Final Supplement to the Hood Canal and Eastern Strait of Juan de Fuca Summer Chum Salmon Recovery Plan

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Prepared by

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Electronic copies (i.e. CD-ROM) may be obtained from:
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Recovery plans can be downloaded from NMFS website: http://www.nwr.noaa.gov/ESA-Salmon-Listings/Salmon-Populations/Chum/Index.cfm

1.0 INTRODUCTION

This document is the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NMFS) Final Supplement to the Hood Canal and Eastern Strait of Juan de Fuca Summer Chum Salmon Recovery Plan prepared by the Hood Canal Coordinating Council (HCCC). Together, the NMFS Final Supplement and the Hood Canal Coordinating Council Plan (HCCC Plan) constitute the Endangered Species Act (ESA) Recovery Plan (Recovery Plan) for the Hood Canal and Eastern Strait of Juan de Fuca Summer Chum Salmon (*Oncorhynchus keta*) evolutionarily significant unit (ESU). This Final Supplement contains revisions and additions inspired by, or in consideration of, public comments, and it supersedes the Draft Supplement.

The HCCC, a regional council of governments, presented its locally developed recovery plan to NMFS on November 15, 2005. The HCCC Plan (HCCC 2005) and NMFS' Draft Supplement were offered for public comment August 16, 2006, and a Notice of Availability was published in the Federal Register (70 FR 76445) on the same date.

NMFS received three comment letters on the HCCC Plan and Draft Supplement; these were from a state agency, a nonprofit conservation organization, and a research institute. NMFS reviewed all comments received for substantive issues and new information and addressed them in a Response to Comments, available at http://www.nwr.noaa.gov/Salmon-Recovery-Planning/Recovery-Domains/Puget-Sound/Index.cfm

The HCCC Plan is the product of several years of work on the part of state and tribal fishery co-managers and numerous organizations and individuals throughout the Hood Canal region; as such, it is an important public achievement, and NMFS intends to move forward to the long-term collaboration that will be necessary to implement it.

This Supplement contains the following components: an introduction and background for ESA recovery planning; a discussion of how the HCCC Plan satisfies ESA recovery plan requirements, when combined with qualifications and enhancements that NMFS believes are necessary for ESA recovery; and a description of NMFS' intended use of the Recovery Plan.

At the time the plan was written, two other salmonid species, Puget Sound Chinook salmon and Coastal/Puget Sound bull trout, which are indigenous to the Hood Canal and eastern Strait of Juan de Fuca regions encompassed by the HCCC Plan, were listed under the ESA. On June 30, 2005, the Shared Strategy for Puget Sound, a nonprofit organization that coordinates recovery planning for Puget Sound Chinook, submitted a recovery plan for Puget Sound Chinook salmon to NMFS. On December 27, 2005, NMFS published a Notice of Availability of the Shared Strategy plan as a proposed recovery plan for Puget Sound Chinook (70 FR 76445). The final Puget Sound Chinook Salmon Recovery Plan was published January 19, 2007. Coastal/Puget Sound bull trout are under the jurisdiction of the U.S. Fish and Wildlife Service (USFWS), and are the subject of a recovery plan published by the USFWS in May 2004. In May 2007, NMFS added Puget Sound steelhead to the ESA list. These species will not be further discussed in this document.

1.1 Endangered Species Act Recovery Planning

The Endangered Species Act of 1973 (ESA) requires NMFS to develop recovery plans for species listed under the Act. The purpose of recovery plans is to identify actions needed "for the conservation and survival" [ESA section 4(f)(1)] of threatened and endangered species to the point that they no longer need the Act's protection.

To be approved by NMFS, a recovery plan must meet certain requirements:

- ESA section 4(f)(1)(B) directs that recovery plans, to the extent practicable, incorporate:

    1. a description of such site-specific management actions as may be necessary to achieve the plan's goal for the conservation and survival of the species;
    2. objective, measurable criteria which, when met, would result in a determination, in accordance with the provisions of this section, that the species be removed from the list; and;
    3. estimates of the time required and the cost to carry out those measures needed to achieve the plan's goal and to achieve intermediate steps toward that goal.

- ESA section 4(a)(1) lists factors for re-classification or delisting that are to be addressed in recovery plans:

    A. The present or threatened destruction, modification, or curtailment of [the species'] habitat or range
    B. Over-utilization for commercial, recreational, scientific or educational purposes
    C. Disease or predation
    D. The inadequacy of existing regulatory mechanisms
    E. Other natural or manmade factors affecting its continued existence

In addition, it is important for recovery plans to provide the public and decision makers with a clear understanding of the goals and scientifically supported strategies needed to recover a listed species (NMFS Interim Recovery Planning Guidance, Update July 2006).

1.2 NMFS Support for Locally Developed Plans

NMFS believes it is critically important to base ESA recovery plans for Pacific salmon on the many state, regional, tribal, local, and private conservation efforts already underway throughout the region. Local support of recovery plans by those whose activities directly affect the listed species, and whose actions will be most affected by recovery requirements, is essential. NMFS therefore supports and participates in locally led collaborative efforts to develop recovery plans, involving local communities, state, tribal, and Federal entities, and other stakeholders.

As the lead ESA agency for listed Pacific salmon, NMFS is responsible for reviewing these locally produced recovery plans and deciding whether adoption is merited. When other entities such as the Hood Canal Coordinating Council develop plans intended to provide for ESA

recovery, NMFS writes a "supplement" summarizing the plan and noting any necessary additions or qualifications. The supplement then becomes part of the ESA recovery plan for the ESU.

In 2005, in addition to the HCCC Plan and the Shared Strategy Salmon Recovery Plan for Puget Sound Chinook Salmon, NMFS received locally developed recovery plans for listed salmon and steelhead from the Upper Columbia Salmon Recovery Board, the Washington Snake River Salmon Recovery Board, and the Yakima Subbasin Recovery Board. A draft recovery plan for the Lake Ozette sockeye salmon ESU is in progress and will be available early in 2008. NMFS is also working with the states of Oregon and Idaho to draft regional recovery plans for listed salmon ESUs within their respective recovery domains for submittal in 2007. As draft plans are completed, NMFS will make them available for public review and comment.

1.3 Federal Treaty and Trust Responsibilities

Hood Canal summer-run chum salmon, as well as all of the other listed salmonid ESUs, have historically been harvested, and there is strong public interest in restoring their abundance to harvestable levels. Because listed salmon often overlap in migration timing and area with healthy, non-listed fish populations, the listings not only constrain the harvest of listed fish but also have become factors limiting the harvest of other fish. Fisheries affecting Hood Canal summer chum salmon are co-managed by Washington State, Puget Sound Tribes, and Federal agencies, under the principles of the Pacific Salmon Treaty (PST), the Magnuson-Stevens Act, U.S. *v*. Washington, and United States treaties with Puget Sound Tribes.

Northwest Indian tribes have legally enforceable treaty rights reserving to them a share of the salmon harvest. Achieving the basic purpose of the ESA (to bring the species to the point where it no longer needs the protection of the Act) may not by itself fully meet these rights and expectations, although it will lead to major improvements in the current situation. Ensuring a sufficient abundance of salmon to sustain harvest can be an important element in fulfilling trust and treaty rights as well as garnering public support for these plans.

It is NMFS policy that recovery of salmonid populations must achieve two goals: (1) the recovery and delisting of salmonids listed under the provisions of the ESA, and (2) the restoration of the meaningful exercise of tribal fishing rights. "It is the agency's view that there is no conflict between the statutory goals of the ESA and Federal trust responsibility to Indian tribes" (Letter from Terry Garcia, Assistant Secretary for Oceans and Atmosphere, to Ted Strong, Executive Director, Columbia Inter-Tribal Fish Commission, July 21, 1998). Additionally, NMFS "will continue to join with states and tribes to develop a comprehensive approach to the restoration of fish and wildlife resources in a manner that fulfills all obligations under Federal law, including trust obligations to Indian tribes" (ibid.).

Thus, it is appropriate for recovery plans to take these considerations into account and plan for a recovery strategy that includes harvest. In some cases, the desired abundances made available for harvest may originate from increases in the natural-origin salmon population. In others, the recovery strategy may include appropriate use of hatcheries to support a portion of the harvest. As long as the overall plan is likely to achieve the ESA-defined recovery of the listed ESU, it will be acceptable to NMFS as a recovery plan.

1.4 Hood Canal Coordinating Council Plan

The HCCC Plan focuses on the recovery of the Hood Canal summer-run chum salmon ESU, which includes summer-run chum salmon populations that naturally spawn in tributaries to Hood Canal as well as in Olympic Peninsula rivers between Hood Canal and Dungeness Bay (FR 64 14508 March 25, 1999). (See also Section 1.7.)

The Hood Canal Coordinating Council is a watershed-based council of governments that was established in 1985 in response to concerns about water quality problems and related natural resource issues in the watershed. It was incorporated in 2000 as a 501(c)(3), Public Benefit Corporation under RCW 24.03. Its board of directors includes the county commissioners from Jefferson, Kitsap, and Mason counties, and elected tribal council members from the Skokomish and Port Gamble S'Klallam Tribes. It also includes a slate of ex-officio board members composed of representatives from state and Federal agencies. The HCCC also has "cooperating partners" (e.g., volunteer groups, regional fisheries enhancement groups, conservation districts, and land trusts) who work collaboratively with the Council on various projects and programs. The HCCC has two missions, one with respect to Hood Canal itself and the other pertaining to Hood Canal salmon, as follows:

> *The Hood Canal Coordinating Council recognizes Hood Canal as a national treasure and will advocate and implement locally appropriate actions to protect and enhance the Canal's special qualities.* (Adopted in 1992)
>
> *To assure the existence of wild salmon in Hood Canal for the next 150 years, the Hood Canal Coordinating Council will: understand the causes of the decline of salmon in the Canal; identify the values and choices to be made in the natural, economic, legal, social, and cultural environments of salmon; develop and choose appropriate responses; and implement actions to maintain natural populations of salmon stocks at self-sustaining levels for ceremonial, subsistence, recreational and commercial fisheries.* (Adopted in 1996)

The State of Washington published its *Statewide Strategy to Recover Salmon: Extinction is Not an Option* in 1999 and subsequently identified seven salmon recovery regions, of which Puget Sound (including Hood Canal) is one. The State of Washington designated HCCC as the Lead Entity for the Hood Canal watershed, and, in 2005, as the regional recovery organization for Hood Canal summer chum.

The range of the Hood Canal/Eastern Strait of Juan de Fuca summer chum salmon ESU encompasses four counties: Mason, Jefferson, Kitsap, and the eastern portion of Clallam. Under Washington State law, counties have considerable land use authority that can affect summer chum salmon habitat. As a Lead Entity under the authority of RCW 77.85, the HCCC is charged with coordinating salmon recovery projects among the various jurisdictions and groups in the watershed. The HCCC specifically intends its plan to be useful at the local level, and to provide information that will help the counties "manage their respective regulatory programs in a manner that is consistent with summer chum salmon recovery." The HCCC further states that its plan

"will provide a logic and rationale for recovery of summer chum salmon populations that can be understood by County Commissioners, Tribal governments, local and regional decision-makers and the public."

As stated in the HCCC plan,

> The Summer Chum Salmon Recovery Plan [SRP] provides analyses and action alternatives that are possible under the authorities of county policies and programs. County staffs have contributed to the development of the analyses provided and the action alternatives described. Each Board of County Commissioners will adopt the recommendations and action alternatives presented according to their respective policies and procedures. The Counties will also use the SRP as guidance in the development, modification and revisions of their respective regulatory programs related to the Growth Management Act and Shoreline Programs. Where applicable, public review processes will be undertaken by the Counties to allow the public to provide input and guidance for the Boards of County Commissioners as they deliberate the recommendations and develop regulatory policies and programs that support the recovery of summer chum salmon in Hood Canal and the Eastern Strait of Juan de Fuca (HCCC Plan, p. 6).

The Skokomish and Port Gamble S'Klallam Tribes are voting members of the HCCC. Several tribes have usual and accustomed fishing rights within the range of the ESU: Skokomish, Port Gamble S'Klallam, Suquamish, Jamestown S'Klallam, Lower Elwha Klallam, Lummi, Tulalip, and Swinomish. Fisheries harvest and hatchery management for the Hood Canal and the eastern Strait of Juan de Fuca watersheds are the direct responsibility of these Tribes and the Washington State Department of Fish and Wildlife (WDFW) (the "co-managers"). The Point No Point Treaty Tribes (Skokomish, Port Gamble S'Klallam, Jamestown S'Klallam, and Lower Elwha Klallam) (PNPTT) and WDFW are the primary authors of a related planning process, the *Summer Chum Salmon Conservation Initiative* (SCSCI) (WDFW and PNPTT 2000).

The SCSCI process, initiated in 2000, is an ongoing planning forum and mechanism by which the co-managers develop and implement harvest management regimes and artificial propagation programs. These regimes and programs are designed to provide opportunities for the recovery of summer chum salmon when integrated with aspects of habitat protection and restoration, also considered in the process. Supplemental reports (e.g., WDFW and PNPTT 2001, 2003, and PNPTT and WDFW 2003), and annual progress reports (e.g., PNPTC and WDFW 2004, WDFW and PNPTC 2005, 2006) have been prepared by the co-managers consistent with the provisions of the SCSCI and can be found at http://wdfw.wa.gov/fish/chum/chum/library. The HCCC Plan makes extensive use of the SCSCI and its supplemental and annual progress reports, as well as the limiting factors reports for Water Resource Inventory Areas (WRIAs) 14, 15, 16, 17, and 18 (Haring 1999, Correa 2002, Correa 2003, Kuttel 2003).

