habitat. Planning and assessments are coastwide priorities that fit into the overall recovery strategy.

[11] Thirty-three of the 62 subbasins have anadromous fish.