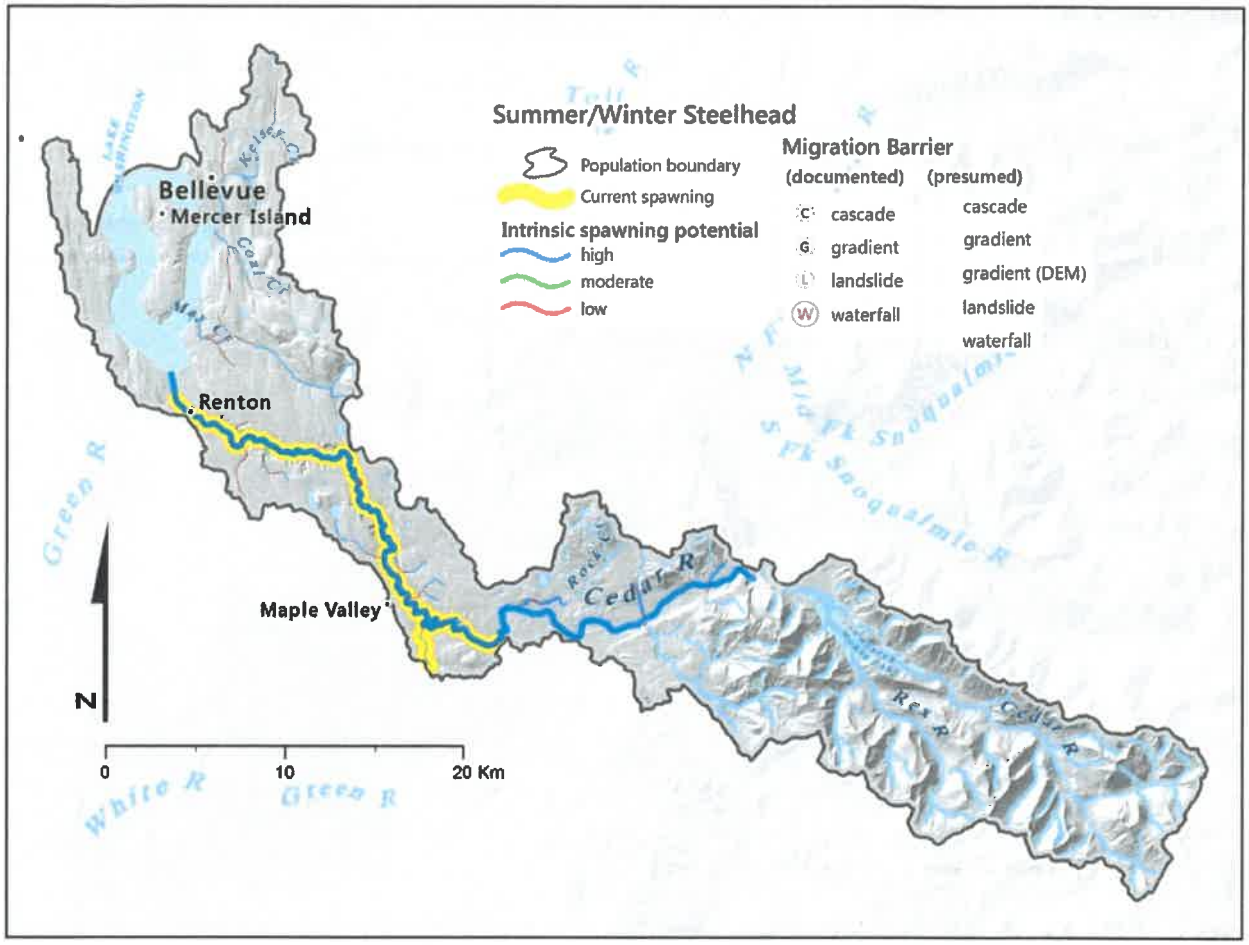

Figure E-52. Map of Cedar River Winter-Run population spatial structure, including migration barriers and spawning potential.

Source. Viability Criteria for Steelhead within the Puget Sound Distinct Population Segment, Puget Sound Technical Recovery Team, 2013.