The fishery co-managers participated in the development of aspects of this plan, and the HCCC Plan is designed to support and complement the co-managers' harvest and hatchery management strategies, including their interim salmon recovery goals and objectives.

1.5 Recovery Domains and Technical Recovery Teams

As part of its salmon recovery planning efforts, NMFS designated five geographically based "recovery domains" in the Pacific Northwest. Hood Canal and the Eastern Strait of Juan de Fuca are considered part of the Puget Sound recovery domain, which encompasses recovery planning initiatives for the listed Hood Canal summer chum, Puget Sound Chinook, and Ozette Lake sockeye salmon ESUs. The other domains are the Willamette/Lower Columbia, Interior Columbia, Oregon Coast, and Southern/Oregon Northern California Coast. For each domain, NMFS convened a Technical Recovery Team (TRT) to develop recommendations on biological viability criteria for the ESU and its component populations, make technical findings regarding limiting factors, provide scientific support to local and regional recovery planning efforts, and provide scientific evaluations of recovery plans.

NMFS' intent in establishing TRTs for each domain was to seek unique geographic and species expertise and to develop a solid scientific foundation for the recovery plans. All the TRTs used the same biological principles for developing their ESU and population viability criteria. These principles are described in a NMFS technical memorandum, *Viable Salmonid Populations and the Recovery of Evolutionarily Significant Units* (McElhany et al. 2000). Viable salmonid populations (VSP) are defined in terms of four parameters: abundance, productivity or growth rate, spatial structure, and diversity. A viable ESU is naturally self-sustaining. Each TRT made recommendations using the VSP framework and based on data availability, the unique biological characteristics of the ESUs and habitats in the domain, and the members' collective experience and expertise. Although NMFS has encouraged the TRTs to develop regionally specific approaches for evaluating viability and identifying factors limiting recovery, each TRT is working from a common scientific foundation to ensure that the recovery plans are scientifically sound and based on consistent biological principles.

In each domain, NMFS has worked with state, tribal, local, and other Federal stakeholders to develop a planning forum, appropriate to the domain, that builds to the extent possible on ongoing, locally led efforts. The role of these planning forums is to use the TRT reports and other technical products to derive recovery goals and make limiting factors assessments, then develop locally appropriate and locally supported recovery actions needed to achieve recovery goals. While these forums also are working from a consistent set of assumptions regarding needed recovery plan elements, the process by which they develop those elements, and the form they take, may differ among domains. In the case of the Hood Canal summer chum ESU, a local planning forum – the Hood Canal Coordinating Council – was already in existence and well prepared to take on the task of developing a recovery plan.

1.6 Puget Sound Technical Recovery Team

The Puget Sound Technical Recovery Team (PSTRT) includes biologists from NMFS, state, tribal, and local organizations who are engaged in an ongoing collaborative process with the co-managers on Hood Canal salmon recovery issues. The PSTRT developed recommendations on biological viability criteria for the Hood Canal summer chum ESU and reviewed an early 2005 draft of the HCCC Plan. The PSTRT also worked with state and tribal fishery co-managers and

HCCC staff to specify the means of addressing the technical questions the PSTRT identified in the draft recovery plan.

1.7 Description of ESU

The Hood Canal summer chum salmon ESU includes summer-run chum salmon populations that spawn naturally in tributaries to Hood Canal as well as in Olympic Peninsula rivers between Hood Canal and Dungeness Bay (FR 64 14508 March 25, 1999). The recovery planning area includes portions of the Washington counties of Jefferson, Mason, Kitsap, and Clallam; the reservations of the Skokomish, Port Gamble S'Klallam, and Jamestown S'Klallam Tribes; and portions of Water Resource Inventory Areas (WRIAs) 14, 15, 16, 17, and 18 (Haring 1999, Correa 2002, Correa 2003, Kuttel 2003) (see Figure 2 of the HCCC Plan, below).

Summer chum salmon spawn from late August through late October, and are "uniquely adapted to exploit spawning habitat when river and stream levels are typically low and before other populations and species of salmon return to spawn" (Sands et al. 2007). Fry emerge from the gravel between early February and May (with peak emergence in March). Emerged fry travel almost immediately (within 12 hours) downstream to the estuaries and tidal marshes, where they begin a relatively rapid seaward emigration through nearshore marine environments in Hood Canal and bay estuaries, including eelgrass beds present in those areas. It appears that survival during this short period of early estuarine and nearshore residence is one critical factor determining the size of the subsequent adult run. After leaving their natal estuaries, summer chum juveniles likely outmigrate in schools along the shorelines of Hood Canal, Admiralty Inlet, and the eastern Strait of Juan de Fuca, and then north and westward through the Strait of Juan de Fuca to reach northeastern Pacific Ocean rearing areas (Tynan 1997; WDFW and PNPTT 2000; HCCC Plan, pp. 69-71).

The PSTRT identified two independent populations of Hood Canal summer chum (Sands et al. 2007). The Strait of Juan de Fuca population spawns in rivers and streams entering the eastern Strait and Admiralty Inlet. The Hood Canal population includes all spawning aggregations within the Hood Canal catchment.

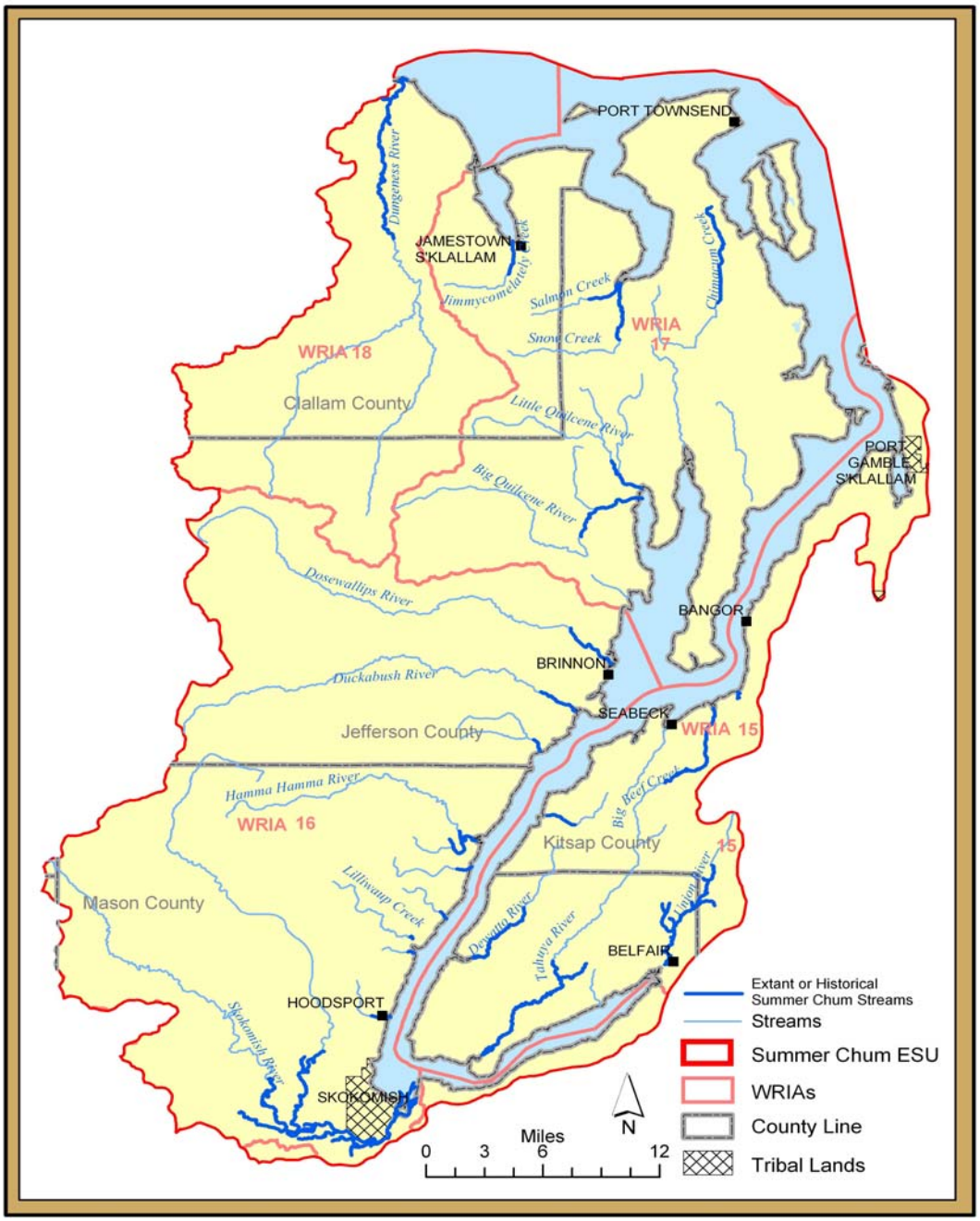

Figure 1. Hood Canal/Eastern Strait of Juan de Fuca Summer Chum Salmon Recovery Planning Area. (from Figure 2, p. 5 of the Hood Canal Summer Chum Recovery Plan, Map developed by Gretchen Peterson, PetersonGIS.)

1.8 Current ESU Status

A status review of all west coast salmon species initiated in 1994 by NMFS (NMFS 1994) determined that summer chum salmon originating from Hood Canal and the eastern Strait of Juan de Fuca watersheds represented an evolutionarily significant unit (ESU) (Johnson et al. 1997). In March 1999, the summer chum salmon ESU was listed as threatened under the ESA (64 FR 14508). In 2005, NMFS reviewed the ESU and determined that it still warranted ESA protection (Good et al. 2005 and 70 FR 37160).

Sixteen historically present "stocks," of which eight are extant, made up the Hood Canal summer chum salmon ESU. The historical populations included at least those 16 spawning aggregation units and likely some additional undocumented and less persistent aggregations (Sands et al. 2007). Programs are underway to reintroduce summer chum to several of the watersheds where stocks were lost. The co-managers have identified all of these stocks in their SCSCI and subsequent supplemental reports (WDFW and PNPTT 2000, 2001, 2003; PNPTT and WDFW 2003). The PSTRT considers these stocks "subpopulations, which contribute to either the Hood Canal or Strait of Juan de Fuca population, depending on their geographical location" (Sands et al. 2007).

2.0 NMFS' REVIEW OF, AND ADDITIONS TO, THE HCCC PLAN

After an extensive review of the HCCC Plan and subsequent public comments, NMFS has concluded that the Hood Canal Coordinating Council Summer Chum Salmon Recovery Plan, with the addition of enhancements identified in this Supplement, meets ESA section 4(f) recovery plan requirements. In this section we summarize NMFS' review, additions, and conclusion.

Sections 2.1 and 2.2 contain NMFS' assessment of and conclusions regarding the HCCC Plan's overall goals and recovery strategy. Section 2.3 is a summary of how the HCCC Plan meets the ESA section 4(f)(1)(B) requirements. Here NMFS also adds specific "threats" criteria addressing the ESA section 4(a)(1) factors for re-classification or delisting of the ESU.

2.1 Recovery Goals

The "overall goal" set in the HCCC Plan is "to recover and obtain delisting of the summer-timed chum salmon populations in Hood Canal and the eastern Strait of Juan de Fuca watershed, including restoration of populations[1] in watersheds where summer chum have been extirpated"[2] (HCCC Plan, p. 12). The purpose of reintroducing summer chum to some historically occupied areas is to recover the populations' spatial structure and diversity sufficiently to allow delisting. At the same time, the HCCC Plan also adopts the overall goal presented in the *Summer Chum Salmon Conservation Initiative,* as follows:

> To protect, restore and enhance the productivity, production and diversity of Hood Canal summer chum salmon and their ecosystems to provide surplus production sufficient to allow future directed and incidental harvests of summer chum salmon (WDFW and PNPTT 2000) (quoted in the HCCC Plan, p. 12).

"The HCCC Board, in considering a recovery plan that can be implemented and meets the desires of the land-use (Counties) and Tribal authorities, further adds that a summer chum salmon recovery plan be designed to provide:

- the Counties with as much certainty as is possible regarding development, growth and land use,
- as much certainty as is possible for Tribal goals and objectives, and
- as much certainty as is possible for private landowners.

"Certainty means that the HCCC Plan will strive to give the Counties, Tribes, and public a clear understanding of salmon recovery, the actions that it will take to achieve recovery, and at what economic cost" (HCCC Plan, p. 12-13).

NMFS supports these goals.

[1] In this context, the Plan is actually referring to the stocks or subpopulations identified by the co-managers.

[2] Extirpated: extinct in a particular area but surviving in others.

