

Supplement to the Draft Yakima Subbasin Salmon Recovery Plan

March 10, 2006 DRAFT

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DISCLAIMER

Under the Endangered Species Act of 1973 (ESA), the goal of a recovery plan is the conservation and survival of a threatened or endangered species. Recovery plans are prepared by the National Marine Fisheries Service (NMFS), consistent with the agency's obligations under the ESA, often with the assistance of recovery teams, contractors, state agencies, and others. Recovery plans are not regulatory or decision documents—that is, the recommendations in a recovery plan are not considered final decisions unless and until they are actually proposed for implementation. Objectives will be attained and funds expended contingent upon appropriations, priorities, and other budgetary constraints. Nothing in this Plan should be construed as a commitment or requirement that any Federal agency obligate or pay funds in contravention of the Anti-Deficiency Act, 31 U.S.C. 1341, or any other law or regulation. Recovery plans do not necessarily represent the views, official positions, or approval of any individuals or agencies, other than those of NMFS, and they represent the official positions of NMFS only after they have been approved by the NMFS Northwest Regional Administrator, after giving notice of a proposed Plan and opportunity for public comment. Approved recovery plans are subject to modification as dictated by new findings, changes in species status, and the completion of recovery actions.

1 INTRODUCTION

The Endangered Species Act of 1973 (ESA) requires the National Marine Fisheries Service (NMFS) to develop recovery plans for species listed under the Act. The purpose of recovery plans is to identify actions needed to restore threatened and endangered species to the point where they are again self-sustaining elements of their ecosystems and no longer need the protections of the ESA.

NMFS believes it is critically important to base ESA recovery plans for 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' approach to recovery planning has therefore been to support and participate 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 salmon and steelhead, NMFS is responsible for reviewing these salmon and steelhead recovery plans.

To be approved by NMFS, an ESA recovery plan must meet certain requirements prescribed by the ESA; it must describe specific management actions, establish objective, measurable criteria for delisting, and estimate the time and cost to carry out measures needed to achieve recovery [listed in ESA section 4(f)(1)(B) and discussed further in Section 3 of this document]. To aid locally developed plans in meeting or contributing to these requirements, NMFS writes a "supplement," summarizing the plan and noting any necessary additions or qualifications. Information contained in the supplement is then used to modify the locally developed plan.

This is a supplement to the Draft Yakima Subbasin Salmon Recovery Plan (the Plan), which the Yakima Subbasin Fish and Wildlife Planning Board (YSPB) prepared and submitted to NMFS in October 2005 for the recovery of the Yakima portion of the Middle Columbia River steelhead evolutionarily significant unit (ESU) (*Onchorhynchus mykiss*). Together, the Plan and the Supplement make up a draft interim regional recovery plan (IRRP). While the Plan also covers bull trout (*Salvelinus confluentus*), listed as threatened on June 10, 1998, the lead ESA agency for bull trout is the U.S. Fish and Wildlife Service; therefore, bull trout will not be further considered in this Supplement. The Draft Plan is available at the following website: <http://www.co.yakima.wa.us/Yaksubbasin/Draft%20plan/RecPlanFinal.pdf>

The Middle Columbia River steelhead ESU was listed as threatened on March 25, 1999. Recently, NMFS revised its species determinations for West Coast steelhead under the ESA, delineating steelhead-only "distinct population segments" (DPS). The former steelhead ESU included both the anadromous steelhead trout and resident, non-anadromous, rainbow trout. The steelhead DPS does not include rainbow trout, which are under the jurisdiction of the U. S. Fish and Wildlife Service (USFWS). NMFS listed the Middle Columbia River steelhead DPS as threatened on January 5, 2006 (71 FR 834). The Federal Register Notice contains a more complete explanation of this listing decision.

To avoid confusion in this Supplement, and with regard to the Plan, which was written before the DPS listing decision was posted, we ask the reader to understand that references to "ESU viability criteria" or "ESU-level plans, considerations, etc." imply the steelhead DPS as well. Also, since both salmon ESUs and steelhead DPSs are considered to be "species," as defined in Section 3 of the ESA, we may refer to "species-level" plans, implying both ESU and DPS.

The range of the Middle Columbia River steelhead DPS includes the Columbia River basin and tributaries upstream from the Wind River to and including the Yakima River (but excluding the Snake River) (http://www.nwfsc.noaa.gov/trt/maps/map_stlhmc.pdf). This DPS contains four major population groups (MPGs): 1) the Cascades Eastern Slope Tributaries MPG, which consists of populations in both Washington and Oregon; 2) John Day River, Oregon; 3) Walla Walla and Umatilla Rivers (Oregon and Washington); and 4) Yakima River Group (http://www.nwfsc.noaa.gov/trt/updated_population_delineation.pdf p. 8, Table 1). The Yakima subbasin contains only 20 percent of the acreage and 4 of the 17 fish populations that make up the DPS. The four Yakima subbasin steelhead populations are Satus Creek, Toppenish Creek, Naches River, and Upper Yakima River. These populations are grouped because they share genetic, geographic, and habitat characteristics within the DPS.

The Yakima Salmon Recovery Region does not encompass the entire range of the DPS; therefore, ultimately this interim regional recovery plan will be combined with other local and regional plans to construct an overall, DPS-level plan. NMFS expects this plan to contribute to meeting the ESA section 4(f) recovery plan requirements as part of the DPS-level plan.

This Supplement contains the following components: the Northwest regional context for the Plan; background and overview of the Plan, including the process by which it was developed; a discussion of how the Plan contributes to ESA recovery plan requirements; and a description of NMFS' intended use of the Plan. After a 60-day public comment period, the YSPB intends to revise its plan according to the Supplement and the public comments, in a process closely coordinated with NMFS.

1.1 Recovery Domains and Technical Recovery Teams

NMFS designated five geographically based recovery domains for preparing recovery plans for listed salmon species in the Pacific Northwest (<http://www.nwr.noaa.gov/Salmon-Recovery-Planning/Recovery-Domains/Middle-Upper-Columbia/Index.cfm>). The Yakima Subbasin Salmon Recovery Region falls into NMFS' Interior Columbia domain. The other domains are Puget Sound, the Willamette/Lower Columbia, Oregon Coast, and Southern Oregon/Northern California Coast. For each domain, NMFS appointed an independent Technical Recovery Team (TRT) to develop recommendations on biological viability criteria for ESUs and populations of salmon and steelhead, to make technical findings regarding limiting factors, to provide scientific support to local and regional recovery planning efforts, and to provide scientific evaluations of recovery plans. The TRT for the Interior Columbia (the ICTRT) includes biologists from NMFS, Oregon Department of Fish and Wildlife, Idaho Department of Fish and Game, U.S. Forest Service, Columbia River Inter-Tribal Fish Commission, U.S. Fish and Wildlife Services, University of Montana, and the University of Washington.

NMFS' intent in establishing TRTs for each domain was to seek unique geographic and species expertise for evaluating viability and identifying factors limiting recovery. Nonetheless, each TRT is working from a common scientific foundation. All the TRTs have used the same biological principles for developing their ESU and population viability criteria. These principles are described in a NMFS technical memorandum, *Viable Salmon Populations and the Recovery of Evolutionarily Significant Units* (McElhany et al. 2000). Viable salmonid populations (VSP) are defined in terms of four parameters: abundance, population productivity or growth rate, population spatial structure, and life history and genetic diversity. The TRT defines a viable salmonid population as an independent population of any Pacific salmonid (genus *Oncorhynchus*)

that has a negligible risk of extinction due to threats from demographic variation, local environmental variation, and genetic diversity changes over a 100-year time frame. They further define a viable ESU as naturally self-sustaining. Each TRT's recommendations are assessed using the VSP framework and are based on data availability, the unique biological characteristics of the ESUs and habitats in the domain, and the members' collective experience and expertise.

In each domain, NMFS is also working with state, tribal, local, and other Federal stakeholders to develop a planning forum appropriate to the domain, one 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 agree on recovery goals and limiting factors assessments, then to 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.

1.2 Listing Decisions and ESU-Level Recovery Plans

Because most state and local boundaries are not drawn on the basis of watersheds or ecosystems, the various groups and organizations formed for recovery planning do not necessarily correspond to ESU areas. Therefore, in order to develop ESU-wide recovery plans that are built from local recovery efforts, NMFS defined "management units" that roughly follow jurisdictional boundaries but, taken together, encompass the geography of entire ESUs. The Interior Columbia domain has three sub-domains: Upper Columbia, Middle Columbia, and Snake. Two of these sub-domains, the Middle Columbia and Snake, have multiple management units. For the Middle Columbia River sub-domain, there are four management units: 1) Oregon; 2) Yakima; 3) Columbia Gorge (Klickitat/Rock Creek/White Salmon); and 4) Southeast Washington (Walla Walla and Touchet). For the Snake River sub-domain there are three management units: 1) Idaho; 2) Oregon; and 3) Southeast Washington (see Figure 1). The YSPB Plan is the plan for the Yakima Management Unit of the Middle Columbia sub-domain, which corresponds to the range of the Middle Columbia River steelhead DPS.

In 2006, the separate management unit plans will be "rolled up" or consolidated into an ESU-level recovery plan. ESU-level interdependencies, such as delisting criteria, population scenarios, out-of-subbasin effects, all-H life cycle analyses, and research, monitoring, and evaluation strategies, will be addressed during roll-up. It is anticipated that individual recovery actions will be integrated into ESU-level recovery actions for the Middle Columbia River steelhead ESU. The final ESU-level recovery plan will incorporate local management unit plans and endorse the recommendations and decisions (for example, decisions on site-specific habitat actions) that are most appropriately left to the local recovery planners and implementers. The ESU-level plan will also more completely address actions for the hatchery, harvest, and hydro sectors.