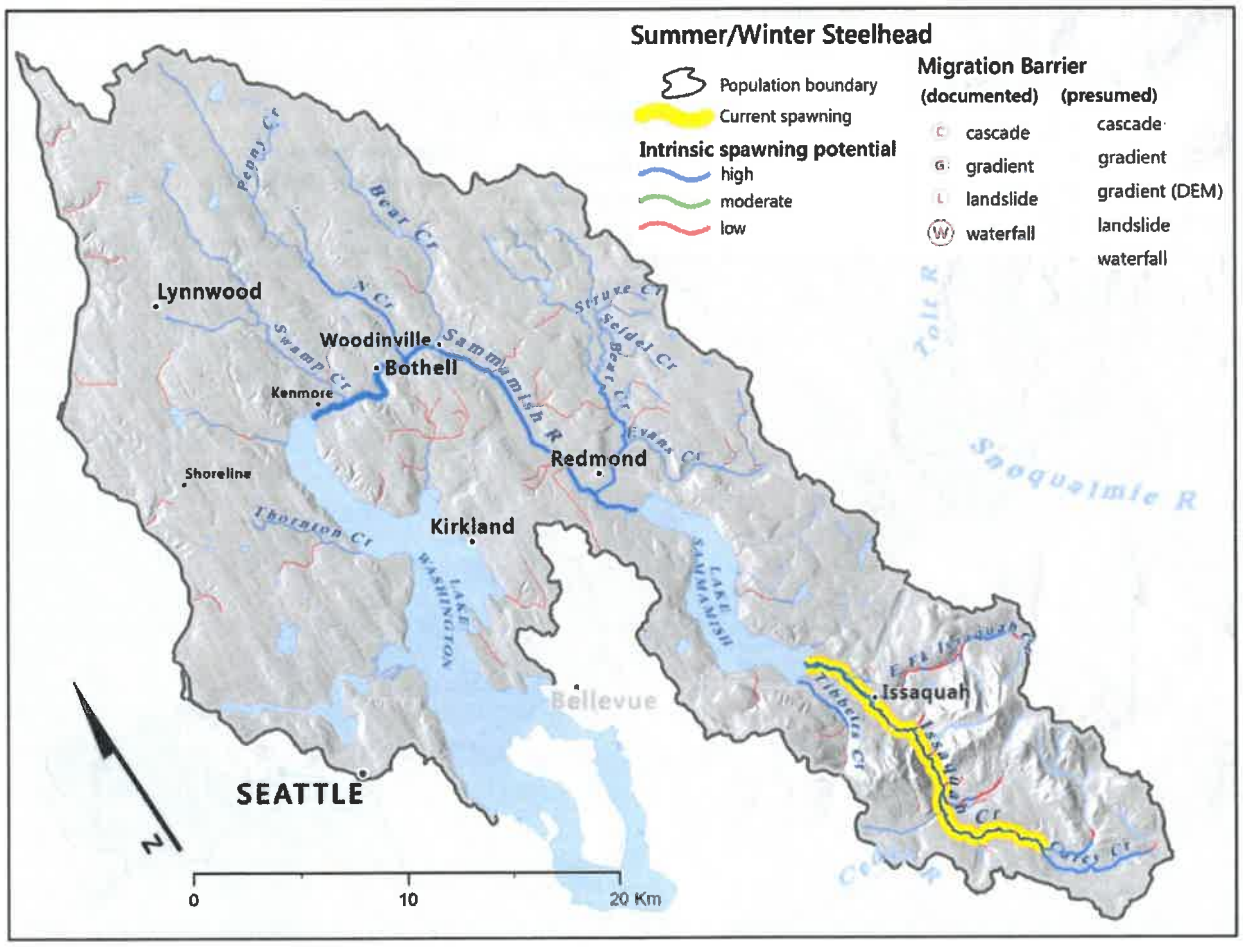

Figure E-56. Map of North Lake Washington and Lake Sammamish Winter-Run population spatial structure, including migration barriers and spawning potential.

Source. Viability Criteria for Steelhead within the Puget Sound Distinct Population Segment, Puget Sound Technical Recovery Team, 2013.

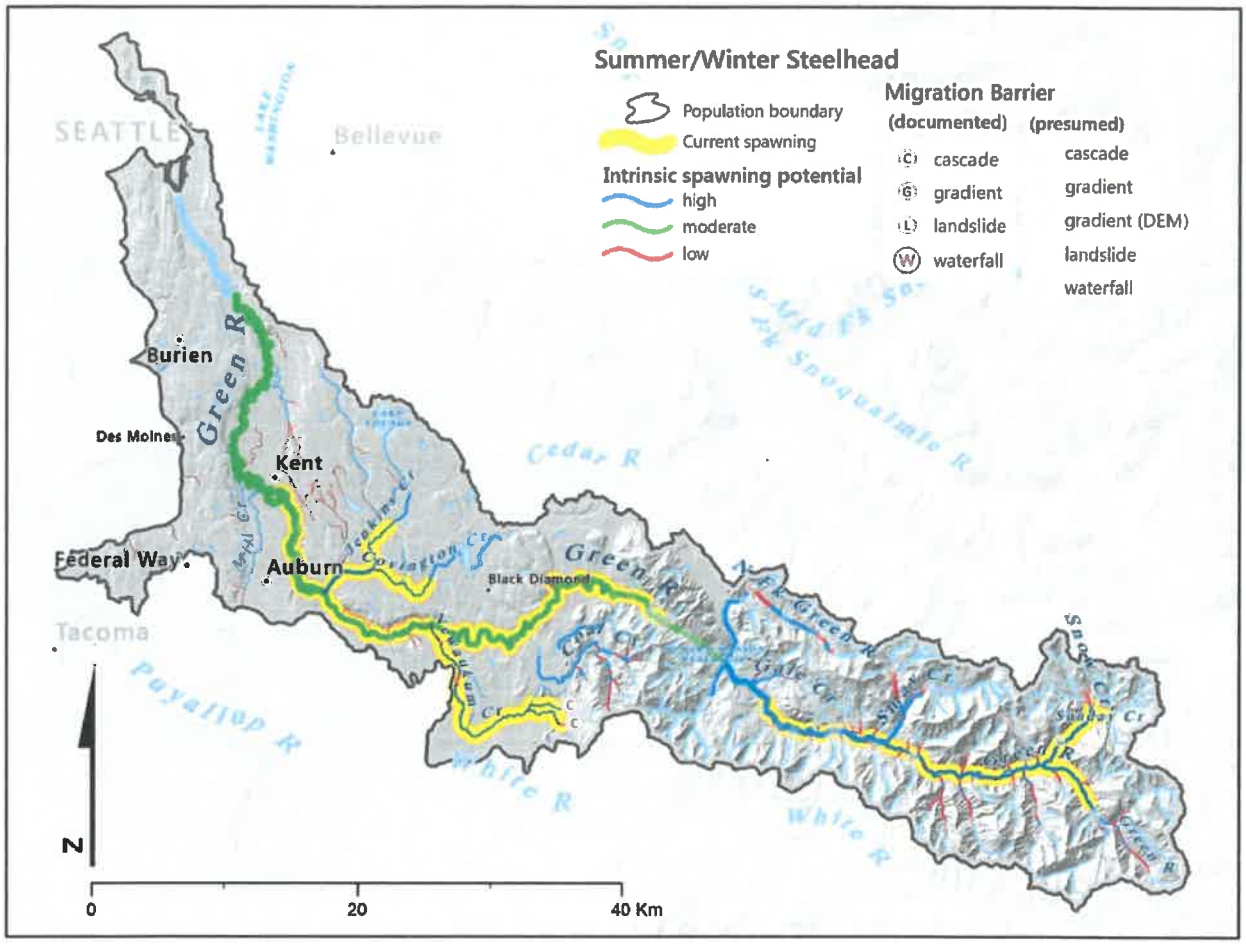

Figure E-59. Map of Green River Winter-Run population spatial structure, including migration barriers and spawning potential.