2.2 Recovery Strategy

The HCCC Plan provides a strategy to achieve its overall goal of recovery and delisting of the summer-run chum salmon in Hood Canal and the eastern Strait of Juan de Fuca. The HCCC Plan's recovery strategy focuses on habitat protection and restoration throughout the geographic range of the ESU, including both freshwater habitat and nearshore marine areas within one mile radius of the watersheds' estuaries. The plan fully adopts and incorporates the co-managers' harvest management and hatchery supplementation programs that are ongoing as part of the SCSCI. The harvest management regime has reduced exploitation rates from nearly 90 percent in the 1980s to the current average of 2 percent. Hatchery supplementation programs use native broodstock, allow hatchery-origin fish to spawn naturally, are carefully monitored and evaluated, and are scheduled to sunset in a maximum of three salmon generations. The SCSCI and the HCCC Plan also include reintroduction of naturally spawning summer chum aggregations to several streams where they were historically present.

The HCCC Plan gives first priority to protecting the functioning habitat and major production areas of the ESU's eight extant stocks, keeping in mind the biological and habitat needs of different life-history stages, and second priority to restoration of degraded areas, where recovery of natural processes appears to be feasible (HCCC Plan, p. 29).

To help organize recovery planning, the HCCC designated six "conservation units," geographic groupings of the eight summer chum stocks identified and targeted for recovery by the co-managers and the PSTRT (Table 1 and Figure 2). The conservation unit concept was used to organize both analysis of the relationships between land use patterns and habitat and potential recovery actions. The HCCC Plan states that organizing by conservation unit will "allow community and volunteer groups and citizens that are already organized in the ESU to direct their efforts at specific recovery issues. Local land use authorities can then clearly see how their individual salmon recovery efforts fit in the comprehensive salmon recovery effort throughout the ESU. . . The conservation unit construct provides an approach for salmon recovery that is responsive to the biological needs of the fish in the context of political, economic and social realities" (HCCC Plan, p.38).

The HCCC Plan focuses on specific solutions or packages of solutions to specific problems in each conservation unit. HCCC planners worked with county staffs and officials to identify policy options and actions for salmon recovery (Sections 7-12 of the HCCC Plan). NMFS expects that together with the harvest and hatchery components of the HCCC Plan, these actions will put the Hood Canal and Strait of Juan de Fuca populations on a trajectory toward recovery.

Recognizing that there is uncertainty involved in taking actions to bring about salmon recovery, the HCCC Plan emphasizes incorporation of monitoring and adaptive management into the planning process, as well as long-term coordination of efforts (HCCC Plan, Chapter 3, p. 22).

NMFS supports the HCCC Plan's recovery strategy and also expects that further work will be done to address recovery priorities as new information becomes available. NMFS will work with the affected Puget Sound Treaty Tribes and the Washington Department of Fish and Wildlife

within the ESA, NEPA, U.S. *v*. Washington, HCCC forums, and the public to evaluate the specific plans proposed within each watershed prior to formal decisions.

In this section we further emphasize, reinforce, or augment particular elements of the HCCC Plan's recovery strategy to ensure uncertainties are minimized to the extent possible at this time.

Table 1. Summer chum salmon stocks associated with the designated conservation units. (Source: HCCC Plan, p. 35)

Conservation Unit	**Stock**	**Status**
Lilliwaup-Skokomish	Lilliwaup	Extant – Supplemented (Hatchery program ongoing.)
	Finch	Extinct
	Skokomish	Extinct
Hamma Hamma-Duckabush-Dosewallips	Hamma Hamma	Extant – Supplemented (Hatchery program ongoing.)
	Duckabush	Extant
	Dosewallips	Extant
Eastern Strait of Juan de Fuca	Dungeness	Extant? Extinct?[3]
	Jimmycomelately	Extant – Supplemented (Hatchery program ongoing.)
	Snow/Salmon	Extant – (Supplemented in Salmon Creek only. Hatchery program met goal and is now terminated.)
	Chimacum	Extinct – Reintroduced (Hatchery program met goal and is now terminated.)
Quilcene	Big/Little Quilcene	Extant – Supplemented (Hatchery program met goal and is now terminated.)
West Kitsap	Dewatto	Extinct
	Anderson	Extinct
	Big Beef	Extinct – Reintroduced (Hatchery program ongoing.)
Union	Union	Extant – Supplemented (Hatchery program met goal and is now terminated.)
	Tahuya	Extinct – Reintroduced (Hatchery program ongoing.)

[3] Not much information available; under study.

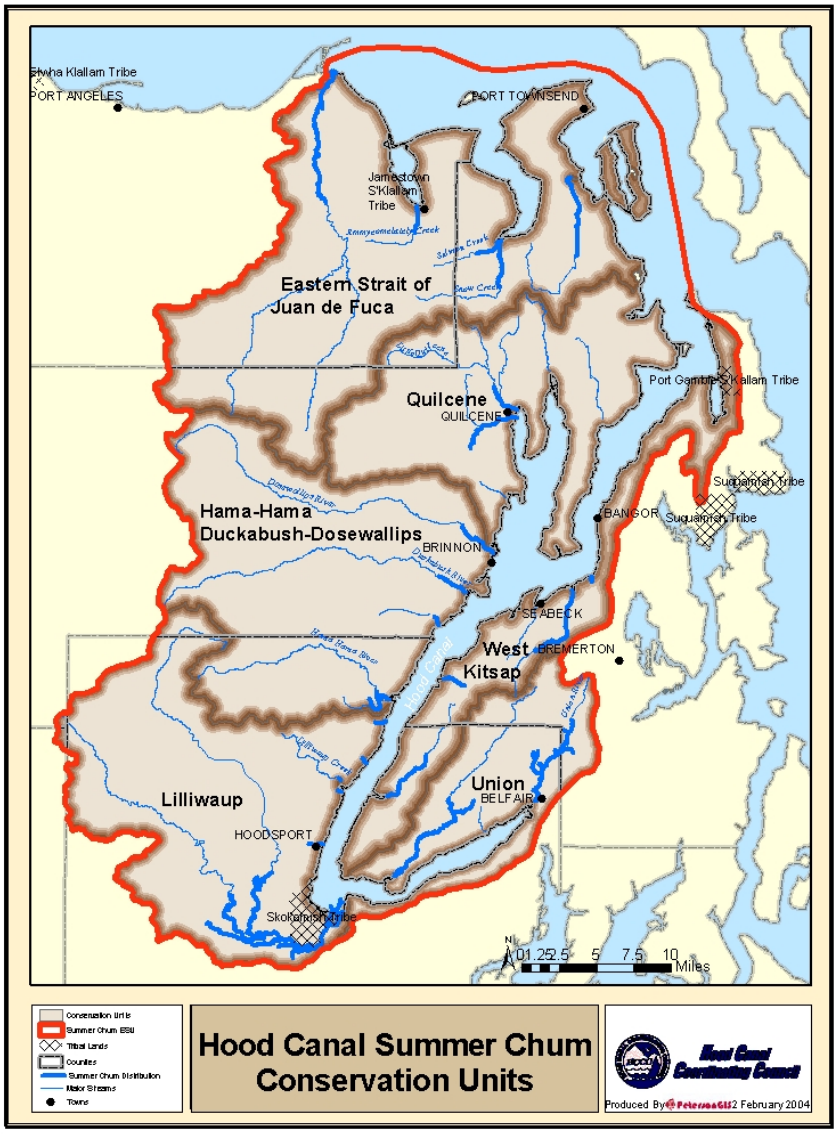

Figure 2. Hood Canal Summer Chum Conservation Units
(Figure 3.2, p. 36 of HCCC Plan)

2.2.1 Factors for Decline

The recovery strategy is intended to address the factors for decline of the species. NMFS finds it helpful to understand the factors for decline in terms of limiting factors and threats. Limiting factors are defined as the physical conditions limiting population status (e.g. elevated water temperature). Threats are defined as those human activities or naturally induced actions that cause the limiting factors (e.g. riparian vegetation removal). The HCCC Plan relies on the SCSCI and its supplemental reports (WDFW and PNPTT 2000, 2001, 2003 and PNPTT and WDFW 2003), the Limiting Factors Reports for WRIAs 14, 15, 16, 17, and 18 (Haring 1999, Correa 2002, Correa 2003, Kuttel 2003), and refugia studies (May and Peterson 2003) for analysis of threats and limiting factors affecting Hood Canal summer chum.

From these sources, the HCCC Plan states that the primary factors for decline of the summer chum salmon are (1) climate-related changes in stream flow patterns, (2) past fishery exploitation, and (3) cumulative habitat loss (p. 71). Hatcheries are not considered a factor for decline in the case of the summer chum; prior to and since the summer chum's listing as threatened in 1999, the co-managers have implemented hatchery supplementation and reintroduction programs to reduce the short-term extinction risk to existing wild summer chum populations, and to increase the likelihood of their recovery. NMFS considers the hatchery supplementation and reintroduction programs to be an important element of the HCCC Plan's recovery strategy.

2.2.2 Habitat

Chapter 6 of the HCCC Plan summarizes overall habitat issues for the ESU. More detail is included in the HCCC Plan's individual chapters on conservation units. The HCCC Plan states that because summer chum rely on a complex mix of different habitat types in different seasons during their various life stages, long-term habitat loss and degradation have affected the chum's productivity and life history diversity as well as abundance. The areas that most directly affect survival and persistence of Hood Canal summer chum populations are the freshwater habitats (typically lower river spawning areas), and the immediate marine nearshore environs. Thus, loss of channel complexity, altered sediment dynamics, riparian degradation, estuarine habitat loss and degradation from diking, filling, log storage, and road causeways, and alteration of the nearshore environment from shoreline development are factors limiting the ESU's survival (HCCC Plan, pp. 68-77).

2.2.2.1 <u>Stream Flow Patterns</u>

The HCCC Plan states that climate-related changes in stream flow patterns are a factor for decline. It states that the interactions of human-induced changes to stream ecosystems and high harvest rates combined to render summer chum subpopulations more vulnerable to climate shifts, but that "Climate shifts like those observed in the past 30 years, with their associated stream flow changes, likely . . . posed little threat to summer chum populations before the cumulative effects of habitat changes from human development became manifest" (HCCC Plan, p. 71).

NMFS agrees that summer chum are particularly sensitive to variations in instream flows, which vary naturally between years and perhaps over decades. However, possible changes in climate over the past 30 years were reasoned from flow records and have not been investigated by a detailed study. The trend in late summer low flows described in WDFW and PNPTT (2000) was not sustained from 1994 through 2003; it may reflect stochastic variation as much as possible climate change. The two watersheds that have a snow-dominant hydrology, the Dosewallips and Dungeness rivers, would be expected to show a trend of lower summer flows over the next few decades if the regional snowpack gradually shrinks from climate change.

The 2004 State of Salmon Watersheds Report (WGSRO 2004) lists the Dungeness as a "water-critical basin" that is over-appropriated. Given the certainty of increasing demand on water supplies throughout Puget Sound, NMFS believes there is an urgent need to ensure sufficient instream flows to recover Hood Canal summer chum salmon. Water quantity management and regulation in Washington is carried out under the laws of the state as administered by the Department of Ecology. NMFS strongly encourages the Department of Ecology to act swiftly to protect instream flows and to work with Puget Sound Tribes, local governments, and other interested parties to implement water conservation and flow restoration programs. The probability of salmon recovery being successful in the Hood Canal region will be substantially increased if an effective instream flow management program is implemented as soon as possible.

2.2.2.2 Forest Lands

Federal forest lands are managed according to the Northwest Forest Plan's Aquatic Conservation Strategy (ACS) (http://www.reo.gov/library/acs/). The ACS has four key elements: riparian reserves, key watersheds, watershed analysis, and watershed restoration. Together these provide comprehensive long-term protection of aquatic habitat. Furthermore, as with all Federal actions, ongoing forest operations on National Forests will be reviewed by NMFS under section 7(a)(2) of the ESA as each National Forest proposes actions that may affect ESA-listed salmon. Forest operations on state forest lands and certain private forest lands are covered by an existing Habitat Conservation Plan already programmatically reviewed and approved by NMFS. The Forest Practice Rules Habitat Conservation Plan (FPHCP, signed June 5, 2006; http://www.nwr.noaa.gov/Salmon-Habitat/Habitat-Conservation-Plans/Washington-Forest-Practices/Index.cfm) includes an extensive record that describes how implementing those conservation measures provides a high likelihood of contributing to recovery of watershed processes that support salmon and trout statewide. In the context of the Recovery Plan, it is significant that several hundred thousand acres of privately managed timberlands in Puget Sound will be managed according to the FPHCP. Over time, watershed processes related to riparian function, sediment delivery, and channel condition are expected to measurably improve. Improving conditions in forested watersheds will likely contribute to salmon recovery.

2.2.2.3 Agricultural Lands

The HCCC Plan supports voluntary best management practices on agricultural lands, as encouraged through county, state, and Federal offices. NMFS recognizes that farmers have a range of abilities and opportunities to manage their farm lands in ways that conserve salmon habitat. In many parts of Puget Sound, including Hood Canal and the Eastern Strait of Juan de

Fuca, substantial improvements in riparian and water management are necessary to provide functional habitats for salmon. NMFS expects that proposed restorative actions on such lands will be consistent with local biological assessments and mirror the priorities described in local recovery plans. Improvements to salmon habitat can result from farm management plans that include enhancing riparian vegetation and stream channel health; treating erosion sites along streams and rivers; ensuring that all watercourses accessible to fish are maintained in a way that avoids exposure of salmon to maintenance actions; properly screening all water diversions; and using biocides and fertilizers consistent with the most recent safeguards identified by NMFS.