1.3 Tribal Trust/Treaty Responsibilities

In the case of listed salmon and steelhead, considerations in addition to the ESA are also important. Middle Columbia River salmon and steelhead and all of the other listed ESUs have historically been harvested, and there is a strong public interest in restoring them to harvestable status. Because listed fish often migrate with non-listed fish, the listings have become factors limiting the harvest of both.

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 they no longer need 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.

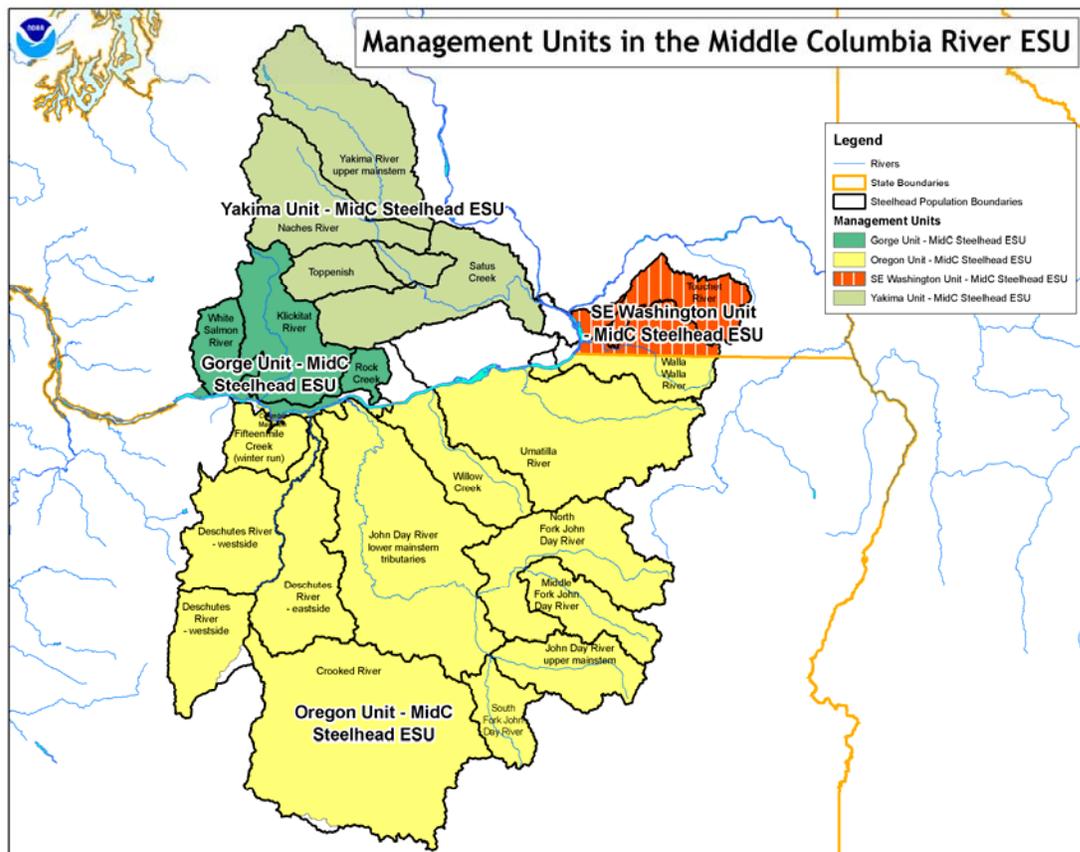
Thus, it is appropriate for recovery plans to take these considerations into account and plan for a recovery strategy that includes harvest. In some cases, increases in the naturally spawning populations may be sufficient to support harvest. In others, the recovery strategy may include appropriate use of hatcheries to support a portion of the harvest. So long as the overall plan is likely to achieve the recovery of the listed DPS, it will be acceptable as a recovery plan.

Two of the four steelhead populations addressed in the Yakima Plan spawn entirely within the Yakama Reservation. The remainder of the Yakima subbasin is part of the Yakama Nation's ceded area. Yakama Nation staff developed most of the data on the Satus and Toppenish populations and are responsible for the dam counts used to track overall Yakima steelhead abundance, along with a variety of other fisheries data. The Yakama Nation is voluntarily participating in recovery planning and implementation in the Yakima subbasin and throughout its ceded area as a sovereign with treaty-reserved rights on and off the reservation, and as a fish and wildlife co-manager. In so doing, the Yakama Nation does not waive or in any way alter its treaty-reserved rights.

1.4 NMFS Public Process

NMFS partnered with the YSPB in the recovery planning process to encourage local participation in development of the Plan. NMFS is publishing a Notice of Availability of the Plan and concurrently posting this Supplement and requesting comments on both documents for 60 days. Upon completion of the 60-day public review process (in May 2006), NMFS will compile all comments received and meet with the YSPB, the Washington Governor's Salmon Recovery Office (GSRO), and others as appropriate to consider the necessary revisions to the Plan based on the Supplement and public comments. All comments received by the date specified will be considered prior to NMFS' decision whether to endorse the Plan, including the Supplement, as an interim regional recovery plan. NMFS will provide a summary of the comments and responses through its regional website (www.nwr.noaa.gov) and provide a news release for the public announcing the availability of the response to comments. NMFS has agreed to share all comments received as a result of this process with the YSPB. Our intent is to assist the YSPB in updating its plan and to continue a collaborative relationship with the YSPB in the adoption and use of its plan as an interim regional recovery plan and as part of a species-level, ESA recovery plan. NMFS will use this interim regional recovery plan to build a species-level ESA recovery plan, which is scheduled to be completed in July 2006.

Figure 1 Management units for Middle Columbia River steelhead DPS



2 BACKGROUND AND OVERVIEW OF THE PLAN

The Yakima Subbasin Fish and Wildlife Planning Board Recovery Plan is an extensive document developed to meet multiple obligations, including state and Federal requirements. It describes recovery goals, habitat strategies, and actions to support the tributary component (the habitat factor) for recovery of populations in the Yakima subbasin. It provides direction for addressing limiting factors and threats within an adaptive management framework. NMFS will address the factors other than habitat, including hydropower system operations, harvest, and hatcheries, in the subsequent DPS-level plan.

The YSPB is composed of representatives from Yakima County, Benton County, Yakama Nation, and thirteen cities within the subbasin. A variety of partners representing Federal agencies, Washington State agencies, regional organizations, special-purpose districts, consultants, and members of the public participated in the planning process. Participation was achieved through the use of websites, work groups, watershed planning units, public meetings, workshops, and public comment.

The Plan is an outgrowth and culmination of several conservation efforts in the Yakima subbasin, including current efforts related to the ESA, state and tribal-sponsored recovery efforts, subbasin planning, and watershed planning. As such, the Plan's ecosystem approach will also benefit a wide variety of other fish and wildlife species as well as the connectivity and migratory habitat in the mainstem Yakima River.

2.1 The Plan's Goals

The YSPB's vision for recovery in the Yakima subbasin is that within the next 15 to 20 years,

“Yakima basin communities have restored the Yakima River basin sufficiently to support self-sustaining and harvestable populations of indigenous fish and wildlife while enhancing the existing customs, cultures, and economies in the basin. Decisions that continuously improve the river basin ecosystem are made in an open and cooperative process that respects different points of view and varied statutory responsibilities and benefits current and future generations.”

The YSPB identified the following guiding principles (Chapter 1, p. 2-3 of the Plan):

1. The natural environment including its fish and wildlife resources is the common heritage of our diverse human community. The underlying premise of the Vision is to prepare and implement a balanced plan of action that plays a key role in the long-term sustainability of this common cultural and biological heritage in the Yakima basin.
2. The quality of water and a near natural timing and quantity of water flow (normative hydrograph) are principal indicators of a healthy river ecosystem. These indicators must be improved and monitored.
3. The continued exercise of the Yakama Nation treaty-reserved and aboriginal rights to religious, subsistence, commercial, and recreational use of natural resources.
4. Planning is based on voluntary incentives.
5. The processes of plan preparation, implementation, and amendment are open and equitable.

6. The costs of plan actions are estimated in relation to benefits. Alternatives that achieve the highest benefit relative to costs are preferred. Costs of habitat and species restoration should be mitigated and distributed equitably.
7. Programs and actions must be monitored and evaluated for effectiveness and may be altered as necessary.
8. Balanced sustainable resource management recognizes these basic precepts:
 - a. The physical and biological environments are functionally interdependent relative to productivity.
 - b. At any level of function, productivity is finite.
 - c. Without actions to restore degraded functions, protect, avoid, and mitigate impacts to the physical and biological environment, the increasing demands of human population growth could reduce productivity to zero, with unacceptable costs to the cultures and economies of the Yakima subbasin.

The YSPB's specific recovery goal for the Yakima population group (or MPG) is "to ensure long-term persistence of viable populations of naturally produced steelhead distributed across their native range" (Chapter 4, Section 4.2). A viable population is defined as an independent population that has negligible risk of extinction due to threats from demographic variation, local environmental variation, and genetic diversity changes over a 100-year time frame.

The Plan's Vision 2020 statement in Chapter 1.2, pp. 2-3, indicates that the recovery plan is but the first step in increasing the abundance and productivity levels of steelhead populations to a point of harvestability for recreational, commercial, and ceremonial purposes, in keeping with the collective, overarching long-term goal shared by Plan contributors. In addition, the recovery planning process itself has goals and objectives of joint decision-making in an atmosphere of cooperation and respect for the customs, cultures, and economies of the Yakima subbasin.

