Puget Sound Steelhead
Harvest Management Plan

Puget Sound Indian Tribes
and
Washington Department of Fish and Wildlife

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1. Scope of the Plan

The Washington Department of Fish and Wildlife (WDFW) and the Puget Sound Indian Tribes (PSIT), which include the Lummi Indian Nation, Nooksack Tribe, Swinomish Tribe, Sauk-Suiattle Tribe, Upper Skagit Tribe, Stillaguamish Tribe, Tulalip Tribes, Muckleshoot Indian Tribe, Puyallup Tribe of Indians, Nisqually Tribe, Squaxin Island Tribe, Skokomish Tribe, Suquamish Tribe, Port Gamble S'Klallam Tribe, Jamestown S'Klallam Tribe, Lower Elwha Klallam Tribe, and Makah Tribe, will manage fisheries directed at steelhead and incidental harvest of steelhead in salmon fisheries in the marine and freshwater areas of Puget Sound in accordance with harvest management guidelines and objectives contained in this Puget Sound Steelhead Harvest Management Plan (Plan). In this Plan 'Puget Sound' includes:

- Defined marine catch accounting areas in the Strait of Juan de Fuca as far west as Cape Flattery, including and east of the Elwha River, Rosario Strait and Georgia Strait, Puget Sound proper and Hood Canal (i.e., Catch Areas 4B, 5, 6C, 6D, 6, 6A, 7, 7A, 7B, 7C, 7D, 8, 8A, 8D, 9, 9A, 10, 10A, 10E, 11, 11A, 12, 12A, 12B, 12C, 12D, 12H, 13, 13A, 13C, 13D, 13E, 13F, 13G, 13H, 13I, 13J, and 13K).
- Defined freshwater catch accounting areas in rivers and streams entering the aforementioned marine waters. These include fishing areas in the Elwha, Dungeness, Nooksack, Samish, Skagit, Stillaguamish, Snohomish, Lake Washington, Green-Duwamish, Puyallup, White, Nisqually, Skokomish, Hamma Hamma, Duckabush, Dosewallips, Quilcene, Little Quilcene, Union, Tahuya, Dewatto rivers, and other independent streams.

2. Objectives and Principles

This Plan does not govern management of other fisheries that may also incur mortality on Puget Sound steelhead, (e.g., fisheries in the coastal marine waters of Washington, fisheries in freshwater areas in the Puget Sound region for trout or warmwater species, or marine fisheries in Puget Sound for halibut, rockfish, other non-salmonid species). The Puget Sound Steelhead Distinct Population Segment (DPS) was listed as threatened under the Endangered Species Act (ESA) in 2007 (72 Fed. Reg. 26722). This Plan is intended to achieve the conservation standards of the ESA, embodied in the steelhead 4(d) rule (73 Fed. Reg. 55451), to conserve the abundance, productivity, diversity, and spatial distribution of steelhead populations comprising the Puget Sound DPS.

One goal of this plan is to assure that harvest-related mortality does not impede the survival and recovery of listed steelhead comprising the Puget Sound DPS. A second goal is to provide the opportunity to harvest surplus production of hatchery-produced steelhead, and of other abundant salmon species that commingle with steelhead, consistent with the first goal. Most hatchery-produced steelhead in Puget Sound, that utilize Chambers Creek winter or Skamania summer broodstock, are not listed, but supplementation programs in the Green River and Hamma Hamma River, utilizing native broodstock were listed. The Hamma Hamma program has been discontinued. Additional supplementation programs now operating in the White, Skokomish, Duckabush, Dewattto, and Elwha rivers, utilizing native wild broodstock, have not been formally listed by the NMFS, but this Plan applies the same principles to conserving adult

production associated with these hatchery programs as applied to listed steelhead populations.

This Plan reflects the intent of the Puget Sound tribes and WDFW to plan and implement steelhead fisheries under agreed harvest objectives and to provide equitably shared tribal and non-Indian harvest opportunity. The Federal court has not adopted a framework for co-management of steelhead fisheries, akin to the Puget Sound Salmon Management Plan, though many of the planning and implementation procedures are in accordance with the fundamental co-management principles of *U.S. v Washington* (1974) and related sub-proceedings, specifically 459 F Supp 1020 (1978) 1085 – 1089 and 459 F Supp 1020 (1978) 1118 – 1120). Pursuant to *U.S. v Washington*, this Plan recognizes the importance of the exercise of Indian treaty rights, within the usual and accustomed fishing areas legally defined for each tribe.

3. Population Structure, Management Units and Abundance Status

3.1 Population structure

The NMFS Technical Recovery Team (TRT) has not delineated the historical population structure of the Puget Sound DPS. The TRT is primarily considering evidence for spatial and genetic isolation to determine historically independent populations. However, we considered some of their preliminary findings, and examined previous stock inventories conducted by WDFW and the Puget Sound tribes (e.g. the Salmon and Steelhead Stock Inventory, WDF, WDW and PSIT 1993), and genetic analyses, to develop an interim view of population structure as the basis for current harvest management (Table 1). Genetic analyses informed our conclusions regarding populations in Hood Canal and the Puyallup-White watershed (Phelps et al. 1994, 1997).

Historical catch and escapement data indicate the steelhead returned to many independent streams in northern and southern Puget Sound, Hood Canal, and the Strait of Juan de Fuca regions. We are uncertain if these aggregations comprise independent populations. It is not clear that criteria for defining independent populations in larger watersheds based on spatial separation, genetic isolation, or watershed size, can be applied to these small systems.