2.2.3 Harvest

The HCCC Plan summarizes the co-managers' conclusions about historical impacts of harvest as a major cause of the summer chum's decline. Harvest increased substantially in the mid-1970s and 1980s; total exploitation rates in the mid-1980s "averaged about 66 percent" (WDFW and PNPTT 2000) and were as high as 90 percent on some stocks (HCCC Plan, pp. 47-48). Since the early 1990s, exploitation rates have declined by 90 percent or more.

Beginning in 1992 and culminating in the implementation of the SCSCI in 2000, the co-managers designed harvest management regimes to limit mortality from fishing to a rate that allows the vast majority of summer chum salmon to return to their natal spawning grounds (HCCC Plan, p. 46). Implementation of the harvest management strategy since 2000 has worked as expected. Escapements have increased to all components of the ESU, and observed exploitation rates are even lower than anticipated (below 3 percent and 1 percent for Hood Canal and Strait of Juan de Fuca populations, respectively). The HCCC Plan fully adopts and incorporates the SCSCI harvest strategy. The HCCC Plan describes the various harvest forums and the structure of the harvest management planning process. Harvest management is a government-to-government process among tribal, state, and Federal managers. Fisheries affecting the summer-run chum salmon ESU are implemented under the principles of the Pacific Salmon Treaty, the Magnuson-Stevens Act, U.S. *v*. Washington, and the Hood Canal Salmon Management Plan. Fishery management will continue to fall under the purview of the laws, regulations, and policies governing each of the harvest management forums. Technical or policy forums created for the HCCC Plan and considering harvest issues must work with the parties in these existing harvest management forums to ensure that harvest planning activities are coordinated.

The harvest strategy in the HCCC Plan includes explicit assumptions regarding the level of Hood Canal summer chum harvest in Canadian fisheries. This is an important element in the overall harvest strategy, since past high exploitation rates in Canadian fisheries contributed to overharvest as a factor of decline for the ESU. NMFS and the co-managers will continue to address Canadian harvest of Hood Canal summer chum through the Pacific Salmon Treaty forum and future negotiations in order to maintain Canadian harvest levels within those stipulated in the HCCC Plan, or at levels that the best available information indicates are consistent with the recovery of the ESU.

The harvest management component of the SCSCI was provided to NMFS in 2000 as the co-managers' proposed joint Resource Management Plan (RMP) for managing salmon fisheries to

meet summer chum salmon ESA conservation needs. NMFS subsequently determined that the RMP adequately addressed all requirements specified under Limit 6 of the ESA 4(d) Rule for Hood Canal summer-run chum salmon (66 FR 31600, June 12, 2001). More information can be found at http://www.nwr.noaa.gov/Salmon-Harvest-Hatcheries/State-Tribal-Management/HC-Chum-RMP.cfm. Nevertheless, NMFS and the co-managers will continue to evaluate the performance of the harvest actions as described by the SCSCI's Base Conservation Regime (BCR) as new information becomes available, consistent with the evaluation and adaptive management elements of the SCSCI and the Plan.

NMFS expects that the co-managers will continue to implement the harvest actions and objectives in the RMP unless revised through adoption of a new harvest plan or through an adaptive management framework developed through recovery planning. NMFS will work with the affected Puget Sound Treaty Tribes and the Washington Department of Fish and Wildlife within the ESA, NEPA, U.S. *v*. Washington, HCCC forums, and the public to evaluate the specific plans proposed within each watershed prior to formal decisions.

2.2.4 Hatcheries

There were no hatchery programs producing Hood Canal summer chum before supplementation started in 1992, and artificial production of other salmonid species is not considered to be a cause of Hood Canal summer chum decline. The Plan fully adopts and incorporates the supplementation and reintroduction approach implemented by the co-managers under the SCSCI beginning in 1992 to conserve summer chum salmon in the action area. As described in the SCSCI and adopted in the Plan, artificial production directed at summer chum recovery would be applied only to preserve stocks identified as at moderate or high risk of extinction, and to reintroduce naturally spawning aggregations in selected watersheds where the indigenous stocks had become extirpated. The co-managers' supplementation and reintroduction programs have a sunset clause, which limits the duration of each hatchery program to a maximum of three summer chum salmon generations (12 years). Comprehensive monitoring and evaluation is set up to ascertain the success or lack of success of each program, its effects on natural populations, and when to stop supplementation. As of June 2006, three summer chum salmon supplementation programs and one reintroduction program had been terminated after meeting individual project goals specified in the SCSCI (WDFW and PNPTT 2000).

NMFS determined that the hatchery component of the co-manager RMP submitted in 2000 met summer chum salmon conservation needs and adequately addressed all requirements under Limit 5 of the ESA 4(d) rule (NMFS 2002a, 2002b). The PSTRT concluded in its 2005 review of the HCCC Plan that the hatchery strategy to supplement summer chum in Hood Canal is very well designed and has been well implemented throughout its tenure. The monitoring information resulting from the hatchery program is exemplary, and the co-managers have used the data to adjust their supplementation strategies as needed. The PSTRT noted that the hatchery strategy was not explicitly linked in the HCCC Plan to desired recovery outcomes for summer chum in Hood Canal. The HCCC responded that linkages between the hatchery strategy and the recovery strategy are addressed in the H-integration strategy, and such linkages are also discussed in the SCSCI and subsequent progress reports developed as part of the supplementation program.

Therefore, the hatchery component is an integral element of the recovery strategy described in the HCCC Plan.

2.2.5 Adaptive Management and Monitoring

Adaptive management is the process of adjusting management actions and/or directions based on new information. The basic idea is to build an evaluation method into an implementation plan, so that selection and design of future recovery actions can be adjusted depending on the results of previous actions. The HCCC Plan incorporates by reference the integrated program for monitoring, evaluation, and adaptive management included in the SCSCI (WDFW and PNPTT 2000, Part 4, Sections 4.2.5 and 4.2.5). In addition, the HCCC is developing a monitoring and adaptive management element of its overall implementation plan. NMFS believes the adaptive management and monitoring approaches specified in the HCCC Plan are adequate.

NMFS will continue to work with the HCCC in the development of this adaptive management and monitoring plan to help ensure that it provides the framework and information needed to evaluate the ESU's biological status and progress toward addressing threats and achieving recovery.

2.2.6 All-H Integration

In salmon recovery planning, it has become common usage to refer to the major categories of limiting factors (habitat, harvest, hatcheries, and hydropower) as the "Hs," and to speak of integrating or coordinating recovery actions among these factors as "all-H integration." In the HCCC Plan, all-H integration is itself integrated into the adaptive management, research, monitoring, and evaluation program. Ongoing recovery actions, including project selection and prioritization, are being coordinated across the Hs, and this will continue as the Recovery Plan is implemented and adaptive management proceeds.

Technical models are important implementation tools for effective harvest, hatchery, and habitat management. Monitoring plans within the Hood Canal summer-run chum recovery plan should include evaluation of available technical management models in order to increase the certainty that annual management regimes will meet their resource management and conservation objectives. Where currently unavailable, modeling tools should be developed to improve assessment of effects of management actions on salmon and salmon habitat. In particular, quantitative integration models should be developed that can be used together with empirical information to assess the cumulative effects of actions across the Hs on recovery of the ESU.

2.2.7 Other Issues

Actions to recover both the Hood Canal summer-run chum and Puget Sound Chinook salmon ESUs are occurring in many of the same watersheds, hatchery programs, and fisheries. Managers will evaluate recovery actions and programs for the two ESUs to find opportunities in the recovery strategies for synergistic effects in recovering both ESUs, to minimize adverse effects of implementing the recovery plan for one ESU on the other ESU where they are unavoidable,

and to maximize efficiencies in staff and financial expenditures where overlaps in recovery strategies occur.

2.3 ESA section 4(f)(1)(B) Requirements

This section contains a discussion and summary of how the HCCC Plan meets the three section 4(f)(1)(B) requirements listed in Section 1.1 of this Supplement.

Evaluating a species for potential delisting requires an explicit analysis of population or demographic parameters (the biological recovery criteria) and also of threats under the five ESA listing factors in ESA section 4(a)(1). Together these make up the "objective, measurable criteria" required under section 4(f)(1)(B).

These criteria are based on the best available scientific information and analyses, incorporating the most current understanding of the ESU and its populations. As the Recovery Plan is implemented, additional information will become available that can increase certainty about whether the threats have been abated, whether improvements in population and ESU status have occurred, and whether linkages between threats and changes in salmon status are understood. These recovery criteria will be assessed through the adaptive management program under development for the Recovery Plan, and there will be a thorough review of the criteria at the 5- and 10-year status reviews of the ESU. NMFS will apply the Recovery Plan's criteria and any subsequent revisions, as appropriate, when it makes a decision whether to delist the ESU.

2.3.1 Biological Recovery Criteria

NMFS' TRTs have identified the biological characteristics of viable ESUs (McElhany et al. 2000). While the ESU is the listed entity under the ESA, the ESU-level viability criteria are based on the collective viability of the individual populations that make up the ESU—their characteristics and their distribution throughout the ESU's geographic range.

The PSTRT defined and recommended viability criteria for the Hood Canal summer chum ESU (Sands et al. 2007) and its two component populations. The population viability criteria are expressed in terms of risk of extinction over a 100-year time frame. Earlier in the SCSCI process, the co-managers developed "interim" or initial recovery goals for the eight extant stocks that make up the Hood Canal and Strait of Juan de Fuca summer chum populations (PNPTT and WDFW 2003), expecting that these would be compatible with the PSTRT's viability criteria (HCCC Plan, Chapter 2). The PSTRT scientists reviewed the co-managers' interim goals and concluded that they were compatible with, and could be viewed as intermediate steps to achieving, the long-term viability criteria. Furthermore, the PSTRT analyses support the use of the local stocks (subpopulations) identified by the co-managers as management units for recovering the ESU. The co-managers' interim recovery goals and PSTRT viability criteria are based on different, but compatible, approaches, and both are described in this section. Each approach and its criteria may be refined as new information becomes available.

NMFS accepts the PSTRT's ESU-level and population viability criteria as the biological component of the delisting criteria for the ESU. NMFS also accepts the co-managers' interim

recovery goals for the eight stocks as appropriate short-term targets and believes they provide a logical intermediate step toward the PSTRT's viability criteria and recovery of each of the populations in the ESU. NMFS will use the PSTRT's long-term viability criteria as part of its eventual delisting determination, which will include other considerations, described in Section 2.3.3.

2.3.1.1 The HCCC Plan's Interim ESU-Level Recovery Goals

The HCCC Plan adopts interim recovery goals for Hood Canal summer chum that were developed by the co-managers under the SCSCI (PNPTT and WDFW 2003). The HCCC Plan states that these goals "are designed to provide numeric targets of summer chum salmon abundance and escapement for the purposes of recovery planning" (HCCC Plan, p. 14), and, further, that "When realized, the recovery goals are expected to provide, on average, sufficient surplus abundance to allow for directed and incidental harvests of summer chum salmon" (ibid.).

In the HCCC Plan, abundance is defined as the size of the run or the number of recruits. Recruits are the number of adult summer chum salmon surviving prior to any fisheries in any given year. Escapement is defined as the number of adults that return to the natal spawning grounds (HCCC Plan, p. 92).

The co-managers set interim recovery goals in terms of abundance and escapement "thresholds" of natural-origin recruits for each of the eight stocks that make up the two extant populations. They linked these goals to specific criteria, including duration and productivity, that they believe should be met for recovery to be achieved. The ESU-wide interim recovery criterion set by the co-managers is for all eight of the extant stocks to meet all the individual stock recovery criteria (see Section 2.3.1.2, below). They further state, "The corollary to this criterion is that, on average, the ESU-wide abundance must meet or exceed the sum of all these individual stock abundance thresholds and the ESU-wide spawning escapement must meet or exceed the sum of all these individual stock escapement thresholds; also, on average, the ESU-wide productivity must meet or exceed 1.6 recruits per spawner" (PNPTT and WDFW 2003). The HCCC Plan adopts this criterion for the ESU (HCCC Plan, p. 18).

To address the restoration and maintenance of population diversity for the ESU, which, as previously described, is considered to relate to freshwater and nearshore habitat diversity, the co-managers propose habitat protection and recovery, and the reintroduction of selected extirpated summer chum salmon stocks, where feasible (HCCC Plan, p. 19).

These interim goals represent a stage in an ongoing collaboration between the co-managers, NMFS, and the PSTRT. NMFS staff participated in the development of the co-managers' interim recovery goals, and the PSTRT reviewed them. As the PSTRT's detailed viability analysis was developed, discussion and collaboration with the co-managers, NMFS, and HCCC staff continued.

2.3.1.2 The HCCC Plan's Interim Stock-Level Recovery Goals

The abundance "thresholds" for each stock that were provided as interim recovery goals under the SCSCI and included in the HCCC Plan were calculated as the arithmetic mean annual

natural-origin recruit run sizes returning to the Hood Canal and Strait of Juan de Fuca marine areas adjacent to the summer chum streams. These recovery abundance goals reflect the abundance of summer chum before the recent population declines, based on the premise that the stocks were relatively healthy at that time. The pre-decline years used to derive mean recovery abundance are different for different stocks, depending on their identified abundance trends. For Hood Canal stocks, the averages are derived from abundances in the 1970s. For Strait of Juan de Fuca, averages are derived from abundances from the mid-1970s through the 1980s.