Source. Viability Criteria for Steelhead within the Puget Sound Distinct Population Segment, Puget Sound Technical Recovery Team, 2013.

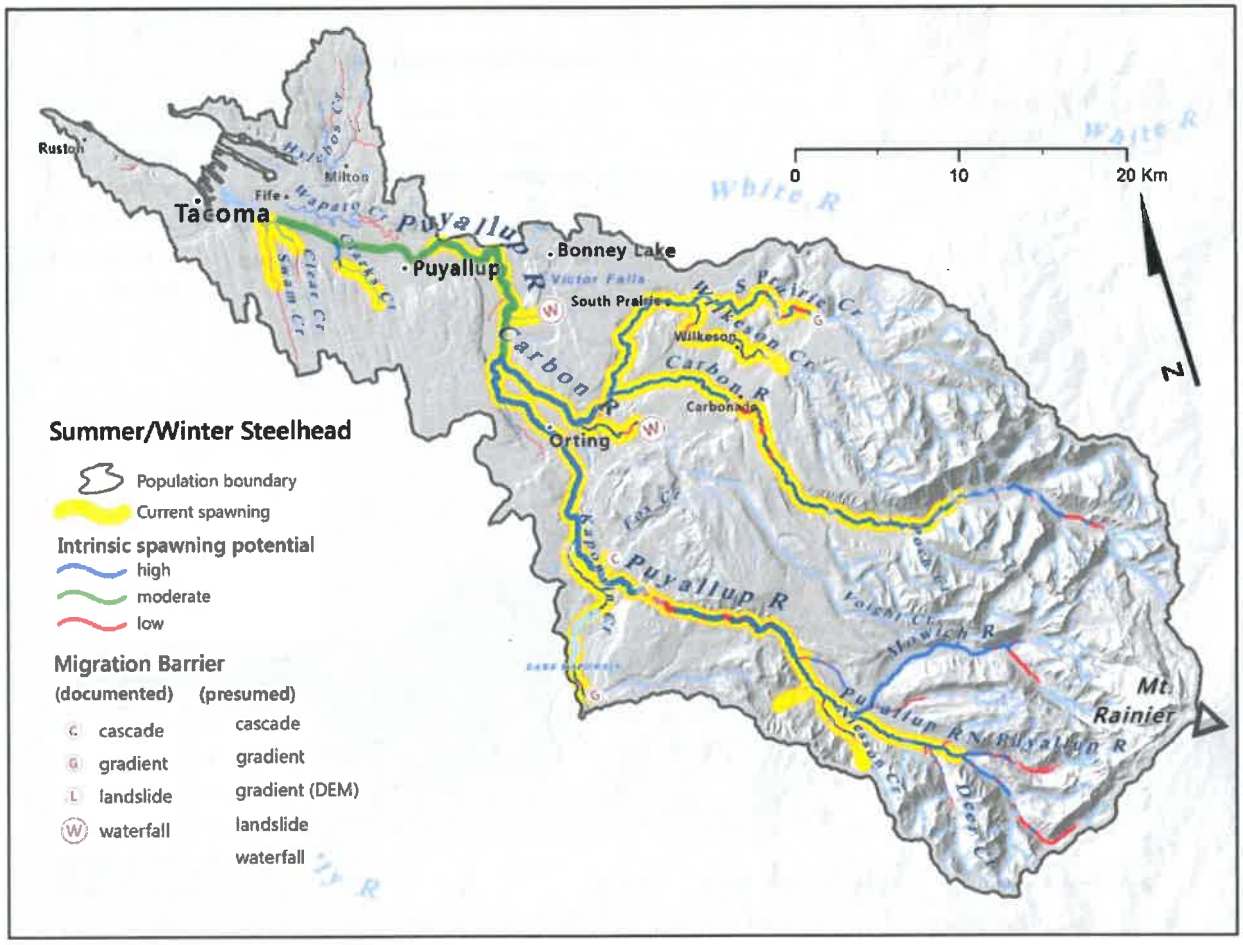

Figure E-62. Map of Puyallup/Carbon Rivers Winter-Run population spatial structure, including migration barriers and spawning potential.

Source. Viability Criteria for Steelhead within the Puget Sound Distinct Population Segment, Puget Sound Technical Recovery Team, 2013.