The structure of extant summer steelhead populations in the DPS is unknown. We have designated summer management units in the Stillaguamish and Snohomish systems because current information suggests that one or more populations exist in these watersheds, and we can estimate their harvest based on migration timing. We do not have reliable spawning escapement estimates for any of these aggregations. Freshwater entry and spawning timing typical of summer steelhead are exhibited by returns to Deer Creek and Canyon Creek in the Stillaguamish River, and in the North Fork Skykomish and Tolt rivers in the Snoqualmie River. Evidence is not conclusive that summer-run steelhead in the Skagit River are spatially or genetically isolated from winter-run steelhead. Similarly, summer run timing is still evident in the South Fork Nooksack River. More information on the presence of summer steelhead in these areas is included in Chapter 5. Lack of consistently reliable escapement estimates for any summer-run

aggregations, in part due to their spawn timing overlap with winter steelhead, adds further uncertainty to the attempt to assess their independence. The Salmon and Steelhead Stock Assessment and Inventory (WDF, WDW and PSIT 1993) listed a number of summer 'stocks' persisting in many small streams, (e.g. in the Strait of Juan de Fuca, Hood Canal, and South Puget Sound), but these runs may be attributable to now-discontinued, hatchery programs.

3.2 Management Units

For the purposes of planning and implementing harvest management, this Plan establishes 17 steelhead management units (MUs). Management objectives or guidelines for each MU are based upon the available biological information for the currently identified natural and/or hatchery steelhead sub-units located within each MU. Individual MUs may include more than one population, or an aggregate of closely related sub-populations (Table 1). MUs may comprise all winter steelhead production in a given watershed (e.g. in the Nooksack, Skagit, Stillaguamish, Snohomish, Green, Nisqually, and Skokomish basins). Other MUs comprise a regional aggregate of production in several, smaller, independent systems (e.g. East and West Hood Canal, and the four MUs in the Strait of Juan de Fuca region – see Figure 1). The population structure or status of steelhead in the many, small, independent streams in south Puget Sound are unknown.

Controlling harvest-related mortality of wild steelhead at the scale of MUs reflects the current harvest regime, and the limits of currently available management tools. Where MUs are comprised of multiple populations, terminal fisheries operate, primarily, where populations commingle, and fisheries cannot be shaped to effect population-specific objectives.

Table 1. Management units and interim population structure for Puget Sound wild winter steelhead.

Management Unit	Populations
Nooksack	Nooksack Drayton Harbor
Samish	Samish
Skagit	Skagit, includes Cascade, Sauk
Stillaguamish	(1) Stillaguamish
Snohomish	Pilchuck Snohomish- Skykomish Snoqualmie
Lake Washington	Lake Washington (Cedar)
Green	Green
Puyallup	Puyallup Carbon
White	White River
Nisqually	Nisqually
Skokomish	Skokomish
West Hood Canal	Includes Hamma Hamma, Duckabush, Dosewallips, Quilcene, & Little Quilcene rivers
East Hood Canal	Includes Dewatto, Tahuya, Union
Sequim-Port Townsend	Chimacum Creek, Snow Creek, Salmon Creek, Jimmycomelately Creek
Dungeness	Dungeness River
Port Angeles	Morse Creek, McDonald Creek, Seibert Creek
Elwha	Elwha River