The HCCC Plan also provides interim escapement thresholds, defined as the number of natural-origin adults that return each year to the natal freshwater spawning grounds. Spawning escapement thresholds were estimated for each stock by dividing the identified stock abundance threshold by a recruit/spawner ratio of 1.6. Lacking adequate historical data, this ratio was selected because it was within a reasonable range of observed productivity levels, including documented estimates for summer chum populations in Alaska and British Columbia (PNPTT and WDFW 2003).

The stock-specific abundance levels set as interim recovery goals reflect marine area abundance levels that would allow both adequate spawning escapement and harvest. These stock-specific abundance levels include stock escapement, fish removed by fisheries, and other sources of pre-escapement mortality. The use of these abundance levels as interim recovery goals for individual stock abundance is supportive of and consistent with the SCSCI and HCCC Plan objective to recover summer chum to levels that will allow "future directed and incidental harvests." A more detailed description of the background can be found in SCSCI Supplemental Report No. 5, Interim Summer Chum Salmon Recovery Goals (PNPTT and WDFW 2003).

The individual stock recovery abundance and spawning escapement thresholds set by the co-managers and adopted as interim recovery goals in the HCCC Plan are as follows (Tables 2 and 3):

Table 2. Eastern Strait of Juan de Fuca Population Annual Natural-Origin Summer Chum Abundance and Escapement Interim Recovery Goals. (Source: HCCC Plan, p. 17)

Stock	Abundance	Escapement
Salmon/Snow	1,560	970
Jimmycomelately	520	330

Table 3. Hood Canal Population Annual Natural-Origin Summer Chum Abundance and Escapement Interim Recovery Goals. (Source: HCCC Plan, p. 17)

Stock	Abundance	Escapement
Quilcene (Big and Little)	4,570	2,860
Hamma Hamma	6,060	3,790
Duckabush	3,290	2,060
Dosewallips	3,080	1,930

Lilliwaup	3,130	1,960
Union	550	340

The co-managers' recovery criteria for each individual stock are as follows (HCCC Plan, p. 18):

- The mean natural-origin abundance and mean natural-origin spawning escapement of each stock shall meet or exceed the above-described abundance and spawning escapement thresholds, over a period of the most recent 12 years.
- The natural-origin abundance and natural-origin spawning escapement of each stock shall be lower than the stock's respective critical thresholds (or, where applicable, minimum escapement flag)[4] in no more than 2 of the most recent 8 years and, additionally, in no more than 1 of the most recent 4 years.
- Natural recruits per spawner shall average at least 1.6 over the 8 most recent brood years for which estimates exist and no more than 2 of the 8 years shall fall below 1.2 recruits per spawner.

Together these criteria address each of the four VSP elements in recovery. The co-managers and HCCC continue to collaborate with the PSTRT on developing approaches that will further clarify the relationship between the interim recovery goals and the PSTRT's viability criteria. Additional quantitative analyses to determine historical habitat capacity, for example, may be conducted during the initial phase of Plan implementation. Results from those analyses would provide a third analytical approach for verifying the co-managers' interim goals and PSTRT viability criteria, the rebuilding strategy between the two, and making informed refinements if necessary as part of the adaptive management program.

2.3.1.3 The PSTRT's ESU Viability Criteria

The PSTRT concluded that both of the historical populations of summer chum should achieve a low risk (i.e., viable) status in order for the ESU to have a negligible risk of extinction. "Viable" in this sense refers to a naturally self-sustaining population that has a negligible risk of extinction over a 100-year time frame. In practical terms, a population should have certain characteristics to be considered viable—sufficient numbers of naturally produced spawners and sufficient productivity (i.e. ratio of naturally produced and natural-origin juveniles per adult), diversity, and distribution of fish throughout the watershed (see McElhany et al. 2000).

As noted in the HCCC Plan, the PSTRT found that summer chum salmon in the Hood Canal and eastern Strait are probably "a single metapopulation held together historically by a stepping stone pattern of demographic exchange" (Sands et al. 2007), created by straying between adjacent streams. The PSTRT noted that because of the historical connectivity between subpopulations that spawned in Hood Canal and eastern Strait of Juan de Fuca streams, and gaps created by subsequent extirpations, it will be important to consider how to re-establish the links in order to maintain sufficient resilience at the stock, population, and ESU level. The PSTRT has provided

[4] See Appendix 1.5 in WDFW and PNPTT 2003b for a description of the critical thresholds, minimum escapement flags, and their derivation.

analyses that will be useful in refining strategies for recovering summer chum abundance, productivity, spatial distribution, and diversity at the ESU level (Sands et al. 2007).

2.3.1.4 The PSTRT's Population Viability Criteria

The PSTRT provided viability criteria for the two summer chum populations (Sands et al. 2007); these criteria describe characteristics predicted to result in a negligible risk of extinction in the long term (100 years). The abundance and productivity attributes are estimated through quantitative population models; spatial structure and diversity of viable populations are described more qualitatively. The PSTRT considers the co-managers' interim stock recovery goals described in Section 2.3.1.2 of this Supplement compatible with these long-term criteria as appropriate short-term targets and a reasonable intermediate step toward the PSTRT's long-term viability criteria.

Abundance and productivity: A population will have a low risk of extinction if it has sufficient naturally produced abundance and productivity to persist in the face of natural variability in returns caused by environmental and anthropogenic factors. Abundance (adults on the spawning ground) and productivity (adult progeny per parent) are linked; populations with low productivity can persist if they are sufficiently large, and small populations can persist if they are sufficiently productive. Productivity can be density dependent, i.e., high abundance of spawners in a given habitat can result in lower productivity, and lower abundance can result in higher productivity, depending on habitat capacity.

The PSTRT used two methods of population viability analysis for estimating minimum abundance levels associated with persistence of Hood Canal Summer Chum ESU populations. The first method, the SimSalmon model, assumes a basic replacement level of productivity (i.e., where recruits to spawners = 1:1), whereas the other method, the VRAP model (Viability and Risk Assessment Procedure), takes into account variations in productivity, habitat capacity, and exploitation rate.

Using the SimSalmon method, a viable Strait of Juan de Fuca summer chum population would have 12,500 spawners, and a viable Hood Canal summer chum population would have 24,700 spawners.

The VRAP model can estimate the productivity and/or abundance required at a given rate of harvest. VRAP assumes that the recruits per spawner relationship (R/S) is density dependent and uses a spawner-recruit function to estimate a productivity curve (defined by intrinsic productivity and capacity) that results in the population remaining above a specified quasi-extinction threshold given a fixed exploitation rate (the fraction of returning adults taken by the fishery). Estimates of spawner escapement consistent with viable summer chum populations under different assumptions of intrinsic productivity, capacity, and persistence probability are presented in Sands et al. (2007). In this second method, separate productivity curves are estimated for the Hood Canal and Strait of Juan de Fuca populations over an exploitation rate range of 0 to 30 percent. To support harvest, the population viability curves should have higher values of productivity and capacity than without harvest.

By the VRAP method, spawner escapement numbers for a viable Strait of Juan de Fuca population could be as low as 4,500 adults if the population can be assumed to be driven by density-dependent dynamics and the intrinsic productivity and capacity parameters of the population's viable spawner-recruit curve can be estimated and achieved (i.e., for escapement of 4,500, intrinsic productivity would have to be 5 and capacity 3,300).

Under a high productivity scenario, spawner escapement numbers for a viable Hood Canal population could be as low as 18,300 adults if the population can be assumed to be driven by density-dependent dynamics and the corresponding intrinsic productivity and capacity parameters of the population's viable spawner-recruit curve can be estimated and achieved (i.e., for escapement of 18,300, intrinsic productivity would be 5 and capacity 13,500).

In both cases the recommended ranges are based on the assumption that the populations are made up of naturally produced salmon, and that they achieve their spatial structure and diversity criteria, i.e. that spawning takes place throughout the population's freshwater spawning range and a representation of historical diversity persists.

During the period before the population achieves its viable state (where the population abundance is stable), a useful benchmark for tracking progress in recovery is for the population growth rate for spawners to be greater than 1.

Spatial structure: A viable population contains multiple persistent spawning aggregations. The number of persistent aggregations needed for viability depends on the historical biological characteristics of the population and the historical distribution of spawning aggregations of the population. A population that meets the criteria below is likely to have a negligible risk of extinction over a 100-year period (i.e., be viable):

- Spawning aggregations are distributed across the historical range of the population.
- Most spawning aggregations are within 20 km of adjacent aggregations.
- Major spawning aggregations (spawning aggregations in rivers/creeks that have historically provided the most persistent habitat) are distributed across the historical range of the population and are not more than approximately 40 km apart.

Both larger and smaller spawning aggregations of summer chum are important. Although it may not be necessary to reestablish spawning aggregations in all rivers and streams where they historically occurred, meeting spatial structure population viability criteria will require reestablishing spawning aggregations in some major rivers and smaller streams and creeks where they have been extirpated. Particularly in the early stages of population and ESU recovery, production of summer chum from smaller streams may provide important contributions to the health of freshwater, estuarine, and marine ecosystems and to the maintenance of the viability of the population while degraded habitats in other rivers and creeks are recovering.

Further, the PSTRT notes that a viable population has spawning, rearing, and migratory habitats that function in a manner that is consistent with population persistence. Conditions in the tributaries will affect the nearshore and estuarine environments into which they empty and poor water quality and other habitat degradation can create inhospitable or stressful local conditions for summer chum salmon. Estuarine habitats associated with both spawning and non-spawning

tributaries act as stepping stone habitats for migrating chum and potentially affect the probability of successful dispersal and recolonization.

Diversity: The PSTRT estimates there were likely to have been at least two ecological diversity groups within the Strait of Juan de Fuca population and at least four ecological diversity groups within the Hood Canal population. Depending on the geographic extent and ecological context of the population, a viable population includes one or more persistent spawning aggregations from each of the two to four major ecological diversity groups historically present within the two populations (see also McElhany et al. 2000). In all cases, with the possible exception of the Dungeness River aggregation within the Strait of Juan de Fuca population, summer chum spawning groups exist today that represent each of the ecological diversity groups within the two populations.

2.3.1.5 Adaptive Management Using ESU Viability Criteria

Implementation of the HCCC Plan is designed to ultimately achieve goals for the four VSP parameters of abundance, productivity, diversity, and spatial structure. However, as with all ESUs, the population viability criteria for the Hood Canal summer chum populations are based on best current information and scientific analyses. There are significant sources of uncertainty associated with the estimates of planning ranges for population and ESU viability; this uncertainty is due to such factors as uncertainty in population boundaries and the suitability of certain streams to support summer chum during juvenile or adult stages (Sands et al. 2007). For this reason, NMFS considers the population viability criteria to be an adaptively managed part of the recovery plan. As new data and modeling results become available, the population viability criteria will be refined over time as necessary. NMFS also expects that management objectives for diversity and spatial structure will be further refined over the next several years as part of recovery plan implementation.

Recent scientific studies indicate the Hood Canal summer chum populations may be particularly vulnerable to climate-related increases in temperature and decreases in stream flow (cf. Battin et al. 2007). NMFS expects existing uncertainties about the effect of climate change on Hood Canal summer chum populations to be resolved and management actions to be adjusted accordingly as the Plan is implemented and adaptive management proceeds.

2.3.2 Listing Factor (Threats) Criteria

Listing factors are those features that were evaluated under section 4(a)(1) when the initial determination was made to list the species for protection under the ESA. These may or may not still be limiting recovery when in the future NMFS reevaluates the status of the species to determine whether the protections of the ESA are no longer warranted and the species could be "delisted."

NMFS proposes that, to determine that the affected ESU is recovered to the point that it no longer requires the protections of the ESA, the ESA listing factors should be addressed according to specific criteria identified for each of them so that delisting is not likely to result in re-emergence of the threat. It is also possible that current perceived threats will become

insignificant in the future because of changes in the natural environment or changes in the way threats affect the entire life cycle of salmon. Consequently, NMFS expects that the ranking of threats will change over time and that new threats may be identified. During the periodic status reviews, NMFS will evaluate and review the listing factor criteria under conditions at the time.

The HCCC Plan describes potential threats in terms of harvest, hatcheries, habitat, ocean conditions, and climate change, and also considers cumulative effects from all of these factors. The HCCC staff provided Table 4 (see below in Section 2.3.4 of this document) summarizing limiting factors identified in the HCCC Plan and recommended habitat and hatchery actions by conservation unit and component stock.

Drawing from the HCCC Plan's discussions, NMFS is providing the specific criteria listed below for each of the relevant listing/delisting factors to help to ensure that underlying causes of decline have been addressed and mitigated prior to considering the summer chum salmon ESU for delisting.

***Factor A: The present or threatened destruction, modification, or curtailment of a species' habitat or range*.** Each of the threats criteria described below is related to one or more of the major factors limiting recovery described in the HCCC Plan and listed in NMFS' 2005 Report to Congress on the Pacific Coastal Salmon Recovery Fund (PCSRF) for Hood Canal summer chum salmon, i.e., (1) degraded floodplain and mainstem river channel structure; (2) degraded estuarine conditions and loss of estuarine habitat; (3) riparian area degradation and loss of in-river large woody debris in mainstem; (4) excessive sediment in spawning gravels; 5) reduced stream flow in migration areas; and (6) degraded nearshore conditions (NMFS 2005a)

To determine that the ESU is recovered, threats to habitat should be addressed as outlined below:

1. Channel function, including vegetated riparian areas, instream wood, stream bank stability, off-channel and side-channel habitats, natural substrate and sediment processes, and channel complexity is restored to provide rearing, migration and spawning habitat to meet the HCCC Plan's recovery goals.