To the extent possible, the process of preparing the Plan locally has been inclusive and transparent, with outreach to engage interested parties and stakeholders. The YSPB or its successor will continue to represent, inform, and confer with local interests as the Plan is "rolled up" into the ESA recovery plan for the entire DPS, to ensure that the substance of the Yakima Plan is not changed without local public review, comment, and approval. The Plan is not a regulatory mechanism, and its implementation will not usurp or diminish the existing authority under state law or Federal treaty of any government or special district.

2.2 Species Status

The current status of Yakima subbasin steelhead populations is summarized in Chapter 2, pp. 8-37, of the Plan. The ICTRT identified independent populations (ICTRT 2005a), recommended viability criteria for Interior Columbia listed ESUs in December 2004 (ICTRT 2004a and b), and updated these criteria in July 2005 (ICTRT 2005b). The YSPB used the ICTRT's identification of independent populations and recommended viability criteria as a basis for its Plan.

In general, based on updated status evaluations considering the four VSP parameters, the Plan concludes that none of the four remaining steelhead populations is currently viable; the Satus and Toppenish populations should be considered to be at moderate risk of extinction, the Naches at moderate to high risk, and the Upper Yakima at high risk. Overall abundance has declined

substantially from historical levels, and many populations are small enough that genetic and demographic risks are likely to be relatively high.

2.3 Factors for Decline

The reasons for a species' decline are generally analyzed in terms of limiting factors and threats. Limiting factors are defined as the biological conditions limiting population productivity. Threats are defined as those human activities or naturally induced actions that cause the limiting factors. The Plan examines the general threats and limiting factors for steelhead recovery in Chapter 3, pp. 44-65. Threats and limiting factors that have historically affected steelhead are described in relation to the biological needs of the species and in categories of habitat, harvest, hydropower, hatchery management, ecological factors, and factors outside the ESU. The plan examines human activities that alter habitat-forming processes such as fish and timber harvest, irrigated agriculture, mining, forestry, urban and rural development, and the introduction of exotic species. After identifying threats to recovery, the Plan describes specific recovery strategies and measures that will be used to guide actions at the watershed level to mitigate the threats.

2.3.1 *Social, cultural, and economic factors*

Chapter 3, pp. 44-46, of the Plan discusses social, cultural, and economic factors as well as policy and management actions that have contributed to the ESA listing: agricultural practices, dams, hatchery production, excessive fishing, degraded habitat, predation, competition, diseases, parasites, and many others. The Plan defines public policy and discusses instances where some policies have resulted in human actions that have actual or potential negative effects on the survival of steelhead and describes prior management practices that failed to view the fishery and its management as a system, resulting in negative impacts to the basin's historical steelhead populations.

2.3.2 *Habitat*

The Plan describes the general causes of habitat degradation and resulting declines in wild salmon runs in the Yakima subbasin. The major steelhead habitats addressed in the Plan are Satus and Toppenish creeks and the Naches and Upper Yakima rivers.

Current habitat conditions, including details of the degradation of aquatic habitat features important to steelhead survival, are described in Chapter 3, pp. 49-55 of the Plan.

2.3.3 *Harvest*

The Plan reviews the history and effects of harvest on Yakima subbasin steelhead in Chapter 3, p. 55 of the Plan.

2.3.4 *Hatcheries*

The Plan reviews the history of hatcheries in the Yakima subbasin and the potential hazards and risks posed by hatchery operations in Chapter 3, p. 56 of the Plan.

2.3.5 *Hydropower*

The Plan discusses hydropower production facilities within the Yakima subbasin and the impacts to steelhead. It also notes that the Federal district court for Oregon recently declared the Federal Columbia River Power System (FCRPS) Biological Opinion to be invalid, and actions to

mitigate for the effects at Federal hydropower facilities are incomplete or not fully defined. See Chapter 3, pp. 56-57, of the Plan for additional details.

2.3.6 *Ecological factors*

The Plan describes the potential impact of competition, predation, disease, and parasitism on steelhead populations in Chapter 3, pp. 57-60.

2.3.7 *Factors outside the ESUs*

A description of the smolt-to-adult return rate (SAR), a steelhead survival index that reflects all agents of mortality affecting the life cycle of salmon and steelhead from migrating smolts through returning adults, is provided in Chapter 3, pp. 60-61.

2.3.8 *Integration of factors*

Recovery will depend on the concerted efforts of actions addressing the many factors noted above that have affected the abundance, productivity, spatial structure, and diversity of Yakima subbasin steelhead. The Plan discusses the integration of these factors in the decline of steelhead in Chapter 3, pp. 61.

2.3.9 *Current threats*

Current threats, such as destruction or modification of habitat or range, over-utilization of fish, disease, predation, inadequacy of existing regulatory mechanisms, and other natural or human-made factors affecting continued existence of steelhead in the Yakima subbasin are covered in Chapter 3, pp. 61-63 of the Plan.

2.3.10 *Uncertainties*

Key uncertainties that can affect the success of actions implemented within and outside the Yakima subbasin are identified and summarized in Chapter 3, pp. 64-66: ocean productivity and natural variation; global climate change; hatchery effectiveness; invasive species; effects of harvest, hatchery, hydropower, and habitat actions; and effects of human population growth and pesticides.

2.4 **DPS Viability Criteria**

Chapter 4 of the Plan explains the VSP parameters used to characterize the steelhead (and bull trout) populations in the subbasin and outlines desired future conditions and recovery targets for steelhead based on those parameters. It also identifies a time frame for meeting recovery goals.

The ICTRT (2005) recommended abundance and productivity criteria listed below, based on intrinsic potential analysis, the concepts contained in McElhany et al. (2000), and habitat capacity estimates. The YSPB used the December 2004 ICTRT recommendations in its draft Plan. Local recovery planners developed the spatial structure and diversity indices based on potential population size, current and potential distribution, and life histories currently exhibited in each population.

The YSPB developed the following criteria (Section 4.3.1, pp. 69-70, of the Plan) based on the December 2004 ICTRT recommendations for the four populations in the Yakima Subbasin.

2.4.1 *Abundance and productivity*

Criterion 1: The 12-year geometric mean for abundance and productivity of naturally produced steelhead in the four Yakima populations must reach levels that would have a less than 5 percent risk of extinction over a 100-year period.

Criterion 2: At a minimum, the Yakima MPG will maintain at least 5,750 spawners and a spawner:spawner ratio greater than 1.0 distributed among the four populations as follows: Satus and Toppenish, 1.3; Naches and Upper Yakima, 1.2 (Table 4.1, p. 69, of the Plan).

2.4.2 *Spatial structure and diversity*

Criterion 3: Naturally produced steelhead will use currently occupied major spawning areas throughout the DPS (identified by the ICTRT in December 2004) according to the following population-specific criteria (Chapter 4, p. 70 of the Plan):

Satus

Naturally produced steelhead spawning will occur within both of the major spawning areas in the Satus watershed (Satus-Logy and Dry Creek watersheds) and both minor spawning areas (Mule-Dry Creek and Poisel Canyon). The minimum number of naturally produced steelhead redds within each of the two major spawning areas will be either 25 percent of the total number of redds within the Satus population or at least 100 redds within each major area, whichever is greater.

Toppenish

Naturally produced steelhead spawning will occur within both of the major spawning areas in the Toppenish watershed (upper Toppenish and Simcoe) and both minor spawning areas (Agency and Mill creeks). The minimum number of naturally produced steelhead redds within each of the two major spawning areas will be either 20 percent of the total number of redds within the Toppenish population or at least 80 redds within each major area, whichever is greater.

Naches

Naturally produced steelhead spawning will occur within six of the seven major spawning areas. Spawning must consistently occur within the Naches mainstem, Ahtanum Creek, and Rattlesnake Creek to maintain distribution across habitat types and life histories. The minimum number of naturally produced steelhead redds within each of the major spawning areas will be either 5 percent of the total number of redds within the Naches population or at least 20 redds within each major area, whichever is greater.

Upper Yakima

Naturally produced steelhead spawning will occur within eight of the eleven major spawning areas. Spawning must consistently occur within at least the Yakima mainstem, Umtanum Creek, Manastash Creek, Taneum Creek, Teanaway River, and upstream from Cle Elum Dam. The minimum number of naturally produced steelhead redds within each of the major spawning areas will be either 5 percent of the total number of redds within the Upper Yakima population or at least 20 redds within each major area, whichever is greater.

2.4.3 Yakima MPG level criteria

The YSPB recommends that efforts be taken to recover all four steelhead populations in the Yakima subbasin. Therefore, the Plan identifies specific actions that are intended to lead to the recovery of steelhead in all four populations. The Plan notes that recovery of all four steelhead populations in the Yakima basin exceeds the December 2004 ICTRT recommendations described below:

- At least half (at least two) of the populations are at recovered abundance levels (population abundance criterion 1), with the other populations being maintained.
- All major life histories supported historically should be present in the major population group.
- The viable populations within a major population group should include proportional representation from populations classified as “large/very large” or “intermediate.” (A very large population is 2,250; a large population, 1,500; and an intermediate population, 1,000.)
- Steelhead hatchery programs within each population must be integrated with the appropriate Yakima subbasin steelhead stock and will operate in a manner that contributes to recovery.
- Levels of gene flow from out-of-DPS hatchery stocks into natural steelhead populations in the Yakima subbasin should be less than 1 percent.
- Patterns of straying and gene flow among the natural populations of steelhead should be free from human-caused alterations.