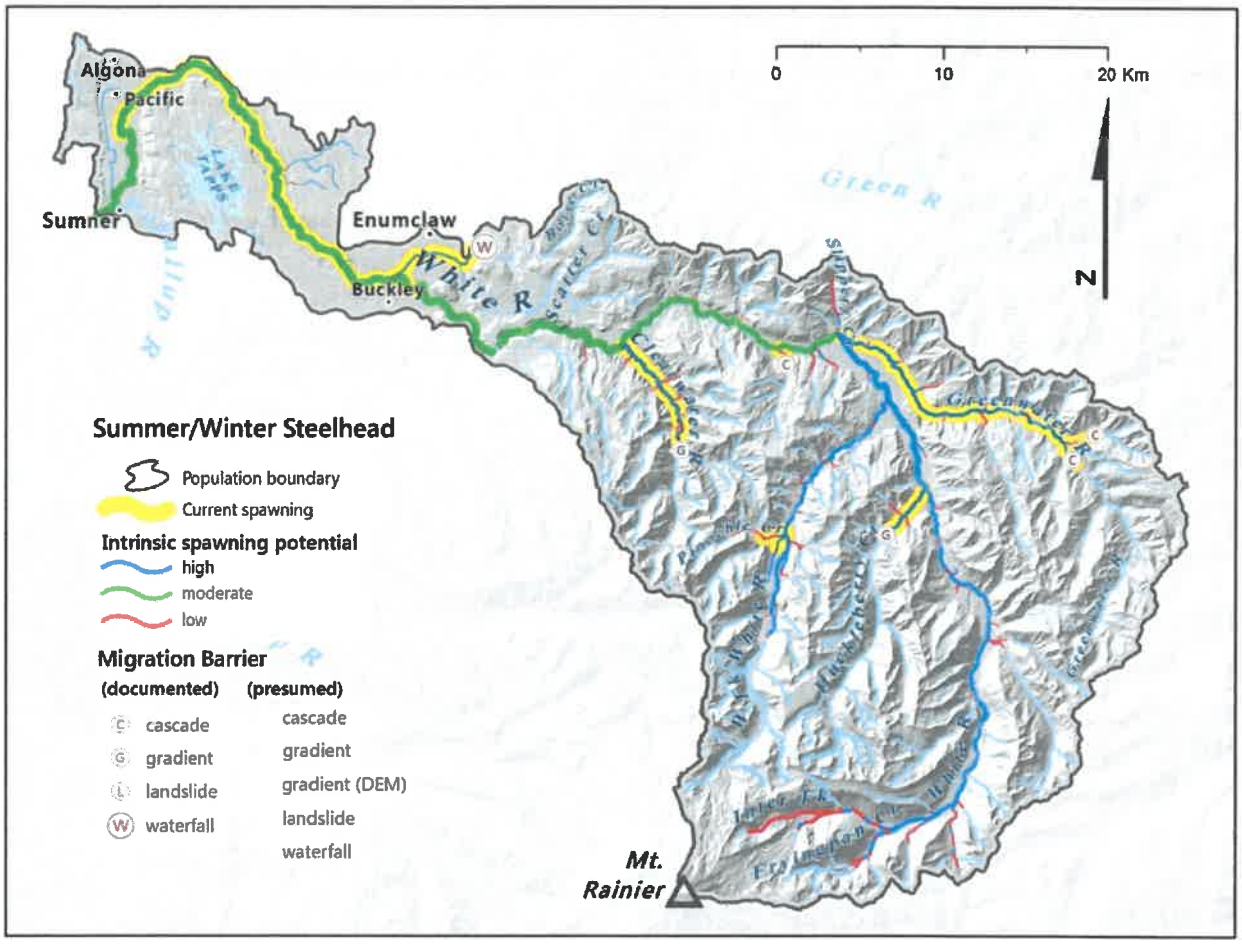

Figure E-65. Map of White River Winter-Run population spatial structure, including migration barriers and spawning potential.

Source. Viability Criteria for Steelhead within the Puget Sound Distinct Population Segment, Puget Sound Technical Recovery Team, 2013.

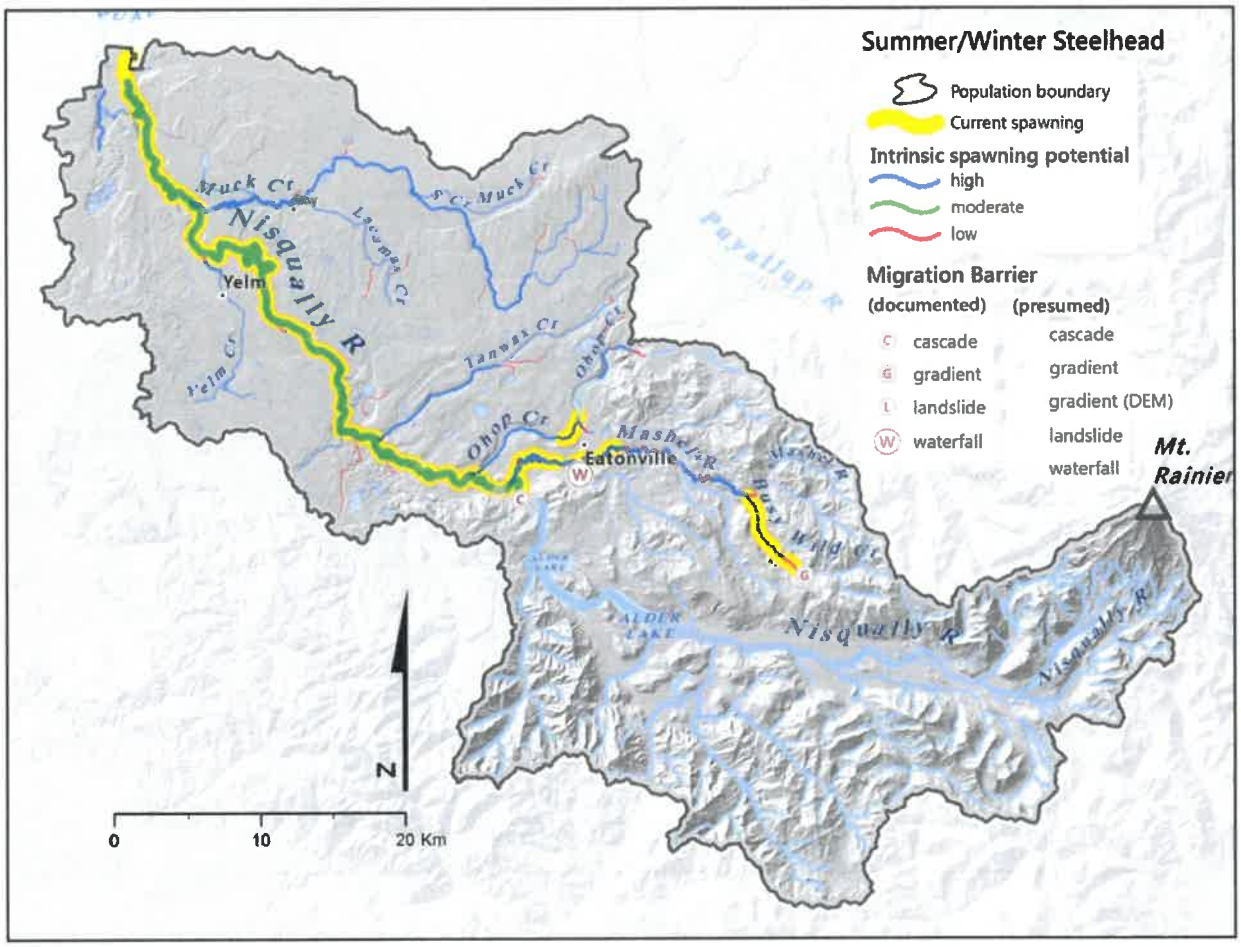

Figure E-68. Map of Nisqually River Winter-Run population spatial structure, including migration barriers and spawning potential. Historically, a series of cascades near the present site of the La Grande and Alder dams may have been a seasonal barrier, but they also could have posed a complete barrier to fish passage.