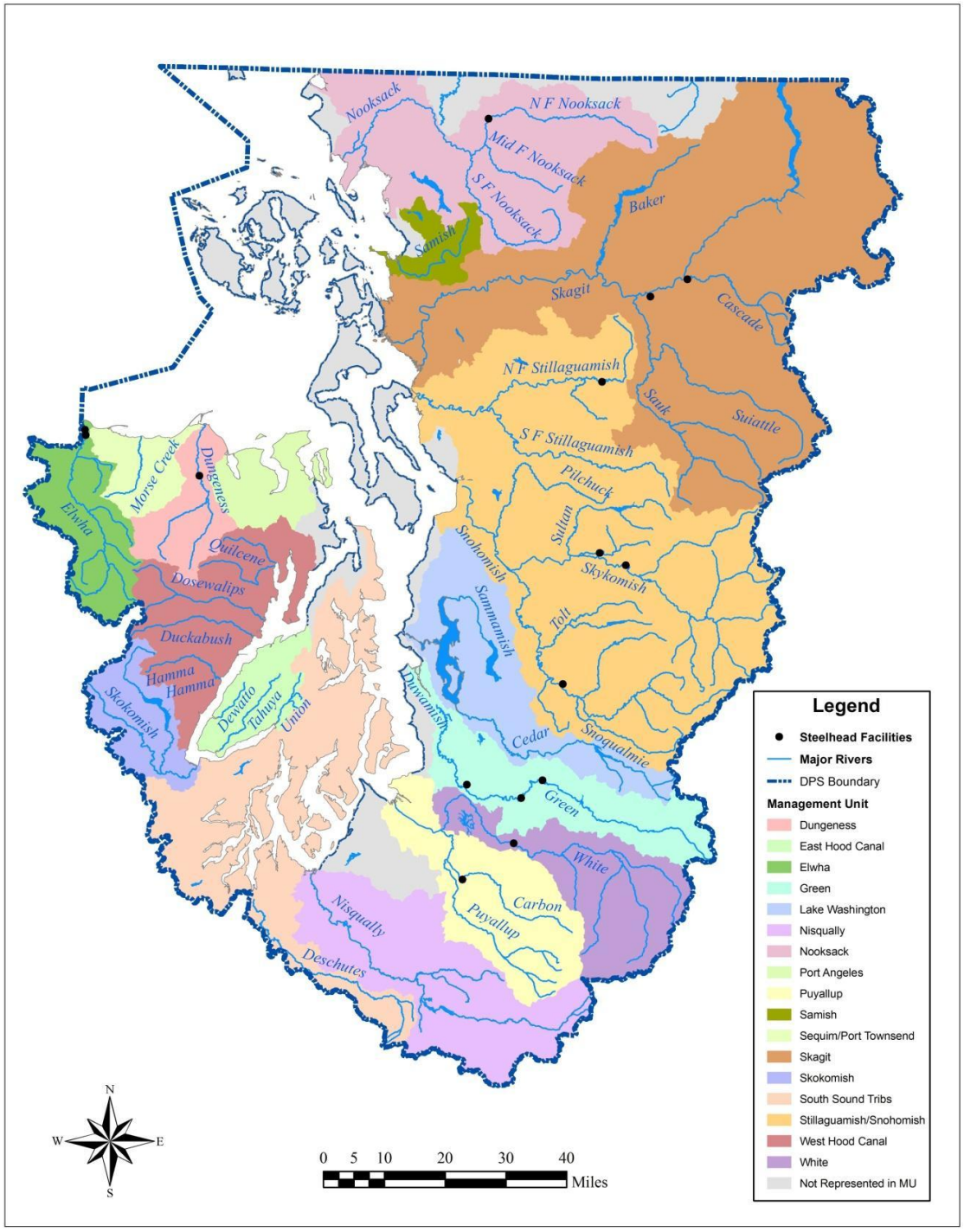

Figure 1. The distribution of wild steelhead populations in the Puget Sound DPS.

3.3 Abundance Status

The abundance of steelhead in many rivers in Puget Sound declined substantially over the last 20 years. The NMFS Status Review (Hard et al. 2007) found "marked declines in natural run size are evident in all areas of the ESU, a pattern that reflects widespread reduced productivity of natural steelhead. Declines over the entire series are observed in northern Puget Sound (Stillaguamish winter run), southern Puget Sound (Cedar, Lake Washington, and Puyallup winter run), Hood Canal (Skokomish winter run), and along the Strait of Juan de Fuca (McDonald winter run). More recently, even sharper declines are observed in southern Puget Sound (Green and Nisqually winter run) and in Hood Canal (Skokomish winter run); significant declines persist in others, including southern Puget Sound (Puyallup winter run) and along the Strait of Juan de Fuca (McDonald winter run). No population, with the exception of the small Hamma Hamma winter run, is showing evidence of improved productivity in more recent years, as measured by natural run size." Smolt-to-adult return rates estimated for hatchery-produced winter steelhead in the Skagit, Puyallup, and Elwha rivers declined from levels observed for the early 1980s, and have remained low since the mid-1990s (WDFW 2008), suggesting that lower marine survival contributed to the observed decline.

To quantitatively assess abundance trends for the purposes of developing this Plan, Population Viability Analyses (PVA) were performed using abundance estimates from the last twenty years (1978 - 2007), to determine the instantaneous growth rate (μ, also referred to as the rate of change) for each steelhead MU, where data were available (Table 2). Abundance estimates were reviewed to exclude unreliable data points, and to insure that time series were of consistently derived estimates. As a result, some time series were limited to more recent years, and some had years of missing data.

Table 2. Instantaneous growth rates ($\hat{\mu}$) with associated standard errors, estimated by PVA from time series of terminal run size or escapement, and recent mean abundance, for Puget Sound winter steelhead management units.

Management Unit	Time series	$\hat{\mu}$ (SE)
Samish	1979 – 2006[a,c]	0.0405 (0.0988)
Skagit	1978 – 2007[a,c]	-0.0057 (0.0378)
Stillaguamish	1985 – 2006[a]	-0.0673 (0.0107)
Snohomish	1981 – 2006[a]	0.0029 (0.0462)
Green	1978 – 2007[a]	-0.0172 (0.0178)
Puyallup-Carbon	1984 – 2007[a]	-0.0874 (0.0319)
White	1980 – 2006[a]	-0.0604 (0.0284)
Nisqually	1987 – 2006[a,c]	-0.1433 (0.0582)
Skokomish	1982 – 2007[b,c]	-0.0506 (0.0156)
West Hood Canal	1999 – 2007[b]	0.0039 (0.1158)
East Hood Canal	1981 – 2007[b]	0.0101 (0.0167)

[a] Escapement time series
[b] Terminal run size time series
[c] Some years missing from time series

The methods used to estimate instantaneous growth rates are discussed in Chapter 5 and Appendix B. Growth rates derived by this method are primarily sensitive to the first and last estimates in the time series, therefore may not reveal short term stability in

abundance, or reflect density-dependent recruitment. We examined whether population trends were increasing or decreasing by testing if the estimated μ statistic was significantly different from 0 at the $\alpha = 0.10$ level, chosen because it lessens Type II error rates in low power tests without a substantial increase in Type I errors. A more data-intensive productivity analysis was conducted for the Skagit MU, where age-structured cohort reconstruction allowed quantification of recent productivity (i.e. fitting a spawner-recruit function).

Instantaneous growth rates were significantly negative for the Stillaguamish, Puyallup-Carbon, Nisqually, and Skokomish units. Growth rates for other management units were not significantly positive or negative. The stability of population abundance at current low levels is uncertain, because we lack estimates of recent recruitment for most populations.

With reference to critical and viable thresholds, described below in Chapter 3.4, Skagit abundance has consistently exceeded MSY escapement; abundance of the Stillaguamish and Snohomish MUs has been above the critical threshold, but below their current escapement goals; Green abundance has not fallen to the critical threshold. Abundance of the White, Puyallup, Nisqually, Skokomish, East Hood Canal, and West Hood Canal MUs has fallen near or below their critical thresholds once or twice in the last five years.

3.4 Critical and Viable Thresholds

Critical thresholds define a level of abundance at which a population is at high risk of extinction or loss of genetic or demographic integrity, within a short period (e.g., 25 years).

Critical threshold values were developed for each MU, based on a theoretical effective population size at which the population was subject to high risk of extinction and/or loss of genetic integrity, and considering the population structure of each MU. We considered the probable population structure within each management unit. The size of the watershed supporting the unit also determined what minimum level of abundance would subject the management unit to high extinction risk. Density, diversity, and spatial structure of populations within an MU are dependent on basin size and drainage characteristics.