2.5 Strategies and Actions for Recovery

The Plan states that it may take several decades to recover Yakima subbasin steelhead. In order to get on a recovery trajectory early in its implementation, the Plan focuses strategies and actions on the next 15 years. Since the existing four independent Yakima subbasin steelhead populations are currently at a moderate to high risk of extinction, the short-term goal is to improve conditions for all the populations. Additional goals in this time frame include: implement and evaluate the set of short-term strategies and priority actions identified, gain a preliminary view of the status and trends of important recovery indicators, and make mid-course corrections as needed.

Chapter 5, pp. 73-138 of the Plan describes an action strategy for Yakima steelhead to meet specific abundance, productivity, spatial structure, and diversity objectives and criteria necessary to achieve the goals and objectives of the Plan. The Plan identified 153 specific recovery actions to be implemented within the Yakima subbasin at the subbasin and population scales.

Subbasin-scale proposed recovery actions are summarized in Tables 5.1 and 5.3 in Plan Chapter 5, along with a text summary of limiting factors and threats.

Actions at the population level are summarized in Tables 5.3 to 5.10, pp. 103-124 of the Plan. Actions recommended at the population (or local population) scale, Chapter 5, pp. 103-138, address factors that limit steelhead within specific watersheds, streams, or major or minor spawning areas. These actions primarily address factors such as habitat diversity and quantity,

riparian habitat, floodplain and off-channel habitat conditions, nutrients, and fish community structure (including exotics and missing native species) at spatial scales smaller than the subbasin. The primary threats at smaller spatial scales include irrigation diversions and return flows, timber and grazing management, and floodplain development including roads and dikes.

For Satus Creek, recovery actions include changes in grazing and forest management practices. For Toppenish Creek, many actions involve improving fish passage and achieving more normative flows. For the Naches River, recovery actions focus on improving irrigation efficiencies and reconnecting floodplains. For Upper Yakima, recovery actions recommend improvements in downstream passage and outmigration flow, including reducing or eliminating power diversions to Roza Dam during the April 1-May 31 steelhead migration season and redesigning and/or reconstructing the dam's diversion and passage facilities.

2.6 Gap Analysis

In the Plan, "gap analysis" is defined as an evaluation of what is still needed to enable implementation of a plan's recovery goals and/or actions. In the Plan's Chapter 6, pp. 139-142, those gaps are identified and responses are recommended. The Plan identifies biological and information gaps for all populations (both steelhead and bull trout), as well as those specific to steelhead, and divides them into two major categories: 1) critical uncertainties, and 2) gaps in knowledge about the linkages between specific actions and their impacts on habitat factors and VSP parameters.

2.7 Public Education and Outreach

Chapter 8, pp. 153-160 of the Plan identifies stakeholder concerns from previous meetings and proposes a vigorous and targeted public information and outreach program that informs and involves diverse stakeholders in salmon recovery activities and promotes a transparent, inclusive, and collaborative process. Without visible and effective public involvement, salmon recovery actions likely will be overwhelmed by increasing pressures brought on aquatic and other natural resources by population growth, recreation, and economic development.

2.8 Implementation

Implementation of the Plan is addressed in Chapter 9, pp. 163-177. The YSPB and the lead entity for the state Salmon Recovery Funding Board are developing a single organization (to be named the Yakima Basin Fish and Wildlife Recovery Board) that will have the capacity to take on the broader needs of current fish and wildlife planning and implementation. The board will consist of Yakima, Benton, and Kittitas counties, the Yakama Nation, and six to twelve cities. The new single entity will have the capacity to conduct large scope planning or aid implementation of very large (multi-million dollar) projects, coordinate basinwide research, monitoring, and evaluation efforts, update subbasin and salmon recovery plans as needed, and participate in Columbia basin and ESU-scale efforts. Members of both boards are working together to form an organization by April 2006.

The Plan states that implementation will largely rely on existing Federal, state, tribal, or local government programs to carry out recovery actions within the Yakima subbasin. Such entities have some funding sources, infrastructure for implementing recovery actions, and a history of successful implementation. They are composed of, or advised by, inter-jurisdictional or interagency bodies. Many of these entities in the Yakima subbasin are currently implementing

recovery projects and have strategic plans of their own for funding, sequencing, and prioritizing actions. According to the Plan, these entities should continue with their programs, use the recovery plan to help them become more efficient, and, if necessary, update their projects and programs to conform to the recovery plan.

The Plan's recovery time frames are discussed in Chapter 4, p. 72. Actions in the Plan are to be implemented in the next 15 years. Recovery of the populations themselves may take considerably longer (up to several decades) because of delayed environmental response (e.g., the time required for a planted riparian zone to reach maturity and full function) and the subsequent population response (e.g., the time required for a population to incorporate restored portions of their range into their life history). Actions are divided into three time frames:

- 1) Ongoing – projects, programs, or studies being implemented now.
- 2) Short-term – One-time or unique actions that can be implemented within the next 5 years.
- 3) Long-term – Actions with a 15-year time frame that generally require additional technical study, policy review, and public comment prior to implementation. In most cases, these actions continue into the future. Specific time frames for implementation of these long-term actions will be developed as an early implementation product in late 2005 and early 2006.

The new implementing board and NMFS will conduct mid-point evaluations, or check-ins, during years 1, 3, 5, 8, 12, and every fourth year thereafter, following implementation (Chapter 9, p. 169 of the Plan). Check-in reports will review progress made toward developing priorities, updating and maintaining a basinwide project inventory, obtaining funding, implementing funded projects, initiating research, monitoring and evaluation, coordination, and other programmatic issues. To the extent possible, they will also provide updates on adult fish returns (spawners), abundance and abundance trends, and juvenile fish survival. Later reports will detail research and monitoring results. If necessary, these results will be used to adaptively modify the recovery plan. Independent scientific review of the 3-, 5-, 8-, and 12-year evaluation reports is also planned.

2.9 Adaptive Management, Research, Monitoring, and Evaluation

Chapter 7, pp. 144-150 of the Plan outlines a monitoring and evaluation program for Yakima subbasin steelhead that aims at filling data gaps, analyzing the effectiveness of actions, modifying the Plan when new information becomes available (adaptive management), and ensuring consistency with the Washington Salmon Recovery Funding Board field sampling protocols for effective monitoring of habitat restoration and acquisition projects. The Plan defines the context for monitoring and evaluation and lists existing monitoring programs and additional monitoring needs.

2.9.1 Research and monitoring

The Plan states that a monitoring program will be designed in 2006 when the Washington Governor's Monitoring Forum releases its standards and protocols for recovery plan monitoring. Additional research will focus on critical uncertainties that constrain effective recovery plan implementation. A list of both in-basin and out-of-basin research is provided, pp. 167-168 of the Plan.

2.9.2 *Adaptive management*

The Plan defines adaptive management, discusses the purpose of evaluation, and identifies the three levels of evaluation (scientific evaluation, public evaluation, policy/decision-making evaluation) used to assess the effects of recovery actions on Yakima subbasin steelhead. The Plan is “adaptive” in the sense that the outcomes of different recovery actions will be monitored and assessed; this information will be combined with cost and benefit estimates to reevaluate priorities and reasonable actions. The Plan calls for natural resource specialists to develop basin-specific response triggers and management responses for each objective before a complete adaptive management plan can be put into effect. This Plan is a “living document” that will be updated as new information becomes available. See Chapter 9.2, pp. 165-170, of the Plan for further information on research, monitoring, and adaptive management.

2.10 Estimates of Time and Costs

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). The preliminary estimated cost of recovery of \$150 to \$200 million includes both listed steelhead and bull trout populations in the Yakima subbasin. (Listed as a threatened nonanadromous fish population, bull trout are under the jurisdiction of the USFWS.) Total cost estimates include expenditures by local, tribal, state, and Federal governments, private business, and individuals. Potential funding sources are listed in the Plan’s Executive Summary, p. xxv. The estimate excludes expenses associated with major capital facilities projects in the Yakima subbasin, the mainstem Columbia River, the estuary, or the Federal Columbia River Power System.

If both the short- and long-term actions recommended in the Plan (and those in the mainstem Columbia River and estuary) are implemented within the Plan’s 5- to 15-year time frames, recovery is estimated to occur within several decades.

2.11 Public and Scientific Review

The ESA requires public review of draft recovery plans, and NMFS policies (NMFS 2004b) require scientific peer review as well. The Act does not require that the public be involved in developing the Plans; however, NMFS policy encourages such involvement. To the extent possible, the process of preparing the Plan locally has been collaborative, inclusive and transparent, with outreach to Federal, state, tribal, and local entities as well as citizen’s groups and interested individuals. In fulfillment of the ESA’s formal review requirements, the YSPB or its successor will continue to seek public input as the Plan is finalized.

2.11.1 *Yakima subbasin public process*

The YSPB used and updated the contact list developed during the Northwest Power and Conservation Council’s (NPCC’s) subbasin planning process to keep interested parties informed and involved in the progression of the draft salmon recovery plan. Participation was also achieved through the use of websites, the media, presentations and updates to interest groups, and public comment periods for each agenda of the advertised board meetings. During the preparation of the Plan, public participation activities emphasized involving stakeholders who are daily engaged in consumptive use, management, or acquisition of resources that directly or indirectly affect salmon and salmon habitat: irrigation and conservation districts, state and

Federal agencies (e.g., Bureau of Reclamation, U.S. Forest Service, Washington Department of Transportation), greenways and land trusts, and city and county planning and public works departments. Beginning in February and extending through June 2005, stakeholders were consulted during person-to-person meetings, including a well-attended workshop held at the Yakima Convention Center on March 2, 2005. The YSPB or its successor plans to revisit the stakeholders in order to refine the products of the meetings held with them, and to engage the general public at the local level in a review of the Plan and the various means of implementing it. The list of stakeholders involved in development of this plan is shown in Appendix C of the Plan. Chapter 8 of the Plan, Public Education and Outreach, contains a discussion of the outcomes of these meetings.