Source. Viability Criteria for Steelhead within the Puget Sound Distinct Population Segment, Puget Sound Technical Recovery Team, 2013.

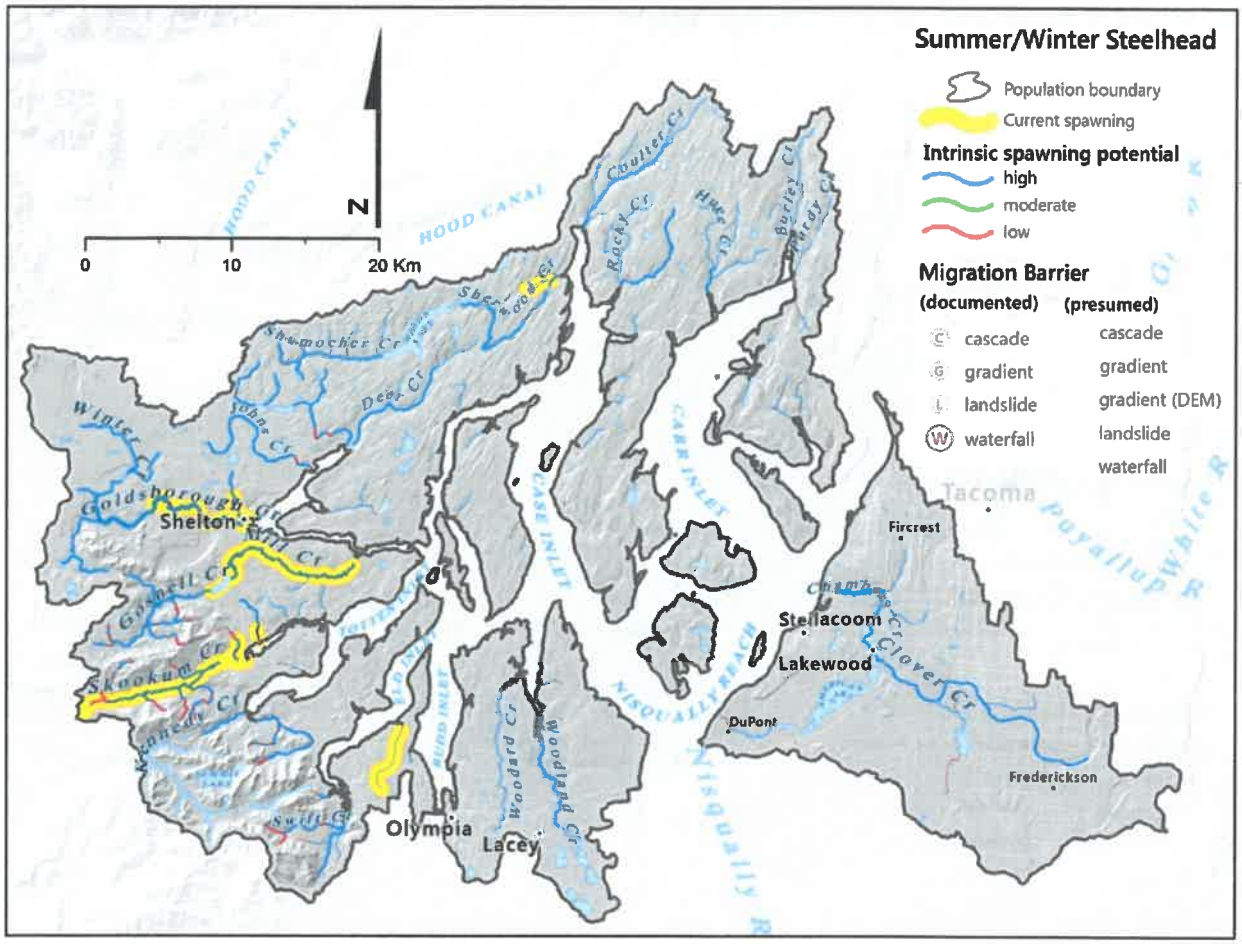

Figure E-71. Map of South Puget Sound Tributaries Winter-Run population spatial structure, including migration barriers and spawning potential.

Source. Viability Criteria for Steelhead within the Puget Sound Distinct Population Segment, Puget Sound Technical Recovery Team, 2013.