The number of effective breeders per year, rather than annual spawner abundance, determines the genetic stability of a salmonid population over time. Waples (1990) estimated through modeling that 100 effective breeders per year would maintain genetic variation in salmon populations for 25 generations, for populations with a four year generation cycle. Annual effective breeder abundance less than 50 was estimated to expose the population to high risk of allele loss through genetic drift. The number of annual effective breeders multiplied by the average age at reproduction (approximately four years for steelhead) equals the generational effective population size (N_e), thus N_e lower than 200 is also associated with high risk.

Although the annual number of successful annual spawners is not easily determined, the relationship between census size and effective breeders has been estimated for Chinook and steelhead. Waples (2004) found that the ratio of effective population size to spawner census (N_e/N_c) for Chinook could be expected to range from 0.05 to 0.3. Estimates of

N_e/N_c in three British Columbia steelhead populations ranged from 0.06 to 0.29 (Heath et al. 2002). In a study of the Snow Creek steelhead, Ardren and Kapuscinski (2003) estimated relatively higher ratios of the annual number of effective breeders to spawner census (N_b/N_c), ranging from 0.16 to 2.4, depending on methodology. Most importantly they found higher N_b/N_c ratios when census size was low, indicating higher reproductive success when fewer spawners were present in this relatively small watershed.

Spawning escapement estimates and landed catch comprise the only population size data to assess performance indicators for Puget Sound steelhead. We can refer to available information on the ratio of effective breeders to census size to estimate a minimum census size at which effective number of spawners may be expected to be large enough to maintain diversity and minimize inbreeding in a population, at least over the short-term.

Watershed area correlates closely to the bank-full channel area potentially available to support steelhead life history phases, though habitat quality is clearly a major determinant of survival and productivity. Higher critical thresholds are appropriate in larger watersheds, due to the effect of spawner density on spawning success at low abundance. We used basin area data obtained from WDFW and NMFS sources to adjust critical thresholds.

Critical threshold values for annual spawning escapement in each MU were chosen such that, for each potential population within an MU, the annual effective size, or number of successful breeders, would not be lower than 50 if an N_b/N_c ratio of at least 0.40 was achieved. If an MU was assumed to include one independent population, and basin size was less than 1100 km^2, the critical threshold is 125 (i.e., 50/0.40), with two exceptions described below. If one or two stocks or independent populations per MU were likely present and basin size was greater than 1100 km^2 but less than 2500 km^2, the critical threshold is set at 250. If two or more stocks or independent populations per MU were likely to occur and basin size was greater than 4500 km^2, the critical threshold is set at 500. None of the basins containing the 17 Puget Sound steelhead MUs had a size between about 2,500 and 4,500 km^2 (Table 3). Two MUs, Sequim-Port Townsend and Elwha, had very small basin sizes, 219 and 75 km^2 respectively. Assuming only one population is present in each MU, the critical threshold is set at 100 for these two MUs, while recognizing that accessible habitat in the Elwha River will be much larger when the dams are removed.

To maintain abundance above the critical thresholds and promote rebuilding from low abundance, we implement Low Abundance Thresholds (LAT) that trigger the most highly constrained harvest management regimes for each MU. The LATs are set at levels significantly above the critical thresholds. When abundance is forecasted, during preseason planning, to fall below the LAT, the lowest harvest rate ceilings and other harvest conservation measures will be implemented, as described for each MU below, in Chapter 5.2.

Table 3. Critical and viable thresholds for Puget Sound winter steelhead management units.

Management Unit	Number of Populations	Watershed Area	Critical Threshold	Viable Threshold	2002-08 Average Escapement
Nooksack	2	2,157	250	500 - 750	N/A
Samish	1	329	125	500 - 750	648
Skagit	1	6,947	500	>1000	5,894
Stillaguamish	1	1,825	250	>1000	569
Snohomish	3	4,744	500	>1000	4,063
Lake Washington	1	1,343	250	500 - 750	22
Green	1	1,292	250	>1000	1,604
White	1	1,406	250	>1000	296
Puyallup	2	1,284	250	>1000	407
Nisqually	1	1,971	250	>1000	660
Skokomish	1	635	250	>1000	288
East Hood Canal	1	1,037	125	500 - 750	231
West Hood Canal	1	355	125	500 - 750	230
Sequim - Port Townsend	1	219	100	500 - 750	N/A
Dungeness	1	257	125	500 - 750	N/A
Port Angeles	1	501	125	500 - 750	179
Elwha	1	75	100	500 - 750	N/A

Viable thresholds define a level of population abundance associated with a very high probability of persistence, or conversely, a very low risk of extinction, for a period of 100 years. The Puget Sound steelhead TRT will develop viable thresholds, once they have delineated the population structure of the DPS, to guide recovery planning. Ultimately these viable thresholds may relate to de-listing criteria, but our recovery goals for each population or management unit may be higher.

Ideally, harvest management objectives should be based on quantitative understanding of current population productivity, as defined by current habitat function. Escapement goals, for example, would refer to optimum seeding of existing habitat (e.g. a level associated with maximum sustainable yield), though adjusted higher to account for the uncertainties inherent to quantifying productivity, and recognizing the lesser risk associated with exceeding MSY escapement, compared with the risks of underseeding spawning and rearing habitat. Achieving optimum escapement under existing habitat condition achieves the ESA conservation mandate of the steelhead 4(d) rule, because it assures that harvest is not impeding recovery, while habitat condition precludes higher levels of production.

Gibbons et al. (1985) developed escapement goals (i.e., levels associated with 'Maximum Sustainable Harvest') for some Puget Sound winter steelhead stocks, based on recruitment functions derived from parr production potential (i.e. recruitment) and estimates of the area of suitable rearing habitat. This analysis assumed that relatively high escapements in the late 1970s were provided optimum seeding of spawning habitat. Given the subsequent decline in productivity, these goals have not been utilized as guidelines for current harvest management, except in the Stillaguamish and Snohomish MUs.