2.11.2 *Scientific review*

As in other regional domains defined by NMFS Northwest Region, the Interior Columbia/ Yakima subbasin planning effort was supported by a NMFS-appointed science panel, the ICTRT. This panel of scientific experts from NMFS, state, local, and tribal entities, agencies, academic institutions, and private consulting groups developed recommendations for ESU viability criteria. They provided technical guidance to local and regional recovery planning efforts and helped evaluate the Plan for consistency and use of best available science.

The NPCC-appointed Independent Scientific Review Panel and the NPCC- and NMFS-appointed Independent Scientific Advisory Board (ISAB) peer-reviewed the Yakima Subbasin Plan. The Yakima Subbasin Plan, prepared by YSPB for the Northwest Power and Conservation Council, was a precursor to and one of the building blocks for the current Plan. The ISAB also reviewed a draft of the ICTRT's identification of independent salmonid populations in the Interior Columbia domain (ISAB 2003).

3 THE PLAN AND ESA REQUIREMENTS

As indicated in Section 1.0 of this Supplement, NMFS supports and participates in locally led watershed and ESU-scale recovery planning efforts. For NMFS to endorse the Plan as an interim regional recovery plan, it should contribute to and be consistent with ESA recovery requirements, as follows:

ESA section 4(f)(1)(B) states that a recovery plan should include:

- (i) 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;
- (ii) 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
- (iii) 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) factors for re-classification or delisting:

- A. The present or threatened destruction, modification, or curtailment of [a 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 [the species'] continued existence

The intent of these statutory requirements is to make recovery plans specific and accountable. In addition, NMFS believes it is important to have goals and scientifically supported strategies to provide the public and decision-makers with a clear understanding of the purpose, objectives and recommended approach for recovering a listed species (NMFS 2004).

Section 3.1 contains NMFS' assessment of and conclusions regarding the Plan's overall goal and recovery strategy. Section 3.2 is a summary of how the Plan contributes to the ESA section 4(f)(1)(B) requirements, including the ESA section 4(a)(1) factors for re-classification or delisting.

3.1 The Plan's Recovery Goal and Recovery Strategy

The Plan's recovery strategy is intended to achieve the overarching recovery goal and the specific goal for steelhead.

3.1.1 *Recovery goal*

As described above in Section 2.1, the specific recovery goal for the Yakima portion of the Middle Columbia River steelhead DPS is "to ensure long-term persistence of viable populations of naturally produced steelhead distributed across their native range." In addition the YSPB's broader goals of harvestability, respect, and cooperation, as stated in the Vision Statement of the Plan and reiterated in Section 2 of this Supplement, are consistent with the overall approach to

recovery for the species described in NMFS' Interim Endangered and Threatened Species Recovery Planning Guidance (2004).

ESA recovery does not require the return of a species to all of its historic range, nor does it require attainment of full carrying capacity of available habitat, as long as an ESU is demonstrably secure. Because steelhead populations within the Yakima subbasin make up only a portion of the total Middle Columbia River DPS, Yakima steelhead recovery goals cannot be conclusively evaluated in isolation from the rest of the DPS.

3.1.2 *Recovery strategy*

NMFS has evaluated the Plan's Chapter 5, Strategy for Recovery, and concluded that some improvements are needed to clarify the relationship of recovery actions to limiting factors and threats. To provide direction for the necessary changes and improvements called for in this section of the Supplement, NMFS, in collaboration with YSPB staff, has drafted a new table for limiting factors and actions at the subbasin or MPG scale and tables for the four major spawning area (MSA) populations. A table for the Yakima MPG and a table for the Satus Creek population are included in the Supplement's Section 4 and offered as examples.

3.1.2.1. Subbasin-scale recovery actions

Subbasin-scale actions recommended in the Plan's Section 5.2 address factors that limit steelhead population viability throughout the entire Yakima subbasin. These actions primarily address factors such as stream flows, fish passage, water quality (high temperatures), and connectivity. The main threats at this scale include dams and diversions, agricultural activities, residential development, and forest management.

As summarized in Section 2.4 of this Supplement, the Plan has developed some important recovery actions, such as improving flow management and operation, strengthening water quality criteria, and localizing tributary actions to support recovery of individual populations.

In some cases in Plan Chapter 5.2, however, the logic path between limiting factors, threats, and recovery actions needs to be clearer. Clarity regarding limiting factors and threats helps identify causation and thus, the appropriate management actions. Limiting factors are conditions fish experience directly or nearly directly. Threats are human actions or natural events that have created and/or are perpetuating limiting factors. A major consequence of ambiguity in defining limiting factors and threats is that corresponding recovery actions can also be ambiguous.

According to NMFS' Draft Guidelines for Limiting Factors and Threats Assessment (2005),

Limiting factors are the physical, biological, or chemical features (e.g., inadequate spawning habitat, high water temperature, insufficient prey resources) experienced by the fish at the population, intermediate (e.g., stratum or major population grouping), or ESU-levels that result in reductions in VSP parameters (abundance, productivity, spatial structure, and diversity) at any life stage. Key limiting factors are those with the greatest impacts on a population's ability to reach its desired status.

Threats, on the other hand, are the human actions or natural events (e.g., road building, floodplain development, fish harvest, hatchery influences, volcanoes) that cause or contribute to limiting factors. Threats may be caused by the continuing results of past events and actions as well as by present and anticipated future events and actions.

For example, in the Plan's Table 5.1, p.77, the lack of cottonwood recruitment should be considered a limiting factor, not a threat. Similarly in Table 5.1, riparian zone degradation is a limiting factor, while grazing, roads, timber harvest and other causes of vegetation removal are the threats.

Table 5.3, p. 90, needs to identify threats that are common to all steelhead populations. The common threats listed elsewhere are dams and diversions, which should also include river operations and their related annual basinwide flow regulation. Irrigated agriculture can severely diminish streamflow quantity and quality in the Yakima and Naches rivers, thereby hindering adult migration and smolt emigration for all four populations in the MPG. Subsequently, fewer adults successfully spawn and fewer smolts reach the Columbia River, with corresponding effects on population recovery potential. The consequence of overlooking the full range of threats, as in this example, is that the corresponding range of recovery actions may also be too narrow. (A more detailed description of threats is offered in the Plan's Chapter 3.)

See Supplement Section 4.4, Table 1, for a reorganization and clarification of these relationships at the subbasin scale..

3.1.2.2. Population-scale recovery actions

In the Plan's Section 5.3, Population Scale Actions, the YSPB has made a significant effort describing limiting factors, threats, and actions in numerous MSAs and minor spawning areas (mSAs) in the Yakima basin. Actions are tailored to the needs of each steelhead population. However, the logical linkages between limiting factors, threats, and actions also need to be improved. While "Risk of Extinction" is the table heading, the explanatory text that follows refers to limiting factors and threats. The tables and accompanying text should be consistent. In Section 5.3, the Table 5.5, Satus Creek Steelhead, pp. 103-104, should include the threats mentioned in the "Summary of limiting factors and threats" text (p.104) and those described in the Plan's Section 3.4.2 (p. 49). Table 5.6, Toppenish Creek Steelhead, p. 105-106, also needs to include threats. The table and accompanying text need to provide more detail about recovery actions; and in the text, limiting factors and threats should be differentiated.

For Tables 5.7, Naches Steelhead, and 5.8, Upper Yakima Steelhead, threats and actions should be added to be consistent with the recommended recovery actions and discussions that follow.

Many of the Plan's recovery actions need more specificity. For example, the Plan specifies what needs to happen at Roza Dam to improve steelhead survival, while other actions are only described in general terms.

See Table 2 in Supplement Section 4.4 for an example of the new population-scale tables, which are subdivided by MSAs and mSAs, and are more detailed than those in the Plan.

Methods for evaluating and quantifying benefits from the recommended recovery actions need to be developed (see Supplement Section 3.2.2.4).

3.2 ESA Section 4(f)(1)(B) Requirements

This section contains a discussion and summary of how the Plan contributes to the three section 4(f)(1)(B) requirements (see Section 4.0).

3.2.1 *Site-specific management actions*

Following the ICTRT review, NMFS reviewed the Plan and its supporting documents. NMFS agrees that as plan implementation and adaptive management proceeds, proposed actions in the subbasin and at individual population levels will be further refined and prioritized for implementation in a manner that specifically addresses the primary limiting factors. NMFS strongly supports the importance of testing hypotheses about limiting factors through adaptive management and monitoring.

NMFS also agrees that some strategies and actions need to be implemented at the ESU-scale to address the factors limiting recovery. As a plan for the entire Middle Columbia River steelhead DPS is developed and implementation and adaptive management unfold, NMFS will continue to work with YSPB and its successor. Working together, priorities for implementing recovery actions at the regional or DPS level will continue to be set in a manner that is consistent with the major limiting factors for the DPS.

NMFS concludes that the Plan contributes to meeting the first of the 4(f) requirements for a recovery plan: it has a description of site-specific management actions, inclusive of the above qualifications and emphases, necessary to achieve the plan's goal for the conservation and survival of the species.

3.2.2 *Objective, measurable criteria*

The intent of the statutory requirement for objective and measurable criteria is to be specific about what must be accomplished by the recovery plan.