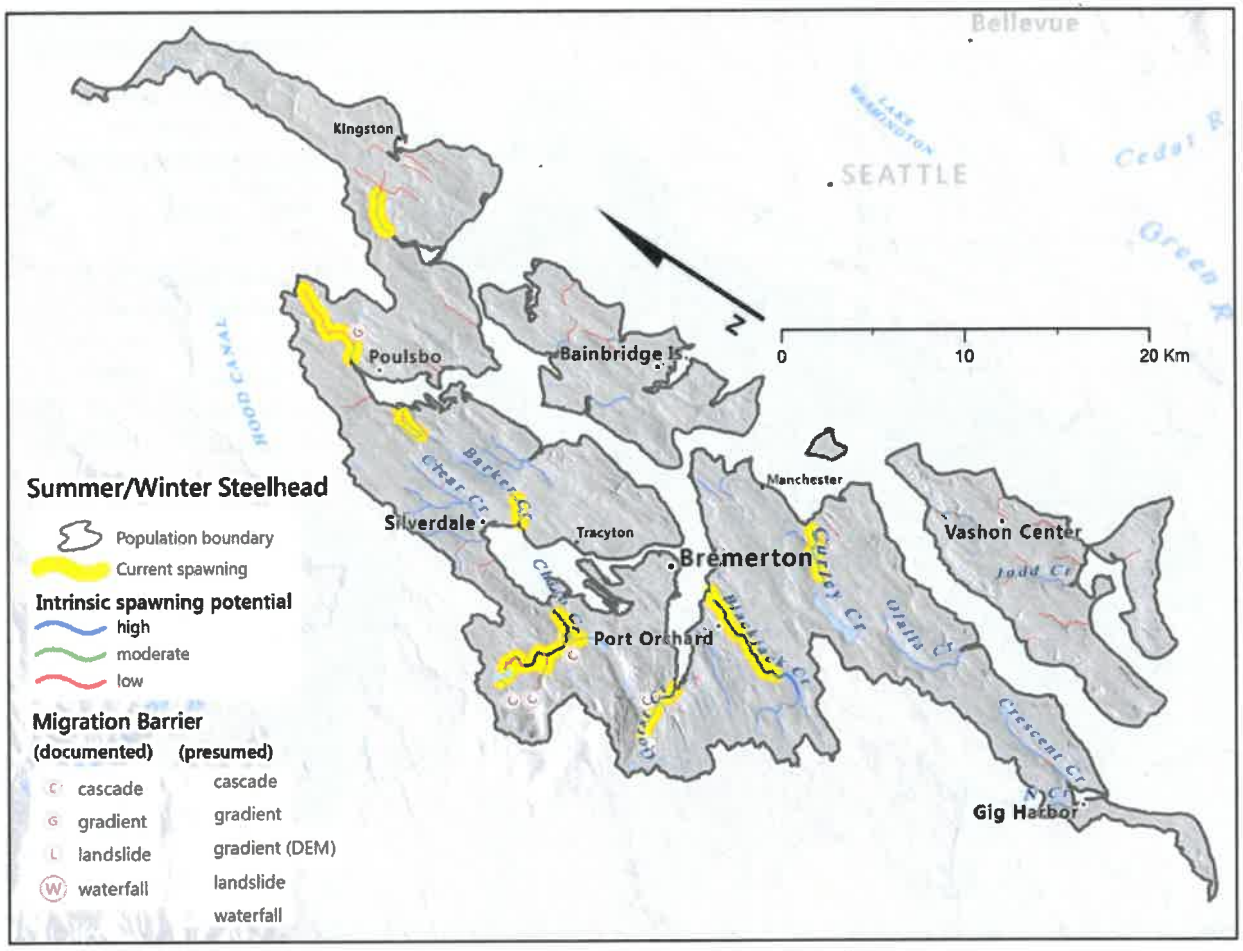

Figure E-74. Map of East Kitsap Peninsula Tributaries Winter-Run population spatial structure, including migration barriers and spawning potential.

Source. Viability Criteria for Steelhead within the Puget Sound Distinct Population Segment, Puget Sound Technical Recovery Team, 2013.

Central & South Puget Sound Planning Template

Draft September 22, 2017

Introduction

The Puget Sound Steelhead Advisory Group is developing a portfolio of conservation objectives, fishery strategies, and hatchery strategies for Puget Sound steelhead. In developing this portfolio, the group recognizes that underlying habitat issues must be addressed to restore Puget Sound steelhead, and the importance of an integrated all-H recovery strategy. The advisory group anticipates that the completed portfolio will subsequently inform the development of a recovery plan and discussions of the Washington Department of Fish and Wildlife (WDFW) with the co-managers regarding fishery management and hatchery programs.

Within the advisory group, the portfolios will be developed through an iterative process that begins with the identification of conservation objectives (referred to as a delisting scenario), aspirational fishery objectives, and initial proposals for artificial production programs that may be helpful in achieving the conservation or fishery objectives. The proposed fishery management and artificial production programs are then evaluated for consistency with the conservation objectives, and the iterative process repeated until the fishery and artificial production strategies are aligned with the conservation objectives (Fig. 1).

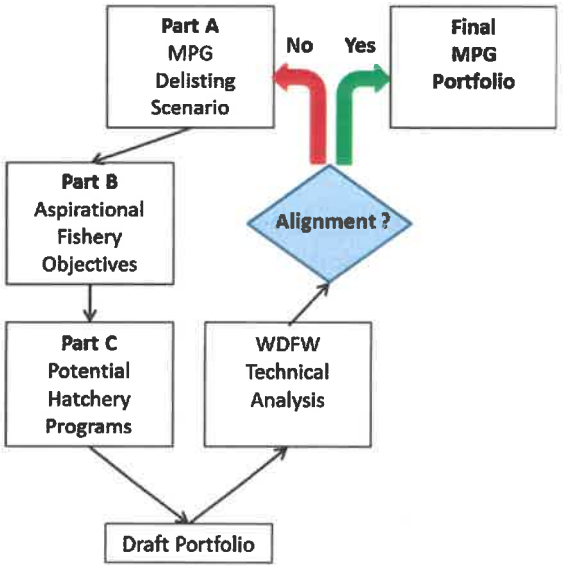

Figure 1. Iterative process used by the advisory group to align fishery and hatchery strategies with delisting scenario.

Part A. Delisting Scenario

A delisting scenario is a combination of population designations that meets Technical Recovery Team (TRT) guidance for a viable Distinct Population Segment (DPS). The scenario represents one of many possible combinations of populations and conservation objectives that could meet DPS and Major Population Group (MPG)-level viability criteria. Different scenarios may fulfill the biological requirements for delisting but can have unique implications for various stakeholders. Selection of a scenario for incorporation into the recovery plan is in part a policy decision based on scientific, biological, social, cultural, political, and economic considerations (drawn with modification from Lower Columbia Salmon Recovery and Subbasin Plan (2004)).