We developed a recruitment function for Skagit winter steelhead, based on cohort reconstruction, which estimates MSY escapement to be 3,200 - 3,800. However, Skagit harvest objectives are structured around a higher 'escapement floor' of 6,000. When forecasted escapement exceeds this floor, the managers have agreed to allow modest additional harvest of wild steelhead, up to a harvest rate ceiling of 16%. Recruitment will, presumably, be optimum at MSY escapement, but considering the uncertainties associated with current productivity, the escapement floor is set substantially higher, to enable escapement to exceed estimated MSY, and further probe productivity potential. Allowable harvest levels tied to the escapement floor were quantitatively shown to exceed specific low-risk criteria for long-term persistence (see Chapter 5.2).

Harvest management for Snohomish and Stillaguamish winter steelhead is indexed to upper management thresholds (i.e., forecasted escapements), of 6,500 and 3,100, respectively. Forecast abundance higher than these levels would trigger implementation of a higher harvest rate ceiling. These thresholds conform to estimates of MSH escapement derived from recruitment functions based on parr abundance surveys and rearing habitat estimates for several Puget Sound steelhead stocks (Gibbons et al. 1985; R. Gibbons, Washington Department of Game, pers. comm. 1986). The need to update this analysis is recognized, since habitat condition has likely deteriorated in the last 25 years. However, MSH escapement levels of abundance are presumably also viable, and therefore link harvest strategy to attainment of viable abundance, as required by the steelhead 4(d) rule.

We have not quantified viable thresholds for application to harvest management of other Puget Sound MUs because their current productivity and habitat capacity are not known. Previous estimates of MSH escapement (Gibbons et al. 1985) are not applicable to current harvest management, at least until current productivity has been verified by updating the information in the analysis, or development of another method to quantify productivity.

The Willamette Lower Columbia TRT (2006) developed generic viable thresholds for Lower Columbia – Willamette salmon and steelhead recovery planning, recognizing that abundance, in isolation, is an incomplete metric for viability. Collectively their viability criteria and thresholds for abundance and productivity, diversity, and spatial structure define de-listing criteria for an ESU. Abundance thresholds (i.e. 20-year mean spawning population size) associated with 'persistence category' 3 and 4, defined as 95 – 99% and greater than 99% probabilities of persistence, respectively, are tabulated below for steelhead populations in different size watersheds (from Table 14 WLCTRT and ODFW 2006):

Watershed size (spawning stream)	***95-99% persistence***	***Greater than 99% persistence***
Small (< 100 km)	500 – 1000	1000
Medium (100 – 200 km)	700 – 1400	1400
Large (> 200 km)	1400 – 2800	1800

This guidance on viable abundance provided us context for setting Low Abundance Thresholds for MUs (other than Skagit, Stillaguamish, and Snohomish), but they cannot be used as management objectives, e.g. in place of escapement goals for Puget Sound MUs. They do not reflect the potential for several management units to comprise

multiple winter steelhead population. The upper management thresholds for the Skagit, Snohomish, and Stillaguamish MUs, specified below in Chapter 5.2, exceed the viable abundance guidelines offered by the Lower Columbia Willamette TRT.

With the exception of Skagit, however, we lack quantitative means for assessing the effect of harvest, controlled by ceilings stated below in this Plan, on the probability of populations recovering to viable abundance.

4. Puget Sound Fisheries

This section describes the distribution and duration of commercial and recreational fisheries that harvest steelhead in the marine and freshwater areas of Puget Sound. The harvest objectives established by this Plan primarily govern fisheries that occur in freshwater or marine terminal areas (Table 4), where the majority of wild and hatchery-origin Puget Sound steelhead are caught. Some recreational harvest of steelhead occurs outside of those areas listed in Table 4, for example in small independent streams in South Sound (Appendix A, Table 37), where the existence or status of wild steelhead populations is unknown.

Steelhead harvested in terminal marine areas includes some un-quantified non-local steelhead originating in other Puget Sound systems. Lacking accurate information to resolve stock composition, the Plan treats terminal harvest as if it were all of local origin.

Table 4. Terminal fishing areas (commercial catch accounting areas), associated with steelhead Management Units in Puget Sound.

Management Unit	Freshwater Areas	Marine Areas
Nooksack	Nooksack River (77B & 77C)	Bellingham Bay (7B) Lummi Bay (7D)
Samish	Samish River (77D)	Samish Bay (7C)
Skagit	Skagit River (78B, 78C & 78D)	Skagit Bay – Saratoga Pass (8)
Stillaguamish	Stillaguamish R (78G)	Possession Sound (8A)
Snohomish	Snohomish River (78F)	Tulalip Bay (8D and 8A)
Lake Washington	Ship Canal (10F) Lake Washington (10G, 10C, 10D)	
Green	Duwamish – Green (80B)	Elliott Bay (10A)
White	White River (81C)	
Puyallup	Puyallup River (81B)	Commencement Bay (11A)
Nisqually	Nisqually River (83F)	
Skokomish	Skokomish River (82G) Purdy Creek (82J)	Hood Canal (12, 12B, 12C, 12D)
East Hood Canal	Tahuya River (82H) Dewatto River (82B) Union River (82I)	Hood Canal (12, 12B, 12C, 12D)
West Hood Canal	Hamma Hamma River (82E) Dosewallips River (82C) Duckabush River (82D) Quilcene River (82F) Little Quilcene River	Hood Canal (12, 12B, 12C) Quilcene - Dabob (12A)[a]
Sequim - Port Townsend	Chimacum Creek Snow Creek Salmon Creek Jimmycomelately Creek	Port Townsend Bay (9)[a] Discovery Bay (6B)[a] Sequim Bay (6B)[a]
Dungeness	Dungeness River (76A)	Dungeness Bay (6D)
Elwha	Elwha River (76B)	Freshwater Bay (6C)
Port Angeles	Morse Creek (76C) McDonald Creek Siebert Creek	

[a] Portions of marine catch reporting areas denoted may pertain to individual subpopulations in an MU.