3.2.2.1. **Biological criteria**

The Plan's specific, recommended VSP criteria for naturally produced steelhead are listed in Supplement Section 2.4 and are based largely on the ICTRT's 2004 viability criteria recommendations. The Plan's goals exceeded the 2004 viability standards, as the YSPB decided they wanted to improve abundance and productivity for all four of the subbasin's populations. NMFS supports the Plan's recovery criteria on an interim basis until the DPS-wide Middle Columbia River steelhead recovery plan is drafted. It should be noted, however, that steelhead populations within the Yakima subbasin make up only a portion of the total Middle Columbia River DPS. Therefore, even if the populations and MPG within the Yakima subbasin meet recovery goals and criteria, the DPS may not be recovered if other populations within its range do not meet their goals and criteria.

NMFS endorses the population-level viability criteria recommended by the Plan on an interim basis, pending the completion of DPS-level criteria and the development of recovery scenarios for the DPS. The recovery scenarios will describe a target status and risk level (probability of persistence) for each population within the DPS and how many and which populations need to be at a particular status for the DPS to have an acceptably low risk of extinction. The development of the recovery scenarios will be a combined policy and technical effort. These DPS-level criteria and scenarios will be incorporated into a Middle Columbia River steelhead DPS-level recovery plan. NMFS will continue to work with the YSPB to address the effect of DPS-level criteria on the populations within the Yakima management unit.

3.2.2.2. Listing factor (threats) criteria

In order to delist the DPS, the biological criteria above must be met and the listing factors must be addressed. 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.

At the time of a delisting decision, NMFS will examine whether the section 4(a)(1) listing factors have been addressed. To assist in this examination, NMFS will use the listing factors (or threats) criteria described below in addition to evaluation of biological viability criteria and other relevant data and policy considerations (see Supplement Section 3.2.2.3, below).

To determine that the affected DPS is recovered to the point that it no longer requires the protections of the ESA, NMFS will review the status of the listing factors according to the specific criteria identified for each of them (see below). The threats need to have been addressed to the point that delisting is not likely to result in their re-emergence. It is possible that current perceived threats will become insignificant in the future as a result 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 status reviews, NMFS will evaluate and review the listing factor criteria under conditions at the time.

The specific criteria listed below for each of the relevant listing/delisting factors helps to ensure that underlying causes of decline have been addressed and mitigated prior to considering a species for delisting. While the Plan does include appropriate biological criteria, it does not include similar explicit listing factor (threats) criteria. To be consistent with section 4(f)(1)(B) of the ESA, the threats criteria described below need to be inserted into the Plan. NMFS expects that if the proposed actions described in this Plan are implemented, they will make substantial progress toward meeting the following listing factor (threats) criteria.

Factor A: The present or threatened destruction, modification, or curtailment of its habitat or range

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

1. Passage obstructions (e.g., dams and culverts) are removed or modified to improve survival and restore access to historically accessible habitat where necessary to support Middle Columbia River steelhead recovery goals as described in the YSPB Plan.
2. Flow conditions that support adequate steelhead rearing, spawning, and migration are achieved through management of Yakima mainstem and tributary irrigation and hydropower operations, and through the improvement of other water user efficiencies and conservation, including for municipal supply and other consumptive purposes.
3. Forest management practices that protect watershed and stream functions are implemented on Federal, state, tribal, and private lands.

4. Agricultural practices, including grazing, are implemented to protect and restore riparian areas, floodplains, and stream channels, and to protect water quality from sediment, pesticide, herbicide, and fertilizer runoff.
5. Urban and rural development, including land use conversion from agriculture and forestland to residential uses, does not reduce water quality or impair natural stream conditions.
6. The effects of toxic contaminants on salmonid fitness and survival in the Yakima mainstem and tributaries are sufficiently limited so as not to affect recovery.
7. Channel function, including vegetated riparian areas, canopy cover, stream-bank stability, off-channel and side-channel habitats, natural substrate and sediment processes, and channel complexity, is restored to provide adequate rearing and spawning habitat.
8. Floodplain function and the availability of floodplain habitats for salmon are restored to a degree sufficient to support a viable DPS. This restoration should include connectedness between river and floodplain and the restoration of impaired sediment delivery processes.
9. Yakima subbasin hydropower operations are managed and operated to maximize survival of emigrating smolts.
10. Water operations management in the mainstem Yakima and tributaries maximize survival of juvenile rearing, emigrating smolts, and immigrating and spawning adults.

For additional information on current threats resulting from habitat degradation and loss, see the Plan's Chapter 3, Factors for Decline and Chapter 5, Strategy for Recovery.

Factor B: Over-utilization for commercial, recreational, scientific or educational purposes

To determine that the DPS is recovered, any utilization for commercial, recreational, scientific, or educational purposes should be managed as outlined below:

1. Fishery management plans for steelhead are in place that (a) accurately account for total fishery mortality (i.e., both landed catch and non-landed mortalities) and constrain mortality rates to levels that are consistent with achieving population viability (i.e., provide for adequate spawning escapement given their productivity); and (b) are implemented in such a way as to avoid deleterious genetic effects on populations or negatively affect the distribution of populations.
2. Federal and state rules and regulations are effectively enforced.
3. Technical tools accurately assess the effects of the harvest regimes so that harvest objectives are met but not exceeded.
4. Handling of fish is minimized to reduce indirect mortalities associated with education or scientific programs, while recognizing that monitoring, research, and education are key actions for conservation of the species.
5. Routine construction and maintenance practices are changed to reduce or eliminate mortality of listed species.

For additional information on threats related to harvest actions, see the Plan's Chapter 3, Factors for Decline and Chapter 5, Strategy for Recovery.

Factor C: Disease or predation

To determine that the DPS is recovered, any disease or predation that threatens its continued existence should be addressed as outlined below:

1. Hatchery operations do not subject steelhead populations to deleterious diseases and parasites and do not result in increased predation rates of wild fish;
2. Predation by avian predators is managed in a way that promotes recovery of salmon and steelhead populations;
3. The northern pikeminnow is managed to reduce predation on steelhead as appropriate to meet recovery goals;
4. Populations of introduced smallmouth bass and catfish are managed such that competition or predation does not impede steelhead recovery.
5. Physiological stress and physical injury that may cause disease or increase susceptibility to pathogens during rearing or migration should be reduced during critical low flow periods (e.g. low water years) or poor passage conditions (e.g. at diversion dams or bypasses).

For additional information on current threats resulting from disease or predation, see Plan's Chapter 3, Factors for Decline and Chapter 5, Strategy for Recovery.

Factor D: The inadequacy of existing regulatory mechanisms

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

1. 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 for the effective management of fisheries.
2. Habitat conditions and watershed functions are protected through land-use planning that guides human population growth and development.
3. Habitat conditions and watershed function are protected through regulations that govern resource extraction such as timber harvest and gravel mining.
4. Habitat conditions and watershed functions are protected through land protection agreements as appropriate, where existing policy or regulations do not provide adequate protection.
5. Regulatory, control, and education measures to prevent additional exotic plant and animal species invasions are in place.

For additional information on existing regulatory mechanisms, see the Plan's Chapter 3 Factors for Decline and Chapter 5 Strategy for Recovery.

Factor E: Other natural or manmade factors affecting its continued existence

To determine that the DPS is recovered, other natural and man-made threats to its continued existence should be addressed as outlined below:

1. Hatchery programs are being operated in a manner that is consistent with individual watershed and region-wide recovery approaches; appropriate criteria must be used for the integration of hatchery steelhead populations and extant natural populations inhabiting watersheds where the hatchery fish return.
2. 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.
3. Mechanisms are in place to reduce the incidence of, and impacts from, introduced, invasive, or exotic plant and animal species.
4. Nutrient enrichment programs must be evaluated to determine where additional nutrient inputs can provide significant benefits.

For additional information on other threats, see the Plan's Chapter 3, Factors for Decline and Chapter 5, Strategy for Recovery.

3.2.2.3. Application of the criteria to delisting decisions

In accordance with our responsibilities under section 4(c)(2) of the Act, NMFS will conduct status reviews of the Yakima steelhead MPG at least once every 5 years to evaluate the status of the Middle Columbia River steelhead DPS and determine whether the DPS should be removed from the list or changed in status. Such evaluations will take into account the following:

- The biological viability criteria and listing factor (threats) criteria described above
- Principles laid out in the Viable Salmonid Populations paper (McElhany et al. 2000)
- Best available information on population and ESU/DPS status and new advances in risk evaluation methodologies
- Considerations consistent with the VSP paper and the ICTRT's recommendations, including: the number of viable populations; the number and status of other extant populations; the distribution of viable populations relative to the range of historical conditions supporting viable populations; linkages and connectivity among viable 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)

The biological criteria (see the Supplement's Section 3.2.2.1 above) and listing factor (threats) criteria (see Section 3.2.2.2 above), when taken together, describe conditions, commitments, and administrative measures that, when met, would result in a determination that the species is not likely to become endangered within the foreseeable future throughout all or a significant portion of its range.

3.2.2.4. Adaptive management and monitoring

The Plan's Chapter 7, pp. 144-150, deals with adaptive management and monitoring. While the Plan provides specific actions needed to address all threats and identifies a process and the parties with the authority, jurisdiction, or resources needed to implement each action, implementation schedules need to be integrated into the process. The Plan emphasizes a number of outstanding deficiencies related to current research and monitoring efforts: research and monitoring are not fully coordinated between the various entities; fundamental data is needed for improved accuracy and prioritization of actions; and the current Bureau of Reclamation's physical models of water flow and habitat conditions have limited utility for managing and monitoring watersheds and aquatic resources. The Plan also identifies ways to address these deficiencies and other tasks. The Plan acknowledges the importance of adaptive management and monitoring and a commitment to addressing them.