2. Instream flow conditions that support salmon rearing, spawning, and migration needs and meet the summer chum salmon population targets are achieved.

3. Floodplain function and the availability of floodplain habitats for salmon are restored to a degree sufficient to support a viable ESU, including tidal wetland habitats in estuaries and the tidal freshwater portion of the lower rivers. This restoration should include connectedness between river and floodplain and the restoration of impaired sediment delivery processes and conditions affecting both estuaries and lower river reaches.

4. Deleterious effects of stormwater runoff are eliminated or controlled so as not to impair water quality and quantity in salmonid streams or the riparian habitats supporting them.

5. Land use and water management practices maintain suitable spawning habitat in watersheds with high-elevation headwaters to buffer against climate-related loss of spawning habitat in lower elevation drainages.

6. Groundwater and stream flows maintain suitable rearing and spawning temperatures.

7. Agricultural practices are implemented to protect and restore riparian areas, floodplains, and stream channels, and to protect water quality from sediment, pesticide, herbicide, and fertilizer runoff.

8. Urban and rural development, including land use conversion from agriculture and forest land to developed areas, does not impair water quality or result in dysfunctional stream conditions.

9. As appropriate or necessary to support region-wide recovery goals, passage obstructions (e.g. dams, tidegates, and/or culverts) are removed or modified to restore fish access to historically accessible habitat.

10. Nearshore processes are protected and restored so that ecological inputs (of sediment, instream and groundwater flows, insects, leaves and wood) and ecological habitat processes support properly functioning estuary and nearshore habitat conditions, including eelgrass beds, drift cells, and mudflats, which in turn support summer chum salmon and the species they prey upon.

11. The effects of toxic contaminants on salmonid fitness and survival in the Hood Canal and eastern Strait of Juan de Fuca estuaries, lower reaches of streams and rivers, and nearshore are sufficiently limited so as not to affect recovery.

12. Activities that dredge or fill in nearshore and river beds or harden stream banks are sufficiently mitigated.

13. Forest management practices that protect and restore watershed and stream functions are implemented on Federal, state, tribal, and private lands.

14. Technical tools accurately assess the impacts of habitat management actions.

For additional information on threats related to habitat, see Section 6 of the HCCC Plan.

Factor B. Overutilization for commercial, recreational, or educational purposes. To determine that the ESU is recovered, any utilization for commercial, recreational, scientific, or educational purposes should be addressed as outlined below:

1. Fishery management plans for salmon ESUs are in place that (a) accurately account for total fishery mortality (i.e., both landed catch and non-landed mortalities) and constrain mortality rates for individual populations to levels that are consistent with achieving ESU viability (i.e., provide for adequate spawning escapement given intrinsic productivity for populations and subpopulations representative of the life history and major regional divisions in the ESU); and (b) are implemented so that any effects on the abundance, productivity, diversity, and spatial structure of populations are consistent with the recovery of the ESU.

2. Technical tools accurately assess the potential impacts of fishery management actions.

3. Rules and regulations for fishery management actions are effectively enforced.

For additional information on threats related to harvest actions, see Section 2 of the HCCC Plan.

Factor C. Disease or predation. To determine that the ESU is recovered, any disease or predation that threatens its continued existence should be addressed as outlined below:

1. Hatchery operations in the region apply measures that reduce the risk that natural summer chum salmon populations are adversely affected by fish diseases and parasites.

2. The effects of harbor seal predation on Hood Canal summer chum salmon have been monitored for at least four years and results indicate that harbor seal predation is not impeding recovery.

3. Populations of introduced game fish are managed such that competition with or predation on summer chum salmon does not impede salmon population recovery.

For additional information on current threats resulting from disease or predation, see the individual conservation unit chapters of the HCCC Plan.

Factor D. The inadequacy of existing regulatory mechanisms. To determine that the ESU is recovered, any inadequacy of existing regulatory mechanisms that threatens its continued existence should be addressed as outlined below:

1. Regulatory mechanisms are in place to ensure that any effects on the abundance, productivity, diversity, and spatial structure of populations are consistent with the recovery of the ESU.

2. Technical tools accurately assess the potential impacts of regulatory actions.

3. Rules and regulations for habitat protection and restoration are effectively enforced.

4. Habitat conditions, watershed functions, and nearshore processes are protected and restored through land-use planning that guides human population growth and development.

5. Habitat conditions and watershed function are protected and restored through regulations that govern resource extraction such as timber harvest and gravel mining.

6. Habitat conditions, watershed functions, and nearshore processes are protected and restored through land protection agreements as appropriate, where existing policy or regulations do not provide adequate protection.

7. Adequate resources, priorities, regulatory frameworks, and coordination mechanisms are established and/or maintained for effective enforcement of land and water use regulations that protect and restore habitats and marine and freshwater water bodies and for the effective management of fisheries.

8. Regulatory, control, and education measures to prevent additional exotic species invasions are in place.

For additional information on existing regulatory mechanisms, see Section 13 of the HCCC Plan.

Factor E. Other natural or man-made factors affecting continued existence. To determine that the ESU is recovered, other natural and man-made threats to its continued existence should be addressed as outlined below:

1. Hatchery management plans are in place to ensure that any effects on the abundance, productivity, diversity, and spatial structure of populations are consistent with the recovery of the ESU.

2. Monitoring, evaluation, and research programs are implemented to assess the potential impacts of hatchery, habitat, and harvest management actions.

3. Rules and regulations for hatchery management and protection are effectively enforced.

4. Hatchery programs are operated in a manner that is consistent with individual watershed and region-wide recovery approaches; appropriate criteria are used for the integration of hatchery summer chum salmon populations and extant natural populations inhabiting watersheds where the hatchery fish return.

5. Hatcheries operate using appropriate ecological, genetic, and demographic risk containment measures for (1) hatchery-origin adults returning to natural spawning areas, (2) release of hatchery juveniles, (3) handling of natural-origin adults at hatchery facilities, (4) withdrawal of water for hatchery use, (5) discharge of hatchery effluent, and (6) maintenance of fish health during their propagation in the hatchery.

6. Hatcheries mark or tag all juvenile summer chum salmon so that they can be differentiated from natural-origin summer chum salmon in fisheries, migratory areas, and as adults returning to hatcheries and natural spawning areas.

7. Mechanisms are in place to reduce the incidence of, and impacts from, introduced, invasive, or exotic species.

8. Ecological functions of salmon, including their benefits in cycling ocean-derived nutrients into freshwater estuarine and nearshore areas, are considered in fishery, hatchery, and habitat management.

For additional information on threats related to hatcheries, see Section 5 of the HCCC Plan.

2.3.3 Application of the Criteria to Delisting Decisions

NMFS concludes that this Recovery Plan, which consists of the HCCC Plan and this Supplement, meets the ESA's section 4(f) requirement for objective, measurable recovery criteria. The Recovery Plan's biological criteria (Section 2.3.1.1) and listing factor (threats) criteria (Section 2.3.1.2), when taken together, describe conditions, commitments, and administrative measures that, when met, would result in a determination that the Hood Canal summer chum ESU is not likely to become endangered within the foreseeable future throughout all or a significant portion of its range. If NMFS reaches this determination, then it can recommend that the ESU be removed from the list of endangered and threatened species.

In accordance with its responsibilities under section 4(c)(2) of the Act, NMFS will conduct status reviews of Hood Canal summer chum salmon once every five years to evaluate the ESU's status and determine whether the ESU should be removed from the list or changed in status. Such evaluations will take into account the following:

- The biological recovery criteria (Sands et al. 2007) and listing factor (threats) criteria described above.
- The management programs in place to address the threats.
- Principles presented in the Viable Salmonid Populations paper (McElhany et al. 2000).
- Co-managers' interim stock-level recovery goals.
- Best available information on population and ESU status and new advances in risk evaluation and population viability methodologies.
- Other considerations, including: the number and status of extant spawning groups; the status of the major spawning groups; linkages and connectivity among groups; diversity groups and the two populations; the diversity of life history and phenotypes expressed; and considerations regarding catastrophic risk.
- Principles laid out in NMFS' Hatchery Listing Policy (70 FR 37204, June 28, 2005).

2.3.4 Site-Specific Management Actions

The ESA requires a recovery plan to include site-specific management actions. NMFS believes the HCCC Plan meets this requirement.

A full range of policy options for acquiring, funneling, and allocating resources for salmon habitat conservation was developed and presented to the members of the HCCC Board for review and decision-making. The HCCC Plan lists potential sources of funding, administrative paths, and target activities that could be undertaken for salmon recovery in the region (HCCC Plan, pp. 43-45), then makes site-specific recommendations in each conservation unit chapter (Chapters 7-12).

Table 4 summarizes the HCCC Plan's extensive program of site-specific actions to meet recovery objectives, including harvest management, hatchery supplementation and operational actions described in HGMPs, and habitat protection and improvements. These actions are detailed in the individual conservation unit chapters.

Table 4. Recommended Actions for Addressing Limiting Factors by Conservation Unit and Component Stock.

Conservation Unit	Target Stocks (1)	Recommended Key Actions (2)	Habitat Factors for Decline
Eastern Strait of Juan de Fuca This unit includes the Dungeness River, Jimmycomelately Creek, Salmon Creek, Snow Creek, and Chimacum Creek watersheds. Also included are the marine nearshore waters stretching from Chimacum Creek estuary, extending along the western shore of Admiralty Inlet, and including Discovery Bay, Sequim Bay, and the Dungeness River estuary. Marine offshore waters of Admiralty Inlet and the Eastern Strait of Juan de Fuca are also included. The eastern portion lies within Jefferson County and the western portion within Clallam County.	Jimmycomelately Stock produced in Jimmycomelately Creek, where they spawn up to RM 1.5, are targeted for recovery by co-managers and PSTRT. One of two extant stocks making up Strait of Juan de Fuca population.	<u>Programmatic Actions</u> • Clallam County enforce and monitor existing zoning for the Jimmycomelately watershed. • Implement National Forest road maintenance and road abandonment plans. • Complete the Jimmycomelately Creek-Lower Sequim Bay Estuary Restoration Project. • Continue the Jimmycomelately Creek Summer Chum Salmon Supplementation Project.	Loss of channel complexity; sediment aggradation; riparian degradation; nearshore habitat degradation including loss of estuaries and subestuaries.
	Salmon/Snow Stock produced in Salmon and Snow Creek watersheds, where they spawn up to RM 2.0 in Salmon Creek, and RM 3.0 in Snow Creek, are targeted for recovery by co-managers and PSTRT. One of two extant stocks making up Strait of Juan de Fuca population.	<u>Programmatic Actions</u> • Support the Snow/Salmon Watershed Fish and Wildlife Management Plan process. • Jefferson County enforce and monitor present zoning for the upper watersheds. • Implement a Community Nearshore Restoration program for Discovery Bay. • Monitor results of the now terminated Salmon Creek Summer Chum Salmon Supplementation Project. • Pursue agricultural Best Management Practices programs. <u>Projects</u> 1. Remove railroad grade, fill, and levees along estuary to restore salt marsh and tide flat. 2. Decommission National Forest roads.	Loss of channel complexity; increase in peak flows; riparian degradation; nearshore habitat degradation including loss of estuaries and subestuaries; increased sedimentation

Conservation Unit	Target Stocks (1)	Recommended Key Actions (2)	Habitat Factors for Decline
	Chimacum (3) The indigenous Chimacum Creek summer chum stock was extirpated, but a naturally spawning aggregation, using transplanted Salmon/Snow stock as donor, has been reintroduced. Chimacum Creek is considered, at least initially, an extension of the Salmon/Snow summer chum stock.	Projects • Fee-simple purchase or conservation easement of: 1) remaining estuary parcels, 2) mainstem floodplain, and 3) parcels downstream of Federal lands. • Monitor results of the now terminated Chimacum Creek Summer Chum Salmon Reintroduction Project.	Increased fine sediments; increased peak flow, freshwater wetland loss, and channel instability; low flows; nearshore habitat degradation including loss of estuaries and subestuaries.
Quilcene This unit includes the Big Quilcene River and Little Quilcene River watersheds as well as the Tarboo Creek and Thorndyke Creek watersheds. Also included are the marine nearshore waters and estuaries of the Dosewallips River, Quilcene Bay, Dabob Bay, and the Toandos Peninsula to the west side of Hood Canal and north through Port Ludlow.	Big/Little Quilcene Stock naturally produced in Big and Little Quilcene watersheds, where they spawn up to RM 2.8 and RM 3 respectively, are targeted for recovery by co-managers and PSTRT. One of six extant stocks making up Hood Canal population.	Programmatic Actions • Support the recommendations of the WRIA 17 watershed planning process regarding the City of Port Townsend water supply. Support City of Port Townsend's efforts to ensure adequate spawning flow in the lower Big Quilcene. • Support and monitor Jefferson County's present zoning for the upper watersheds. • Monitor results of the now terminated Quilcene Summer Chum Supplementation Project. Projects • Remove dikes along the Big Quilcene River and Little Quilcene River and nearshore to restore salt marsh habitat. • Remove landfill and bulkhead between Boat Haven Marina and Indian George Creek on Quilcene-Dabob Bay to restore historic salt marsh and intertidal habitat.	Low flows; loss of channel complexity; sediment aggradation; riparian degradation; nearshore habitat degradation including loss of estuaries and subestuaries.