4.1 Steelhead-directed fisheries

Puget Sound steelhead fisheries are directed at hatchery-produced winter or summer steelhead. Most of these fisheries enhancement hatchery programs produce winter steelhead derived from the Chambers Creek (South Puget Sound) stock, which was intentionally altered to exhibit earlier migration timing than wild winter steelhead, to facilitate their selective harvest (Crawford 1979). The Chambers Creek stock typically exhibits freshwater entry timing in December and January, whereas wild winter steelhead entry timing is later, primarily from February – May (see Figure 2 and Figure 3, and further discussion of run timing in Chapter 5). Hatchery production of summer steelhead in the Puget Sound region utilizes the Skamania stock, originally derived from Washougal River and Klickitat River broodstock in the Columbia River basin (Crawford 1979). This stock was selectively altered to exhibit early spawn timing in December and January, compared to the February through April timing of wild summer steelhead.

Freshwater entry timing of hatchery-produced winter steelhead overlaps to a variable degree with that of wild winter steelhead. Entry timing varies annually and between watersheds. When necessary, hatchery-directed fisheries are typically scheduled to end before a significant proportion of the wild run has entered freshwater, to reduce encounters and incidental mortality. Fisheries may be extended in cases when adequate numbers of wild fish are predicted to be harvestable. The run timing of hatchery fish is described from historical catch data; the entry timing of wild steelhead is characterized by catch sampling, and from the Buckley trap on the White River and from the Snow Creek weir (see Figure 2 and Figure 3).

Tribal commercial, subsistence, and ceremonial fisheries for winter steelhead, which utilize net and hook and line gear, operate throughout the Puget Sound region. Most tribal fisheries are conducted in freshwater, though some tribes open terminal marine areas adjacent to the mouths of rivers. Tribal net fisheries directed at steelhead typically operate between December 1 and March 31, but time and area regulations vary.

Recreational fisheries open under time and area restrictions that vary from basin to basin depending on the availability of hatchery fish. Recreational steelhead fishing occurs primarily in freshwater, although the retention of marked hatchery steelhead is also allowed in all marine areas of Puget Sound. The most substantive marine steelhead fishery operates at Bush Point on the west side of Whidbey Island.

Annual landed catch of hatchery-origin and wild steelhead in terminal-area fisheries in Puget Sound averaged just less than 10,000 over the last five management years; 87% of the catch was taken by recreational fisheries (Table 5). Harvest by fisheries in the Skagit, Stillaguamish, Snohomish, and Green rivers makes up most of the total catch.

The recent landed catch of wild winter steelhead in tribal terminal net and freshwater recreational fisheries is tabulated below in Chapter 5.2.

Recreational fisheries directed at hatchery-produced summer steelhead occur in the Skagit, Stillaguamish, Snohomish, and Green Rivers. Tribal commercial and subsistence fisheries occur only in the Green River.

Summer steelhead-directed fisheries are managed to achieve high harvest rates on fish surplus to the broodstock requirements of supporting hatchery programs. The only tribal net fishery currently directed at summer steelhead operates in the Green River. Recreational summer steelhead fisheries are typically integrated with the general summer freshwater recreational fisheries that are open to the retention of both trout and hatchery origin steelhead in streams and rivers that may or may not be planted with hatchery summer steelhead. Angling is restricted in some streams to protect migrating juvenile Chinook or coho.

Table 5. Average landed catch of HATCHERY-ORIGIN and WILD steelhead in terminal-area tribal and recreational fisheries, 2003-04 through 2007-08, November through April periods.

Management Unit	Recreational	Tribal	Total
Nooksack	268	5	273
Samish	26	0	26
Skagit	1,014	664	1,678
Stillaguamish	649	22[a]	671
Snohomish	5,413	143[b]	5,556
Lake Washington	2	0	2
Green	359	244	603
White	1	5	6
Puyallup	190	45	235
Nisqually	2	20	22
Skokomish	15	3	18
East Hood Canal	1	0	1
West Hood Canal	2	0	2
Sequim - Port Townsend	0	0	0
Dungeness	33	23	56
Port Angeles	60	0	60
Elwha	237	222	459
Total	**8,272**	**1,396**	**9,668**

[a] Average 2003-04 to 2005-06 and 2007-08 wild harvest only.
[b] Average 2003-04 to 2005-06 harvest.

4.2 Marine and freshwater salmon fisheries

4.2.1 Tribal commercial, ceremonial and subsistence fisheries, and non-treaty commercial fisheries

Tribal subsistence and commercial fisheries and non-treaty commercial and recreational fisheries directed at Chinook, sockeye, pink, sockeye, and chum salmon, operating in marine waters outside of those areas previously defined as terminal areas (Table 4), also incur incidental harvest of steelhead. For the purposes of this plan, steelhead harvested in the following pre-terminal commercial catch reporting areas are assumed to be a mixture of Puget Sound and, in some areas, other steelhead stocks:

- Strait of Juan de Fuca (Areas 4B, 5, 6, and 6C)
- San Juan Islands/Point Roberts (Areas 7, 7A, 7B, and 7C)

- Central Puget Sound (Areas 9, 10, 10E, and 11)
- South Puget Sound (Areas 13, 13A – 13I)

Some of the steelhead caught in the Strait of Juan de Fuca and San Juan Islands/Point Roberts areas originate in British Columbia.

Annual total tribal harvest in Puget Sound pre-terminal areas ranged from 28 to 105 for the management years 2003-04 through 2007-08 (Table 6). These regional harvest figures may not include some steelhead taken for subsistence purposes.

Table 6. Treaty commercial and take-home harvest of steelhead, in mixed-stock pre-terminal areas of Puget Sound from 2003-04 through 2007-08.