NMFS supports this commitment. It is essential to have monitoring and adaptive management frameworks in place early in Plan implementation to ensure that the appropriate types and amounts of data are collected to assess the effectiveness of recovery actions and the progress towards recovery. NMFS will work with local subbasin planning groups and the regional adaptive management steering committee to support development and implementation of the adaptive management and monitoring program.

NMFS is developing an adaptive management framework that will guide monitoring and evaluation programs for this and other recovery plans. The framework is based on a decision structure that identifies the questions that need to be asked to structure the monitoring and evaluation program. The decision structure builds upon (a) the ESU and population viability principles described in McElhany et al. 2000 and associated indicators proposed by the TRTs, and (b) the identified threats limiting population and ESU viability as defined by the five statutory listing factors section 4(a)(1) of the ESA (see Supplement Section 3.2.2.2). NMFS Salmon Recovery Division and staff will help YSPB or its successor and other regional, state, tribal, and local entities to develop appropriate research, monitoring and evaluation plans for adaptive management.

3.2.3 *Time and cost estimates*

The Plan's time and cost estimates combine meeting the recovery goals for both the ESA-listed steelhead and bull trout populations. In conjunction with the drafting of a DPS-wide Middle Columbia River steelhead plan, the Yakima Fish and Wildlife Salmon Recovery Board will need to provide separate time and cost estimates for steelhead recovery goals. NMFS will provide guidance for estimating the costs of actions within the Yakima subbasin. Working with the Board, NMFS will take the lead in estimating costs for out-of-subbasin actions (hydro, harvest and the estuary). This more comprehensive cost estimate needs to be available before completion of the DPS-level recovery plan.

NMFS reviewed the Draft Yakima Subbasin Salmon Recovery Plan and believes that, with the additional information requested in this section, the Plan will contribute to meeting the third of the 4(f) requirements for a DPS-level recovery plan: it will include 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 before the DPS-level plan is complete.

3.2.4 *Implementation schedule*

The scale of human activities that limit or threaten steelhead in the Yakima basin is broad and pervasive. Recovery can be achieved only through the combined and coordinated actions of Federal and state agencies, the Yakama Nation, and local governments, and with the participation of nonprofit organizations, the business sector, and citizens. Collectively, these parties are referred to as implementing partners. The Plan provides specific actions with the greatest potential for protecting and recovering steelhead, and their implementation will not consist of a one-time or short-term initiative. Most programs and actions will likely need to be sustained, evaluated, adjusted, and augmented over the recovery period.

The current implementation schedule in Plan Chapter 4, p. 72, is very general, indicating those actions that are ongoing, short-term (those that can be implemented within 5 years), and long-term (those that can be implemented within 15 years). The Plan commits to developing specific time frames for implementation of these long-term actions in late 2005 and early 2006. NMFS recommends that in preparing a more detailed recovery schedule, the new Yakima recovery board (Chapter 9, p.171) work with its partners to develop 6-year implementation schedules that will describe the tasks, schedules, priorities, estimated costs, and the broad public and stakeholder involvement needed to carry out recovery actions. Each of the Federal and state agencies, tribal and local governments, and non-governmental entities identified as partners will be requested to prepare an implementation schedule for their recovery actions. These individual schedules will be combined into a regional implementation schedule that will cover the entire management unit and, after the DPS roll-up, the local schedules will be combined into a Middle Columbia River steelhead DPS implementation schedule.

This approach fits into the Plan's adaptive management approach, which acknowledges that existing information is too uncertain to definitively identify a mix of actions that will ensure recovery of steelhead. The Plan's adaptive approach will be based on the results of evaluations, or "check-ins" in years 1, 3, 5, 8, 12, and every fourth year thereafter, following implementation. Also see Section 2.8 of this Supplement.

3.2.5 *ESA section 4(f) conclusion*

NMFS reviewed the Plan as well as the notes and conclusions of the ICTRT from its review of the Plan in 2005. Based on that combined evaluation, NMFS believes that the Plan, with the revisions identified in this Supplement will contribute to meeting ESA requirements for the DPS-level recovery plan.

4 NMFS' INTENDED USE OF THE PLAN

As a result of the evaluation of the Plan presented in Supplement Section 3, and after considering public comment on the Plan, NMFS expects that the Plan will be revised. NMFS then intends to endorse this Plan as an interim regional recovery plan for the Yakima Management Unit.

As previously noted, NMFS prefers to rely on locally developed recovery plans to the extent possible. By endorsing a locally developed recovery plan, NMFS is making a commitment to implement the actions in the Plan for which we have 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. We will also encourage the State of Washington to seek similar implementation commitments from state agencies and local governments.

As noted in Section 1 of this Supplement, the spawning range of the Middle Columbia River steelhead DPS corresponds to the Middle Columbia sub-domain, which in turn contains four management units consisting of northeastern Oregon, the Yakima subbasin, the Columbia Gorge (Big White Salmon/Klickitat Rivers/Rock Creek), and southeast Washington. Management units were designed to accommodate the local groups and organizations formed for recovery planning and to ensure that the DPS-wide recovery plans would be built from local recovery efforts.

In the process called “roll-up” or consolidation, representatives from the management units and other appropriate representatives from habitat, hydropower, harvest, and hatchery interests (all “H” sectors) will be involved in identifying the DPS-level needs. DPS-level interdependencies, such as DPS-level recovery criteria, population scenarios, out-of-subbasin effects, all-H life cycle analyses, and research, monitoring, and evaluation strategies, will be addressed during roll-up. The final DPS-level recovery plan will incorporate the management unit plans in a manner that is consistent with our legal mandate to recover listed species.

NMFS intends to work with the Federal agencies to develop an agreement for cooperative implementation of Federal funding programs, including the Bonneville Power Administration's Fish and Wildlife Program and NMFS' Pacific Coast Salmon Recovery Fund.

NMFS expects the YSPB Plan, and other plans developed throughout the Northwest Region, to help NMFS and other Federal agencies take a more consistent approach to future section 7 consultations. For example, the Plan will provide greater biological context for the effects that a proposed action may have on the listed DPS. This context will be enhanced by adding recovery plan science to the “best available information” for ESA section 7 consultations. Such information includes viability criteria for the DPS and its independent populations; better understanding of and information on limiting factors and threats facing the DPS; better information on priority areas for addressing specific limiting factors; and better geographic context for where the DPS can tolerate different levels of risk. Recovery plans will also help focus funding and other efforts on priority areas and issues and will improve cost effectiveness by identifying priorities and by implementing credible adaptive management frameworks.

4.1 ESA-Related Decision Making

Recovery plans provide context and a technical foundation for NMFS decisions. NMFS will use completed plans to:

- Ensure an integrated approach to ESA section 7 consultations across all “Hs.”
- Judge the significance of proposed actions relative to the importance of the affected habitat and population to DPS survival and recovery.
- Guide and expedite ESA section 7 consultations, HCP approvals, section 4(d) rules, and permitting applications for proposed actions consistent with recovery plans.
- Evaluate the degree to which a proposed action is consistent with an applicable recovery plan in making ESA determinations.
 - Proposed actions that are consistent with an applicable recovery plan are more likely to be approved.
 - Proposed actions that are inconsistent with an applicable recovery plan will have an additional burden to demonstrate that they are nonetheless consistent with a no-jeopardy determination.

4.2 Priority Setting

Recovery plans help focus funding and other efforts on priority areas and actions that must be done first to achieve recovery. NMFS has provided guidance to states and tribes to the effect that actions for Pacific Coast Salmon Recovery Funding (PCSRF) need to be consistent with recovery plans.

- NMFS will prioritize permitting for actions implementing recovery plans and for actions that are consistent with recovery plans.
- Recovery plans will improve cost effectiveness by identifying priorities and by setting up credible adaptive management frameworks.

4.3 Best Available Science

In some instances, there may be science other than that provided in the draft Plan that may be applicable to addressing specific recovery issues. Therefore, NMFS will consider all the information available in evaluating plan implementation and performance and assessing risk of actions to the listed Middle Columbia River steelhead. NMFS is committed to working with local watershed planning groups during these reviews to share and gain information and perspectives so that plan implementation efforts across the subbasin can improve over time.

4.4 Improvements and Changes to Plan

NMFS has also identified specific improvements to the Plan that should be undertaken when this draft plan is revised at the conclusion of the public process, as follows:

- Better define limiting factors and threats at the subbasin and population scales, which will provide implementing partners with an easier link between recovery actions and the factors that likely hinder recovery of Middle Columbia River steelhead in the Yakima subbasin. Identify and describe limiting factors and threats according to NMFS draft guidelines. See Supplement Sections 3.1.2.1 and 3.1.2.2.
- Identify threats common to all steelhead populations. See Supplement Section 3.1.2.1.

- Provide information about threats to Satus and Toppenish creeks. See Supplement Section 3.1.2.1 and MSA population tables in Supplement Section 4.4.
- Use limiting factors rather than the risk of extinction concept to guide development of appropriate population-scale recovery actions. See Supplement Section 3.1.2.1 and 3.1.2.2.
- Make tables and accompanying text in the Plan's Section 5.3 consistent and include the threats discussed in the accompanying text. See Supplement Section 3.1.2.2.
- Elaborate on the effects of subbasin recovery actions on the MSA populations. See Supplement Section 3.1.2.2.
- Estimate the benefits from recovery actions based on the four VSP parameters. See Supplement Section 3.1.2.2.
- Include a more detailed monitoring and adaptive management implementation framework that takes into account the framework being developed by NMFS. See Supplement Section 3.2.2.4.
- Provide recovery costs for steelhead separately from bull trout recovery costs, and estimated in greater detail. NMFS will work with the YSPB or its successor to see that this task is accomplished. See Supplement Section 3.2.3.
- Provide a more detailed recovery implementation schedule as described in Supplement Section 3.2.3.
- Insert the listing factor (threats) criteria from Supplement Section 3.2.2.2 into the Plan.
- Consult with Federal partners, such as the U.S. Forest Service, Natural Resource Conservation Service, and other U.S. Department of Agriculture programs; the Bureau of Reclamation, Bureau of Indian Affairs, Bureau of Land Management, and other U.S. Department of the Interior programs; the U.S. Army Corps of Engineers; and other Federal agencies and programs, to identify the actions they are taking or plan to take that will affect recovery of the Middle Columbia River steelhead DPS in the Yakima subbasin.
- Integrate Supplement Tables 1 and 2 (below) into the Plan.