Conservation Unit	Target Stocks (1)	Recommended Key Actions (2)	Habitat Factors for Decline
Hamma Hamma-Duckabush-Dosewallips This unit includes the Hamma Hamma, Duckabush, and Dosewallips River watersheds, their estuaries, the marine nearshore areas around these areas and the mid Hood Canal marine waters.	Hamma Hamma Stock naturally produced in Hamma Hamma watershed, where they spawn up to RM 2 in Hamma Hamma R. and up to RM 1.8 in John Ck, are targeted for recovery by co-managers and PSTRT. One of six extant stocks making up Hood Canal population.	Programmatic Actions • Continue and monitor the Hamma Hamma River Summer Chum Salmon Supplementation Project. • Develop a comprehensive floodplain management and restoration plan for the Lower Hamma Hamma watershed. Projects • Remove fill and relocate structures along north side of Wacetickeh estuary and north of shellfish facility to restore marsh.	Loss of channel complexity; altered sediment dynamics; riparian degradation; nearshore habitat degradation including loss of estuaries and subestuaries.
	Duckabush Stock naturally produced in Duckabush watershed, where they spawn up to RM 3.5 in Duckabush R., are targeted for recovery by co-managers and PSTRT. One of 6 extant stocks making up Hood Canal population.	Programmatic Actions • Support and monitor Jefferson County zoning for Duckabush watershed. Projects • Remove dike along Robinson Road. • Remove levees and rip-rap in lower river to restore channel sinuosity.	

Conservation Unit	Target Stocks (1)	Recommended Key Actions (2)	Habitat Factors for Decline
	Dosewallips Stock naturally produced in Dosewallips watershed, where they spawn up to RM 4.3, are targeted for recovery by co-managers and PSTRT. One of six extant stocks making up Hood Canal population.	Programmatic Actions • Support and monitor Jefferson County zoning for Dosewallips watershed. • Develop Dosewallips River comprehensive floodplain management plan. Projects • Remove dikes in vicinity of mainstem Dosewallips River and estuary to restore estuarine habitat and channel complexity. • Restore Sylopash slough tidal prism and riparian area.	
Lilliwaup-Skokomish This unit includes the Lilliwaup River and Skokomish River watersheds, as well as the estuaries and nearshore up to the Hamma Hamma watershed.	Lilliwaup Stock naturally produced in Lilliwaup Creek, where they spawn up to RM 0.7, are targeted for recovery by co-managers and PSTRT. One of six extant stocks making up Hood Canal population. The indigenous summer chum stock in the Skokomish was extirpated, but summer chum spawning, presumably from few strays, is observed.	Programmatic Actions • Support and monitor Mason County zoning and develop comprehensive plan. • Support stormwater management planning for Hoodsport and Skokomish areas. • Continue and monitor the Lilliwaup Creek Summer Chum Salmon Supplementation Project. Projects • Remove bulkhead, fill, and diking to restore nearshore processes, juvenile migration corridor, and salt marsh habitat.	Loss of channel complexity; riparian degradation; nearshore habitat degradation including loss of estuaries and subestuaries.

Conservation Unit	Target Stocks (1)	Recommended Key Actions (2)	Habitat Factors for Decline
Union This unit includes the Union River and Tahuya River watersheds and the marine nearshore waters east of the town of Union near the mouth of the Skokomish River north to Rendsland Creek.	Union Stock naturally produced in Union watershed, where they spawn up to RM 2.5 in Union R., are targeted for recovery by co-managers and PSTRT. One of six extant stocks making up Hood Canal population.	Programmatic Actions • Support Mason County zoning and comprehensive plan/CAO updates and monitor the results. • Monitor results of the now terminated Union River Summer Chum Salmon Supplementation project, and continue and monitor the on-going program to collect broodstock for reintroduction of summer chum in the Tahuya River. Projects • Remove dike, tide gates, fill, bulkhead, and levees to restore habitat.	Loss of channel complexity; riparian degradation; nearshore habitat degradation including loss of estuaries and subestuaries.
	Tahuya (3) The indigenous Tahuya summer chum stock was extirpated, but a self-sustaining naturally spawning aggregation, using transplanted Union stock as donor, is being reintroduced. Spawning in the Tahuya R can occur up to RM 8.0.	Programmatic Actions • Support Mason County zoning and comprehensive plan/CAO updates and monitor results. • Continue and monitor the Tahuya River Reintroduction/Union River Supplementation project. • Projects • Remove helicopter landing pad downstream from Northshore Road.	Loss of channel complexity; riparian degradation; nearshore habitat degradation including loss of estuaries and subestuaries; water quality, temperature
West Kitsap This unit includes Big Beef Creek, Big Anderson Creek, and the Dewatto River watersheds, their estuaries and associated marine nearshore areas.	Big Beef (3) The indigenous Big Beef summer chum stock was extirpated, but a self-sustaining naturally spawning aggregation using transplanted, but now localized, Quilcene stock is being reintroduced. More study	Programmatic Actions • Update Kitsap County's Shoreline Master Plan and CAOs and monitor results. • Conduct a Nearshore Assessment. • Adopt the Kitsap County Draft Shoreline Environmental Designations.	Loss of channel complexity; riparian degradation; nearshore habitat degradation including loss of estuaries and subestuaries; summer low and peak flows

Conservation Unit	Target Stocks (1)	Recommended Key Actions (2)	Habitat Factors for Decline
	needed to determine whether stock will be targeted for recovery. The indigenous summer chum stocks in Dewatto and Big Anderson are extirpated. Spawning in the Dewatto, presumably from few strays, is observed.	• Continue and monitor the Big Beef Creek Summer Chum Salmon Reintroduction project. <u>Projects</u> • Restore natural tidal processes, sediment transport in subestuary by addressing causeway and hatchery weir. • Remove fill.	

(1) Existing summer chum stocks with identified interim recovery goals by the co-managers.

(2) HCCC Summer Chum Salmon Recovery Plan includes extensive list of recommended actions (projects and programs). This table summarizes selected, key recommendations.

(3) No interim recovery goals identified for these stocks, which are considered extirpated; however, a self-sustaining stock is being reintroduced using an adjacent transplanted stock as donor broodstock.

2.3.5 Time and Cost Estimates

The ESA section 4(f)(1) requires that the recovery plan include "estimates of the time required and the cost to carry out those measures needed to achieve the Plan's goal and to achieve intermediate steps toward that goal" (16 U.S.C. 1531-1544, as amended).

Appendix D of the HCCC Plan contains cost estimates for 78 of the 107 habitat projects proposed in the HCCC Plan. The estimates were prepared by Evergreen Funding Consultants in late 2004. The cost estimates cover all capital projects judged to be feasible in the six conservation units, and non-capital work projected to occur over the initial 10-year period. The cost of various non-capital needs was estimated using a spreadsheet model. The model estimates costs such as staffing directly associated with implementation of the HCCC Plan, including design, permitting, and management of capital projects, interagency coordination, and some monitoring activities. In summary, the budget costs of the initial ten-year implementation of the Hood Canal salmon recovery strategy were estimated as follows:

Summer chum habitat projects (estimated in detail)	$101 million
Other summer chum projects (rough estimate)	$ 30 million
Non-capital costs (estimated in detail)	$ 3.1 million
Continuing agency/organization costs (rough estimate)	$ 2 million
TOTAL APPROXIMATE BUDGET COSTS	$136.1 million

The HCCC Plan contains an extensive list of actions that need to be undertaken to recover Hood Canal summer chum salmon; however, there are many uncertainties involved in predicting the course of recovery and in estimating total costs. Such uncertainties include biological and ecosystem responses to recovery actions as well as long-term and future funding. NMFS supports the HCCC Plan's determination to focus on the first 10 years of implementation, provided that before the end of this first implementation period specific actions and costs will be estimated for subsequent years, to achieve long-term goals and to proceed until a determination is made that listing is no longer necessary.

NMFS estimates that recovery of the Hood Canal Summer Chum ESU, like recovery for most of the ESA-listed Pacific Northwest salmon, could take 50 to 100 years. The HCCC Plan estimates it may cost $2 million to cover agency and organization staffing costs during the first 10 years of plan implementation, and it is conceivable that this level of effort will need to continue for the Plan's duration. Also, continued actions in the management of habitat, hatcheries, and harvest, including both capital and non-capital costs, will likely warrant additional expenditures beyond the first 10 years. Although it is not practicable to accurately estimate the total cost of recovery, it appears that most of the costs will occur in the first 10 years. The costs for the remaining years are expected to be lower, possibly ranging from a total of $15 million to $65 million.

NMFS expects that the HCCC will adopt a schedule for project completion and a revised budget for both capital and non-capital costs as part of plan implementation and adaptive management. This process is already underway in association with ongoing Puget Sound-wide planning and funding efforts for recovery of listed species under the Washington State Salmon Recovery Funding Board and the newly formed Puget Sound Partnership.

NMFS concludes that the HCCC Plan meets the third of the 4(f) requirements for a recovery plan: it includes estimates of the time required and cost to carry out the measures needed to achieve the plan's goal and to achieve intermediate steps toward that goal.

2.3.6 Ongoing Programs and Actions that Support Recovery

NMFS recognizes that many of the management changes that have taken place in the recovery planning area within the last few years may benefit the ESU.

2.3.6.1 Habitat

Some habitat management actions that are already being implemented for recovery purposes are as follows:

- NMFS has approved two Habitat Conservation Plans (HCPs) and related ESA Section 10(a)(1)(B) incidental take permits for management of state and private timber lands that will gradually result in improved conditions on forest roads and riparian areas. The Washington State Department of Natural Resources developed, and NMFS approved, the State Lands HCP in January 1997 (http://www.nwr.noaa.gov/Salmon-Habitat/Habitat-Conservation-Plans/WA-Dept-Natural-Resources/Index.cfm). This HCP covers about 120,000 acres of state forest lands that drain into the area inhabited by the Hood Canal summer chum. Another recently approved HCP (NMFS 2006a) (http://www.nwr.noaa.gov/Salmon-Habitat/Habitat-Conservation-Plans/Washington-Forest-Practices/Index.cfm) includes about 300,000 acres of state-regulated private timberlands in the same area. Including conservative management of the Olympic National Forest, forest management on the lands that affect this ESU will continue to provide more functional watershed conditions that support summer chum and other salmonids.

- The HCCC, as the designated Lead Entity for the Hood Canal watershed, coordinates ongoing salmon habitat restoration projects. HCCC is charged with the coordination of salmon recovery projects from counties, cities, conservation districts, Tribes, environmental groups, business interests, landowners, citizens, volunteer groups, regional fish enhancement groups, and other habitat interests. The Lead Entity is responsible for submitting habitat project lists to the Salmon Recovery Funding Board (SRFB) for its funding consideration. Other entities such as the U.S. Forest Service and the Skokomish and Port Gamble S'Klallam Tribes have also implemented a variety of salmonid habitat restoration projects throughout Hood Canal.

- Clallam County, the Jamestown S'Klallam Tribe, and the Dungeness River Management Team have been working toward restoration of the riparian corridor along the Dungeness River and Jimmycomelately Creek for several years.

- The HCCC's Community Nearshore Restoration Program (CNRP) is a combined education/outreach and restoration program for marine waterfront (shoreline) property

owners and land managers. CNRP provides information about marine nearshore processes and ecosystem functions in marine "edge" habitats, and explains how human activites affect those processes and functions. In pilot programs in the Northshore and Dewatto communities in Mason County, the HCCC has worked directly with shoreline landowners.

- Each of the four counties (Mason, Jefferson, Kitsap, and Clallam) that encompass the range of the summer chum salmon ESU have completed or are in the process of developing a variety of land use regulatory programs. These programmatic actions include updates of Shoreline Master Programs and Critical Area Ordinances, implementation of stormwater plans and facilities, exploration of landowner incentive programs for protection of salmon habitat, and implementation of zoning and land use designations that protect habitat.

- The HCCC is working with several existing entities to develop a coordinated approach to revegetating the marine shorelines of Hood Canal. Workshops, curricula, and training are designed for landowners and master gardeners to provide site-specific planting plans.

2.3.6.2 Harvest

Harvest management actions that are already being implemented for recovery purposes are as follows:

- Since 1999, the co-managers and NMFS have worked together on the development of a harvest management plan that would also address ESA goals. NMFS approved the plan in 2001 (61 FR 31600, June 12, 2001) as a plan contributing to the conservation of the ESU. The HCCC Plan fully adopts and incorporates this harvest management plan as its harvest strategy.

- Many of the harvest restrictions incorporated in the "Base Conservation Regime" defined in the harvest management plan have been initiated since 2000. Specific monitoring programs have been established to improve stock assessment methodologies as well as effectiveness of harvest management actions. These procedures include monitoring hatchery contribution to natural spawning populations, data collection of size and age of spawners, better assessment of the productivity of the various watersheds, and evaluation of enforcement efforts.