Year	Strait of Juan de Fuca	San Juan Is. Point Roberts	Central Sound	South Sound
2003-04	47	1	2	0
2004-05	60	1	29	5
2005-06	17	0	3	0
2006-07	65	1	39	0
2007-08	26	0	2	0
Average	**43**	**1**	**15**	**1**

We cannot estimate the stock composition, or hatchery and wild composition of catch in these pre-terminal fisheries. Given the small volume of catch, and assuming that steelhead originating outside of Puget Sound comprise some of the catch, the collective impact of these fisheries on listed Puget Sound steelhead is unlikely to exceed more than a small fraction of one percent of aggregate Puget Sound abundance, and is therefore not considered significant.

Steelhead are harvested incidentally during tribal fisheries directed at fall and late-run chum salmon in the terminal fishing areas described above, and to a lesser extent during limited ceremonial or subsistence fisheries for sockeye and spring Chinook in the Nooksack, Skagit, and White Rivers, in May and June. Fisheries directed at sockeye and spring Chinook may catch winter steelhead kelts, and summer steelhead. Fall Chinook, pink, and coho fisheries in the terminal areas also encounter summer steelhead. Terminal-area fall chum fisheries that operate into mid-December primarily encounter hatchery-origin winter steelhead due to their earlier run timing. The late chum fishery in the Nisqually River operates into January, and may involve slightly higher incidental mortality on wild steelhead.

Non-treaty commercial salmon fisheries directed at Chinook, coho, pink, sockeye, and fall chum salmon operate in some marine areas in Puget Sound. A low number of steelhead are encountered in these fisheries. Regulations for non-treaty commercial net fisheries prohibit retention and sale of steelhead. Since 1991, observer monitoring of non-treaty purse seine and gill net fisheries, involving 4,424 purse seine sets and 251 gillnet sets (primarily in Areas 7, 10, and 12), recorded capture of only 17 steelhead, all in purse seine fisheries where release of steelhead is required (Jording 2008). The aggregate impact on listed Puget Sound steelhead is very low.

4.2.2 Recreational salmon fisheries

Recreational fisheries directed primarily at Chinook, coho, and pink salmon occur throughout the marine areas of Puget Sound. Retention of marked, hatchery steelhead is allowed in these fisheries, but the total average landed catch is low (Table 7). Encounters with, and incidental mortality of listed Puget Sound steelhead are not quantified.

Recreational salmon-directed fisheries in freshwater may be expected to encounter listed steelhead. The salmon fisheries are typically closed during the freshwater entry and spawning period (January-May) of winter steelhead, and in stream reaches where summer steelhead hold or spawn during the late winter.

Fisheries directed at hatchery-origin spring Chinook as have occurred in the Skagit River in recent years during June, encounter wild winter steelhead kelts. The summer Chinook fishery on the Skykomish River is more likely to encounter wild summer steelhead. Coho and pink salmon fisheries occur widely throughout Puget Sound in August to September, and coho-directed fisheries may extend until December; the steelhead encountered in these fisheries are primarily hatchery-origin winter stocks.

Summer-fall Chinook, pink, and coho fisheries are expected to have limited impact on wild steelhead, because they start well after the winter and summer steelhead spawning period, and occur primarily in the lower and mid-mainstem river reaches, where native summer steelhead (if present in the system) are not believed to hold for an extended period, and conclude before significant numbers of winter steelhead arrive.

Fall chum fisheries also occur widely throughout Puget Sound, from October to mid-December. A fishery directed at late-run, winter chum salmon in the Nisqually River extends into January. These chum fisheries involve encounters with wild steelhead, but they conclude before significant numbers of native winter steelhead are present.

Table 7. Landed catch of steelhead in Puget Sound recreational fisheries, 2003/04 through 2007/08 in Marine Areas 4-13 (WDFW Catch Record Card estimates).

Return Year	Hatchery	Wild
2003/04	160	0
2004/05	263	0
2005/06	102	0
2006/07	114	0
2007/08	352	0
Average	**198**	**0**

Pink fisheries occur in the Nooksack, Skagit, Stillaguamish, Snohomish, Green, and Puyallup rivers in odd- numbered years, dependent on harvestable abundance. Even-year pink stock originating in the Snohomish River and a few other watersheds, are generally less abundant. While recreational fishing may be allowed, no directed commercial fisheries are implemented targeting even-year pinks. Sockeye fishing opportunities are limited to the Baker River and Lake Washington.

Regulatory measures (i.e. non-retention of unmarked steelhead, and time and area closures) have been implemented to reduce the mortality of wild steelhead in the recreational fisheries discussed above.

4.3 Non-landed mortality

Steelhead are subject to non-landed mortality in gillnet fisheries, and release mortality in hook-and-line, troll, beach seine, and purse seine fisheries. 'Drop-out' mortality in gillnet fisheries is not well quantified by active observation, but for salmon fisheries is typically estimated at 2% or 3% of landed catch in pre-terminal marine and freshwater fisheries, respectively (Puget Sound Indian Tribes and Washington Department of Fish and Wildlife 2004). There are very limited tribal troll fisheries in Puget Sound that rarely involve encounters with steelhead.

Except for the Green River, where one wild summer steelhead (naturalized Skamania stock) may be retained per year by each fisher, recreational fishers are required to release all wild steelhead (i.e. those with an adipose fin intact). All hatchery production of winter and summer steelhead is marked. Hooking mortality associated with recreational fishing is generally believed to be less than 10% of the fish encountered, though the results of studies vary widely in this respect (Hooton 1987; and 2001).