The Lower Columbia Salmon Recovery Plan (2010) provides the following description of the population designations:

a. ***Primary populations*** are targeted for restoration to high (95-99% probability) or very high (> 99%) viability. These populations are the foundation of salmon recovery. Primary populations are typically the strongest extant populations and/or those with the best prospects for protection or restoration. These typically include populations at high or medium viability during the listing baseline.
b. ***Contributing populations*** are those for which some improvement will be needed to achieve a stratum-wide average of medium viability (75 – 94% probability). Contributing populations might include those of low to medium significance and viability where improvements can be expected to contribute to recovery. Varying levels of improvement are identified for contributing populations. Some contributing populations are targeted for substantial improvements whereas more limited increases are identified for others.
c. ***Stabilizing populations*** are those that would be maintained at baseline levels. These are typically populations at very low viability during the listing baseline. Stabilizing populations might include those where significance is low, feasibility is low, and uncertainty is high. While stabilizing populations are not targeted for significant improvement, substantive recovery actions will typically be required to avoid further degradation.

Task

Our first ask is to develop an initial proposal for a delisting scenario for the Central and South Puget Sound MPG. Review Table 1 ("Factors to consider in the designation of Central and South Puget Sound populations as Primary, Contributing, or Stabilizing") and designate each of the populations as Primary, Contributing, or Stabilizing.

In order to achieve the draft viability criteria for the MPG, a proposed delisting scenario should identify at least four populations as Primary (highest viability category) and the geometric mean score of all population designations for the MPG must be at least 2.20.

The spreadsheet "Central and South Puget Sound Delisting Scenario" can be used to compute the geometric mean score and plot the delisting scenario.

Population	Contribution to Delisting	Comments
Cedar River Winter Run		
North Lake Washington and Lake Sammamish Winter Run		
Green River Winter Run		
Puyallup/Carbon Rivers Winter Run		
White River Winter Run		
Nisqually River Winter Run		
South Puget Sound Tributaries Winter Run		
East Kitsap Peninsula Tributaries Winter Run		

Table 1. Factors to consider in the designation of Central and South Puget Sound populations as Primary, Contributing, or Stabilizing.
Draft: Sept. 22, 2017

Population or Watershed	Run Type	NOAA Intrinsic Potential (IP) [1/]	Average Spawners (2007-2016)	NOAA Viability Assessment P(Viable) [2/]	Past Segregated Hatchery Gene Flow	% Public Land	Hydrology [3/]
North Lake Washington and Lake Sammamish	Winter	10,536	Not Available	Low	[4/]	13%	90% Lowland
Cedar	Winter	11,899	4	Low	[4/]	51%	48% Lowland 17% Snow` 15% Rain
Green	Winter	39,537	968 [5/]	Low	8% Winter [6/] 1% Summer	45%	51% Lowland 17% Rain & Snow 17% Snow
Puyallup/ Carbon	Winter	29,432	565	Low	[7/]	30%	35% Lowland 20% Highland 16% Rain 16% Rain & Snow
White	Winter	34,981	509 [8/]	Low	[4/]	60%	41% Highland 23% Snow
Nisqually	Winter	30,660	723 [9/]	Low	[4/]	43%	47% Lowland 16% Rain & Snow 15% Snow
SPS Tributaries	Winter	19,709	Not Available	Low	[4/]	8%	98% Lowland
East Kitsap Tributaries	Winter	3,115	Not Available	Low	[4/]	13%	99% Lowland

[1/] Source: Viability Criteria for Steelhead within the Puget Sound Distinct Population Segment, Table B-1, Puget Sound Technical Recovery Team 2013.

[2/] Source: Viability Criteria for Steelhead within the Puget Sound Distinct Population Segment, Fig. 58, Puget Sound Technical Recovery Team 2013.

[3/] Source: Identifying Historical Populations of Steelhead Within the Puget Sound Distinct Population Segment, Appendix 4, Puget Sound Technical Recovery Team, 2013.

[4/] No releases of early winter steelhead or summer steelhead for more than 10 years.

[5/] Green River estimates include spawners returning from wild stock broodstock program beginning in 2005.

[7/] No releases of early winter steelhead since 2013.

Part B. Aspirational Objectives for Recreational Fishery

The aspirational objectives describe the desired future state for recreational fisheries. Aspirational objectives may not be achievable, particularly in the short-term, given conservation or resource constraints. Nevertheless, they are important to initiate the discussion of our vision for the future of Puget Sound steelhead. Through an iterative process we will "true up" our aspirational objectives with the conservation framework of the delisting scenario.

In developing the aspirational objectives, it may be helpful to recall several of the objectives the advisory group has identified:

1) describes a path toward diverse and sustainable recreational fishing opportunities, with benchmarks to assess our progress;
2) recognizes the importance of steelhead and steelhead fisheries to our rural communities, preservation of our cultural heritage, and state economy;
3) promotes greater understanding of steelhead populations through an experimental approach, and recognizes that adaptive management will be required to be successful;
4) is not constrained by previous fishery and hatchery management approaches;
5) identifies watershed-specific strategies for fisheries and artificial production programs designed to achieve specific seasons and fishery types in a manner consistent with achieving conservation objectives; and
6) enjoys broad support among stakeholders interested in steelhead, including anglers and those interested in steelhead as a part of the Puget Sound ecosystem.

Task

Our second task is to identify our aspirational objectives for recreational fisheries. Although there are many types of recreational fisheries, perhaps the two broadest categories are catch-and-release and catch-and-keep. For catch-and-release fisheries, please identify the months for the fishery and the approximate angler days (i.e., 1000 anglers each fishing 10 days would be 10000 angler days). For catch-and-keep fisheries, please identify the months for the fishery and the approximate catch.

As you consider options, it may be helpful to review the coarse scale assessment of the fishery and hatchery strategies that were previously developed for Hood Canal (see notes from June 1, 2017 meeting).