- The co-managers have also implemented area, time, and gear restrictions that limit harvest opportunity on other salmon species to reduce impacts on listed summer chum. Among others, these actions include complete closure of most terminal fisheries, non-retention of summer chum, and gear restrictions (WDFW and PNPTT 2000). This management strategy is expected to result in, on the average, a 10.9 percent total annual incidental harvest of Hood Canal stocks, and an 8.8 percent total annual incidental harvest of Strait of Juan de Fuca stocks.

- Since the ESU was listed in 1999, Hood Canal summer-run chum salmon escapements

have been stable or increasing for subpopulations in both regions, an apparent positive response to the decline in exploitation rates, in combination with other factors (PNPTC and WDFW 2004, WDFW and PNPTT 2005, 2006). Exploitation rates since the adoption of the management plan have averaged 2 percent or less for all populations in the ESU except the Quilcene, which is managed in the extreme terminal area (Quilcene Bay and Big Quilcene River) on the basis of the forecast return, and later (after about 50 percent of the run is on the spawning grounds) on the basis of in-season escapement estimates tied to escapement thresholds that define the level of exploitation. The Quilcene escapements have met or exceeded management targets every year since 1996. The overall pattern of low exploitation rates is anticipated to continue under the Base Conservation Regime.

- Although total exploitation rates have declined 90 percent since the early 1990s, Canadian fisheries accounted for more than 40 percent of the harvest of Hood Canal summer chum in the 1980s when exploitation rates were high. Exploitation rates in Canadian fisheries in recent years have been less than 1 percent. Much of this reduction is due to increased conservation efforts on Canadian salmon stocks and the significant reduction or elimination of coho salmon fisheries. Although these and other potentially influential fisheries are outside the jurisdiction of the U.S., the U.S. and Canada are parties to the Pacific Salmon Treaty. The Treaty establishes a framework for managing salmon stocks either originating from one country and intercepted by the other, or affecting the management or biology of the stocks of the other country. The Treaty commits the co-managers to equitable cross-border sharing of harvest, and to the conservation of U.S. and Canadian stocks.

- Much of the high harvest of Hood Canal summer-run chum in U.S. fisheries in the 1980s was also incidental to the catch of other salmon species, particularly coho. The reductions in exploitation rate were a result of both the explicit management for summer chum and, initially, significant reductions in coho fisheries as a result of conservation concerns for coho. It is important that fisheries continue to be managed for the needs of summer chum, even as the abundance of other salmon species improves and fisheries are adjusted to take advantage of those improving conditions.

- Because information on productivity has been lacking, management goals are based on historical patterns of observed escapement with the addition of conservation buffers. Managers should update harvest objectives to be consistent with better information on habitat productivity and capacity as that information becomes available.

- Information on stock productivity and the contribution of hatchery spawners to the reproductive success of naturally spawning salmon populations is key to developing appropriate harvest management measures and objectives. Even more importantly, the information is critical in assessing the progress toward meeting all four of the viability criteria for naturally produced salmon: abundance, productivity, spatial structure, and diversity. Monitoring and assessment of both stock productivity and hatchery contribution have increased in recent years and are key components of the state and tribal harvest management plan. Substantial new information is anticipated over the next few

years as data become available from programs currently in place. However, these programs have been implemented only recently, information is still very limited, and many rely on uncertain future funding. To provide as complete and accurate an assessment as possible, data on productivity and hatchery contribution continue to be collected as part of an integrated monitoring program of harvest, habitat, and hatchery actions.

2.3.6.3 Hatcheries

Artificial propagation measures already in place are as follows:

- Prior to and after the 1999 listing of the ESU, the co-managers have implemented artificial propagation actions defined in the SCSCI (WDFW and PNPTT 2000) to preserve, rebuild, and reintroduce summer chum salmon populations and to reduce hatchery-related risks to natural-origin summer chum.

- Consistent with SCSCI requirements for summer chum programs, supplementation is used only when a summer chum stock is at moderate or high risk of extinction, or to develop a broodstock in support of summer chum population reintroduction to previously occupied habitats.

- Only the local, native fish are used as a broodstock source for supplementation, and the closest adjacent summer chum stock may be used only once for a reintroduction project.

- Each program is limited to a 12-year (or three chum salmon generation) duration as a measure to reduce the risk of genetic diversity reduction in the propagated population.

- Operational standards have been applied to minimize impacts on natural salmon populations from potential hazards including: 1) partial or total hatchery failure resulting in a loss of summer chum placed in the hatchery, 2) ecological effects from predation, competition, or disease transfer, 3) genetic effects from loss of genetic variability between or within populations, 4) effects from selection or reducing the population size of donor stocks, and 5) effects on other salmonid populations and species.

- Monitoring and evaluation plans specified in the SCSCI are implemented to measure the effects of supplementation on the target stock and other summer chum populations.

- SCSCI risk-reduction requirements for hatchery programs producing other species in the region have also been implemented. Actions implemented in Hood Canal and Strait of Juan de Fuca hatcheries producing fall Chinook, coho, fall chum, and pink salmon, and steelhead include: adjustments in juvenile fish release timings to avoid interactions with emigrating and rearing summer chum salmon fry; operation of broodstock collection weirs to minimize injury and mortality to migrating summer chum adults; termination of off-station release programs in summer chum streams; and compliance with intake screening and effluent discharge requirements at hatcheries to reduce the risk of harm to incubating and emigrating summer chum juveniles.

- Risk containment measures applied for hatchery programs in the region have benefited summer chum salmon abundance and distribution and have likely reduced ecological and demographic risks to natural-origin summer chum posed by hatcheries producing other species since the time of listing (WDFW and PNPTT 2003, 2005, 2006; PNPTC and WDFW 2004).

- The risk of extinction was reduced from high to low for the Big Quilcene and Salmon Creek summer chum stocks following implementation of supplementation programs that contributed adult summer chum to the natural returns and spawning populations. Natural-origin summer chum adult escapements to the Big Quilcene River in the four brood years prior to the 1992 initiation of supplementation actions by the co-managers (1988-1991) were 120, 1, 6, and 49 fish. Natural-origin summer chum adult escapements to the Big Quilcene River for the most recent four years (2003-2006) were 9,959, 32,765, 5,806, and 9,504 fish.

- Naturally spawning and, now, natural-origin summer chum salmon aggregations have been reintroduced into vacant habitat formerly occupied by summer chum in Big Beef and Chimacum creeks. These reintroductions are initially considered to be range extensions of the donor Quilcene and Snow/Salmon stocks, further reducing their risks of extinction.

- Protective measures specified in hatchery plans approved by NMFS under the ESA will continue to be implemented into the future. However, implementation of one key requirement called for in the SCSCI – termination of supplementation and reintroduction programs after 12 years – means that the populations must eventually become self-sustaining in their natural habitats. Following this requirement, four of the eight summer chum hatchery programs originally authorized by NMFS under the ESA in 2002 (NMFS 2002a; 2002b) have now been terminated by the co-managers (Big Quilcene, Salmon Creek, Chimacum Creek, and Union River). NFMS continued the Threatened ESA listing status for the ESU in June 2005, given the need to secure viable, natural-origin populations without supplementation and the habitat needed to sustain them for the foreseeable future.

2.3.7 ESA section 4(f) Conclusion

NMFS reviewed the HCCC Plan, the public comments, and the notes and conclusions of the PSTRT from its reviews of the HCCC Plan in May and July 2005. Based on that evaluation, NMFS concludes that the HCCC Plan, in combination with this NMFS Supplement, meets the requirements in section 4(f) of the ESA for developing a recovery plan.

3.0 NMFS' INTENDED USE OF THE PLAN

As a result of the evaluation of the HCCC Plan presented in Section 2.0, and after considering public comment on the HCCC Plan and finalizing this Supplement, NMFS adopts the combination of the HCCC Plan and the Supplement as the ESA Recovery Plan for the Hood Canal summer chum salmon ESU.

By endorsing this locally developed recovery plan, NMFS is making a commitment to implement the actions in the plan for which it has authority, to work cooperatively on implementation of other actions, and to encourage other Federal agencies to implement plan actions for which they have responsibility and authority. NMFS will also encourage the State of Washington and Treaty Tribes to seek similar implementation commitments from state agencies, local governments, and tribal governments.

3.1 Using Recovery Plans in Regulatory Decision Making

Recovery plans are not regulatory in and of themselves; their implementation is voluntary. They do, however, provide the roadmaps for species recovery and ultimate delisting. Recovery plans will function as guides to NMFS staff when they are evaluating proposed actions in the consultation process. For all consultations, recovery plans will be used as a reference and a source of context, expectations, and goals. NMFS staff will encourage the Federal "action agencies" to describe in their biological assessments how their proposed actions will affect specific populations and limiting factors identified in the recovery plans, as well as any mitigating measures and voluntary recovery activities in the action area. Recovery plans are important tools that help to do the following:

- Provide context for regulatory decisions.
- Guide decision making by Federal, state, tribal, and local jurisdictions.
- Provide criteria for status reporting and ultimate delisting decisions.
- Organize, prioritize, and sequence recovery actions.
- Organize research, monitoring, and evaluation efforts.

NMFS will emphasize recovery plans in ESA section 7 (a)(2) consultations, section 10 permits, and application of the section 4(d) rule by considering:

- Delisting criteria that address both viability and threats
- Description of limiting factors and threats (factors for decline)
- Description of a recovery program (site-specific management actions necessary to achieve recovery of the species)
- Estimates of the time and cost to carry out measures to achieve the plans' goals

NMFS will encourage Federal agencies and non-federal jurisdictions to take recovery plans under serious consideration as they make the following sorts of decisions and allocate their resources:

- Actions carried out to meet federal ESA Section 7 (a)(1) obligations

- Actions that are subject to ESA Sections 4d, 7 (a)(2), or 10 consultations
- Hatchery Genetic Management Plans, permit requests, harvest plans and permits
- Selection and prioritization of subbasin planning actions
- Development of research, monitoring, and evaluation programs
- Revision of land use and resource management plans
- Other natural resource decisions at the state, tribal, and local levels

3.2 Changes Incorporated Over Time

The ESA requires a review of all listed species at least once every five years. Guidance for these reviews is on the NMFS website (http://www.nmfs.noaa.gov/pr/laws/esa/policies.htm#recovery). Furthermore, NMFS Interim Endangered and Threatened Species Recovery Planning Guidance (NMFS Recovery Guidance) (NMFS 2006b) requires that immediately following this five-year review, approved recovery plans will be reviewed, in conjunction with implementation monitoring, to determine whether or not they need to be brought up to date.

NMFS Recovery Guidance describes three types of plan modifications: 1) an update; 2) a revision; or 3) an addendum. An update involves relatively minor changes. An update may identify specific actions that have been initiated since the plan was completed, as well as changes in species status or background information that do not alter the overall direction of the recovery effort. An update does not suffice if substantive changes are being made in the recovery criteria or if any changes in the recovery strategy, criteria, or actions indicate a shift in the overall direction of recovery; in this case, a revision would be required. Updates can be made by NMFS and would be forwarded to stakeholders and cooperators and posted on the NMFS website. An update would not require a public review and comment period. NMFS expects that updates will result from implementation of the adaptive management program for this plan. Minor addenda such as information updates to implementation strategies also can be added to a plan after it has been approved.

A revision is a substantial rewrite and is required if major changes are needed in the recovery strategy, objectives, criteria, or actions. A revision may also be required if new threats to the species are identified, when research identifies new life history traits or threats that have significant recovery ramifications, or when the current plan is not achieving its objectives. Revisions must include a public review and comment period.

3.3 Conclusion of Public Process

NMFS collaborated with the HCCC in the recovery planning process. NMFS published a Notice of Availability of the HCCC Plan and NMFS' Draft Supplement to that plan for public review and comment (August 16, 2006). NMFS carefully considered the comments received and prepared responses to each. NMFS' response to public comments on the HCCC Plan and Draft Supplement can be found at the NMFS website at http://www.nwr.noaa.gov/Salmon-Recovery-Planning.cfm and the HCCC website at http://www.hccc.wa.gov/SalmonRecovery/default.aspx . Printed versions and compact discs will be available at public locations also listed on the HCCC website. Publication of this Final Supplement concludes NMFS' formal administrative process.

4.0 ABBREVIATIONS

BCR	Base Conservation Regime
ESA	Endangered Species Act
ESU	evolutionarily significant unit
GMA	Growth Management Act
HCCC	Hood Canal Coordinating Council
HCP	Habitat Conservation Plan, associated with ESA section 10(a)(1)(B) permits
HGMP	Hatchery and Genetic Management Plan
Hs	habitat, harvest, hatcheries, hydropower
NMFS	National Marine Fisheries Service
NOA	Notice of Availability
PCSRF	Pacific Coastal Salmon Recovery Fund
PNPTC	Point No Point Treaty Council
PNPTT	Point No Point Treaty Tribes
PST	Pacific Salmon Treaty
PSTRT	Puget Sound Technical Recovery Team
RMP	Resource Management Plan
SCSCI	Summer Chum Salmon Conservation Initiative
SMA	Shoreline Management Act
TRT	Technical Recovery Team
USFWS	U.S. Fish and Wildlife Service
VSP	viable salmonid population
WDFW	Washington Department of Fish and Wildlife
WRIA	Watershed Resource Inventory Area

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