Tables 1 and 2, which follow, represent an organization and clarification of actions found in the Plan (with some amplification in the case of the two smaller Satus and Toppenish populations).

Table 1 Top limiting factors for the Yakima River MPG by population

Population	Limiting Factor	Key actions
Satus Creek	Poor riparian conditions in many reaches	Continue and redouble efforts to control livestock over utilization of riparian areas.
	Reduced headwater and floodplain storage function resulting in decreased base flows	Implement appropriate measures to improve headwater storage and floodplain function, including meadow headcut stabilization, restoration of beaver forage, and reconnection of side channels.
	Sedimentation of substrates	Properly maintain and opportunistically re-locate forest roads that contribute to sedimentation problems or those that reduce floodplain/channel interaction.
	Poor smolt migration conditions in the Yakima River mainstem below Satus Creek	Improve Yakima mainstem flows during juvenile migrations by increasing reservoir releases, reducing diversions or both. In particular, subordinate power diversions at Chandler during the juvenile migration period.
Toppenish Creek	Reduced floodplain function	Continue floodplain reconnection from the Olney Diversion downstream.
	Altered surface/ground water interactions causing seepage loss	Continue YN Toppenish Creek corridor riparian restoration program.
	Reduced natural flows in middle mainstem Toppenish and Simcoe Creeks along with heavy irrigation return flows	Increase ground water contribution to base flow and decrease or eliminate surface discharge of agricultural return flows into Toppenish Creek and tributaries.
	Unsafe juvenile passage conditions	Screen all surface water withdrawals or otherwise ensure safe passage.
	Poor water quality in mid-lower reaches of Toppenish Creek	Increase stream flows in the mid-mainstem Toppenish and Simcoe Creeks by improving water management.
	Poor juvenile passage in Yakima mainstem below Toppenish Creek	Improve Yakima mainstem flows during juvenile migrations by increasing reservoir releases, reducing diversions or both. In particular, subordinate power diversions at Chandler during the juvenile migration period.
Naches	Channel simplification as a consequence of levees along the mainstem and large tributaries and a heavily altered hydrograph in the Tieton River.	Selectively reconnect floodplains by removing or lowering levees.

Population	Limiting Factor	Key actions
	Altered hydrograph as a result of BOR flow regulation, in particular extremely high flows in the Tieton River in Sept.	Attenuate flow extremes resulting from flip flop, in particular reduce extremely high September flow.
	Low flows in the Wapatox reach during August and very low flows in the Tieton River during the winter months.	Fully realize the benefits of the Wapatox water right purchase by improving the efficiency of irrigation water delivery.
	Lack of access to historically productive habitats.	Continue passage improvements in Cowiche Creek and pursue passage at Bumping and Tieton Dams.
	Poor smolt migration conditions in the Yakima River mainstem.	Improve Yakima mainstem flows during juvenile migrations by increasing reservoir releases, reducing diversions or both. In particular, subordinate power diversions at Chandler during the juvenile migration period.
Upper Yakima	Altered hydrograph as a result of BOR flow regulation.	Attenuate effects of flip flop, in particular extremely high August flows.
	Lack of access to historically productive habitats.	Set winter flows no lower than flows set for spring Chinook salmon spawning and maintain these flows throughout the winter.
	Channel simplification as a consequence of channel realignment for highway and levee construction.	Continue efforts to reconnect side channels.
	Seasonal low flow problems – low winter flows below reservoirs, low flows below Roza Dam during juvenile migration, low flows in some tributaries.	Provide passage into Upper Cle Elum, Upper Yakima above Easton (all years), Manastash Creek, Nanum Creek and other tributaries as opportunities are available.
	Impediment to juvenile passage at Roza Dam.	Suspend power production at Roza Dam during the juvenile migration period and evaluate the biological adequacy of the existing flow targets below this dam and increase these targets as warranted.
	Poor smolt migration conditions in the Yakima River mainstem.	Improve Yakima mainstem flows during juvenile migrations by increasing reservoir releases, reducing diversions or both. In particular, subordinate power diversions at Chandler during the juvenile migration period.

Table 2 Limiting factors and actions for Satus Creek MSAs

		Limiting Factors			Actions	
MSA	Limiting Factor	Threats	VSP Parameters Affected	Affected Site	Action	Significance of Actions
Dry MSA	Channelization of wet meadows and uplands; flashy flow	Grazing practices; feral horse introduction; forest management including fire suppression	Productivity, Spatial Structure	Dry Creek tributaries	Manage cattle and horse grazing Promote cattle dispersal by fencing and watering systems Develop feral horse management plan	Restore year-round fish habitat; improve out-migration conditions
					Manage riparian conifers to restore beaver food source	
					Stabilize headcuts in meadows	
Reduced channel-floodplain interaction and riparian zone health in forested area; fine sediment deposition	Forest management including fire suppression, timber harvest selectivity and timber haul roads	Abundance, Productivity and Spatial Structure	Dry Creek and tributaries	Improve, relocate forest roads	Improve quality of existing habitat	
				Improve road crossings		
				Manage riparian conifers to restore beaver food source		
Status-Log MSA	Channelization of wet meadows and uplands; flashy flow; high maximum temperature	Grazing practices; feral horse introduction; forest management including fire suppression	Productivity, Spatial Structure	Satus Creek tributaries	Manage cattle and horse grazing Promote cattle dispersal by fencing and watering systems Develop feral horse management plan	Restore year-round fish habitat; improve out-migration conditions
					Manage riparian conifers to restore beaver food source	
					Stabilize headcuts in meadows	
	High maximum temperature and low flow in summer	Grazing practices and road networks	Abundance, Productivity and Spatial Structure	Satus Creek	Manage cattle and horse grazing Promote cattle dispersal by fencing and watering systems Develop feral horse management plan	Improve quality of existing habitat
					Improve, relocate forest roads	
Confinement, loss of floodplain habitats	Road network including SR 97	Abundance, Productivity and Spatial Structure	Satus Creek and Tributaries	Improve floodplain connectivity and channel-forming processes adjacent to SR 97 and other floodplain roads	Improve quality of existing habitat	
Reduced channel-floodplain interaction and riparian zone health in forested area; fine sediment deposition	Forest management including fire suppression, timber harvest selectivity and timber haul roads	Abundance, Productivity and Spatial Structure	Satus Creek and tributaries	Improve, relocate forest roads	Improve quality of existing habitat	
				Improve road crossings		
				Manage riparian conifers to restore beaver food source		
Poisel mSA	Channelization of wet meadows and uplands; flashy flow	Grazing practices; feral horse introduction	Productivity and Spatial Structure	Tributary network draining Poisel Butte area	Manage cattle and horse grazing Promote cattle dispersal by fencing and watering systems Develop feral horse management plan	Improve downstream base flow and water quality

Limiting Factors					Actions	
MSA	Limiting Factor	Threats	VSP Parameters Affected	Affected Site	Action	Significance of Actions
					Stabilize headcuts in meadows	
Mule-Dry mSA	Channelization of wet meadows and uplands; flashy flow	Grazing practices; feral horse introduction	Abundance, Productivity and Spatial Structure	Mule-Dry Creek and tributaries	Manage cattle and horse grazing Promote cattle dispersal by fencing and watering systems Develop feral horse management plan	Restore year-round fish habitat; improve out-migration conditions
					Stabilize headcuts	
	Reduced riparian zone health; fine sediment deposition		Abundance, Productivity and Spatial Structure	Mule-Dry Creek and tributaries	Improve, relocate roads	Improve quality of existing habitat
					Improve road crossings	
[Non-mSA Lower Status]	Incision and simplification of lower Satus Creek; riparian degradation	Channel manipulation, floodplain development	Abundance, Productivity and Spatial Structure	Lowermost 8 miles of Satus Creek	Allow the creek to meander and introduce appropriate roughness features	Restore some of original channel complexity and floodplain functions
					Lease or purchase floodplain habitats from willing participants	
	Degraded water quality and high maximum temperature	Irrigation return flows	Abundance, Productivity and Spatial Structure	Lowermost 8 miles of Satus Creek	Improve irrigation and water conservation practices	Improve quality of existing habitat
					Potential passage obstruction at abandoned irrigation diversion dam	Irrigation development

5 ABBREVIATIONS

DPS	distinct population segment
ESA	Endangered Species Act
ESU	evolutionarily significant unit
FCRPS	Federal Columbia River Power System
GSRO	(Washington) Governor's Salmon Recovery Office
ICTRT	Interior Columbia Technical Recovery Team
ISAB	Independent Scientific Advisory Board
MPG	major population group
MSA	major spawning area
mSA	minor spawning area
NMFS	National Marine Fisheries Service
NPCC	Northwest Power and Conservation Council
PCSRF	Pacific Coastal Salmon Recovery Fund
SAR	smolt-to-adult return rate
TRT	Technical Recovery Team
USFWS	U.S. Fish and Wildlife Service
VSP	viable salmonid population
YSPB	Yakima Subbasin Fish and Wildlife Planning Board

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