Population	Catch-and-Release			Catch-and-Keep		
	Directed at Wild Steelhead?	Months	Angler Days	Directed at Wild Steelhead?	Months	Catch
Cedar River Winter Run						
North Lake Washington and Lake Sammamish Winter Run						
Green River Winter Run						
Puyallup/Carbon Rivers Winter Run						
White River Winter Run						
Nisqually River Winter Run						
South Puget Sound Tributaries Winter Run						
East Kitsap Peninsula Tributaries Winter Run						

Notes

NOAA's criteria for limit 5 may help inform the development of the aspirational objectives for the recreational fishery. The 4(d) rule is under the Fishery and Hatchery tab of your notebook. Several key concepts are provided below:

- Proposed management actions must recognize the significant differences in risk associated with viable and critical population threshold states and respond accordingly to minimize the long-term risks to population persistence. Harvest actions impacting populations that are functioning at or above the viable threshold must be designed to maintain the population or management unit at or above that level. For populations shown with a high degree of confidence to be above critical levels but not yet at viable levels, harvest management must not appreciably slow the population's achievement of viable function. Harvest actions impacting populations that are functioning at or below critical threshold must not be allowed to appreciably increase genetic and demographic risks facing the population and must be designed to permit the population's achievement

of viable function, unless the plan demonstrates that the likelihood of survival and recovery of the entire ESU in the wild would not be appreciably reduced by greater risks to that individual population.

- Set escapement objectives or maximum exploitation rates for each management unit or population based on its status and on a harvest program that assures that those rates or objectives are not exceeded. Maximum exploitation rates must not appreciably reduce the likelihood of survival and recovery of the ESU. Management of fisheries where artificially propagated fish predominate must not compromise the management objectives for commingled naturally spawned populations.
- Display a biologically based rationale demonstrating that the harvest management strategy will not appreciably reduce the likelihood of survival and recovery of the ESU in the wild, over the entire period of time the proposed harvest management strategy affects the population, including effects reasonably certain to occur after the proposed actions cease.

Part C. Potential Artificial Production Programs to Meet Fishery or Conservation Objectives

An artificial production program is a management action to help achieve fishery or conservation objectives. As discussed above for the aspirational objectives for the recreational fishery, we will need to "true up" our proposed hatchery programs with the conservation framework of the delisting scenario.

In general, a segregated hatchery strategy will only be appropriate for a catch-and-keep fishery, while an integrated hatchery strategy may be used for a conservation program, for a catch-and-keep fishery, or for a catch-release-fishery.

In evaluating options for hatchery programs, it may be helpful to recall several of the objectives the advisory group has identified:

1) Contributes to the conservation and recovery of Puget Sound steelhead;
2) is informed by our scientific understanding of steelhead and the factors affecting their abundance, productivity, diversity, and spatial structure;
3) promotes greater understanding of steelhead populations through an experimental approach, and recognizes that adaptive management will be required to be successful;
4) is not constrained by previous fishery and hatchery management approaches; and
5) identifies watershed-specific strategies for fisheries and artificial production programs designed to achieve specific seasons and fishery types (catch and release, catch and keep, rivers with no hatchery production).

Task

Our third task is to assess if an artificial production program might help achieve our conservation and aspirational fishery objectives. Please indicate in the tables below whether a hatchery program should be initially considered as a management action.

Note that no new hatchery program should be proposed for the Nisqually River as it has been designated as a Wild Steelhead Gene Bank.

Population	No Hatchery Releases	Conservation Program	Catch-and-Keep Hatchery Strategy		Catch-and Release Integrated Strategy
			Integrated	Segregated	
Cedar River Winter Run					
North Lake Washington and Lake Sammamish Winter Run					
Green River Winter Run					
Puyallup/Carbon Rivers Winter Run					
White River Winter Run					
Nisqually River Winter Run	Wild Steelhead Gene Bank				
South Puget Sound Tributaries Winter Run					
East Kitsap Peninsula Tributaries Winter Run					

Notes

1) Guidance Dependent on Biological Phase of Population. An important consideration in developing and evaluating hatchery conservation programs is the status, or biological phase, of the population. The HSRG (2014) defined four biological phases (Preservation, Re-colonization, Local Adaptation, and Full Restoration) for a population and provided the following guidance regarding the objectives of an associated hatchery conservation program.

Table 3-3. Biological phases of restoration and objectives for different ecosystem conditions.

Biological Phases	Ecosystem Conditions	Objectives
Preservation	Low population abundance; habitat unable to support self-sustaining population; ecosystem changes pose immediate threat of extinction	Prevent extinction; retain genetic diversity and identity of existing population
Re-colonization	Underutilized habitat available through restoration and improved access	Re-populate suitable habitat from pre-spawning to smolt outmigration (all life stages)
Local Adaptation	Habitat capable of supporting abundances that minimize risk of extinction as well as tribal harvest needs; prevent loss of genetic diversity; and promote life history diversity	Meet and exceed minimum viable spawner abundance for natural-origin spawners; increase fitness, reproductive success and life history diversity through local adaptation
Full Restoration	Habitat restored and protected to allow full expression of abundance, productivity, life-history diversity, and spatial distribution	Maintain viable population based on all viable salmonid population (VSP) attributes using long-term adaptive management

Source: On the Science of Hatcheries, HSRG, 2014.

2) Guidance Dependent on Population Designation. The Department and Hatchery Scientific Review Group (2014) have provided the following guidance for broodstock management for programs designated as Primary, Contributing, or Stabilizing (pHOS – proportion hatchery-origin spawners; PNI – proportionate natural influence).

Hatchery Program Strategy	Population Designation	PNI	Effective pHOS	Gene Flow[1/]
Integrated	Primary Contributing Stabilizing	≥ 0.67 ≥ 0.50 1/	< 0.30 < 0.30 2/	NA
Segregated	Primary Contributing Stabilizing	NA	< 0.05 < 0.10 2/	< 0.02 < 0.04 2/

1/ Department guidance for segregated steelhead programs.

2/ Standards for Stabilizing populations are situation specific.