Recreational creel surveys have been conducted in several rivers to estimate mortality of Chinook and coho salmon. Information gathered incidentally indicates that few encounters with steelhead occur in these fisheries. Creel surveys of the Cascade (Skagit) River spring Chinook fishery in 2005 - 2007, which operated from June 1 through the first week of July, recorded five to 13 wild steelhead (mostly winter kelts) were caught and released. Surveys of the Skykomish River (Snohomish) summer Chinook fishery in 2003 – 2007, which was open in June and July, estimated that wild steelhead encounters ranged from 14 to 57. Surveys of the Chinook fishery in the Green River in 2007, the Carbon River (Puyallup) in 2003 – 2007, and the Skokomish River in 2005 – 2007, suggested no encounters with wild steelhead. Surveys of pink salmon fisheries in the Snohomish River in 2004 and in the Skagit River in 2003 recorded seven and eight steelhead encounters, respectively. A survey of the 2003 Dungeness River coho fishery in October and November recorded three encounters with wild steelhead.

5. Harvest Management Guidelines

This Plan focuses, primarily, on harvest guidelines for wild winter steelhead comprising the Puget Sound DPS. Steelhead fisheries, throughout Puget Sound, are primarily directed at hatchery-produced winter and summer steelhead in every river system where hatchery programs operate. Harvest of hatchery steelhead is structured to ensure that:

- Hatchery escapement goals are achieved
- Incidental mortality of wild steelhead is constrained to levels that will not substantially increase their likelihood of extinction or impede their potential for recovery.

This Plan accounts, to the extent possible, for all harvest-related mortality in Puget Sound fisheries, and harvest guidelines (e.g., harvest rate ceilings) are expressed in the same terms (i.e. including landed and non-landed, or induced mortality). This said, we recognize that some landed harvest of wild steelhead, and non-landed mortality, are not now accurately quantified.

Harvest of steelhead occurs principally in terminal areas (i.e. rivers and immediately adjacent marine areas) where local-origin steelhead are predominant. Catch accounting, in relation to stated objectives, assumes that the entire terminal catch is of local origin. Hatchery- and wild-origin steelhead from other watersheds commingle to a greater or lesser extent in all terminal areas, but information necessary to quantify straying is not currently available.

For each MU, this Plan specifies the regulatory structure of terminal-area fisheries, recent harvest, and - in some cases - the adopted harvest rate ceilings, for wild steelhead and assessment of the effect of harvest on extinction risk. Risk assessment methods, outlined below, test whether the stated harvest regime increases the likelihood that the abundance of any MU will fall to a critical (quasi-extinction) threshold. With the exception of one MU, we lack methods for quantifying the effect of the proposed harvest regime on the likelihood of recovery.

Owing to the limits of current data and management tools, we cannot distinguish the effects of harvest on individual populations comprising complex MUs. Information derived from mark and scale sampling is used, with forecasted abundance for some MUs, and run timing information, to estimate the hatchery and wild composition of catch.

Harvest of winter and summer steelhead in Puget Sound is distinguished by catch accounting periods. Steelhead caught in marine and freshwater terminal areas between November 1 and April 30 are categorized as winter-run fish, and those caught between May 1 and October 30 as summer-run. This distinction is functional for terminal area fisheries, based on the migration and freshwater entry timing of summer and winter steelhead, but winter and summer steelhead may commingle in some fishing areas and time periods. Winter kelts, for example, may still be present in some areas after April 30.

Winter steelhead fisheries management in the Puget Sound region is structured around the different freshwater entry and migration timing of hatchery and wild winter steelhead. The distinctly earlier and more compressed run timing of the Chambers Creek hatchery stock enables their selective harvest to incur low incidental harvest or non-landed

mortality of wild steelhead. The tribal net fishery in the Skagit River encounters few wild steelhead in December. As their abundance increases mid-January they comprise a majority of catch taken in January – April (Figure 2). The contribution of wild steelhead to tribal net catch in the Green River does not exceed 10% until the first week of January; the majority of harvest occurs in December (Figure 3).

Wild steelhead mortality in recreational fisheries is substantially controlled by the current regulatory regime, which only allows the retention of marked (adipose-fin-clipped) hatchery fish. Regulations further limit recreational and tribal fisheries to migration corridors of hatchery steelhead. Recreational regulations (Appendix E) seek to reduce or eliminate angler presence on smaller steelhead and salmon spawning streams during the late fall through early summer period to prevent disturbance of spawning salmon and steelhead, and prevent angler access to streams with low or unknown numbers of wild steelhead.

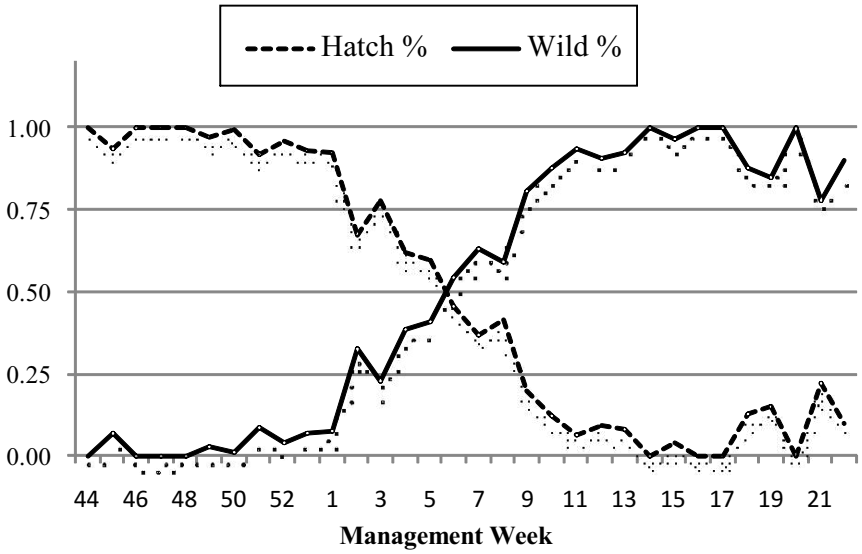

Figure 2. Average (2004-2009) composition of the Skagit River tribal winter steelhead catch (R. Bernard, Upper Skagit Tribe, pers. comm.).

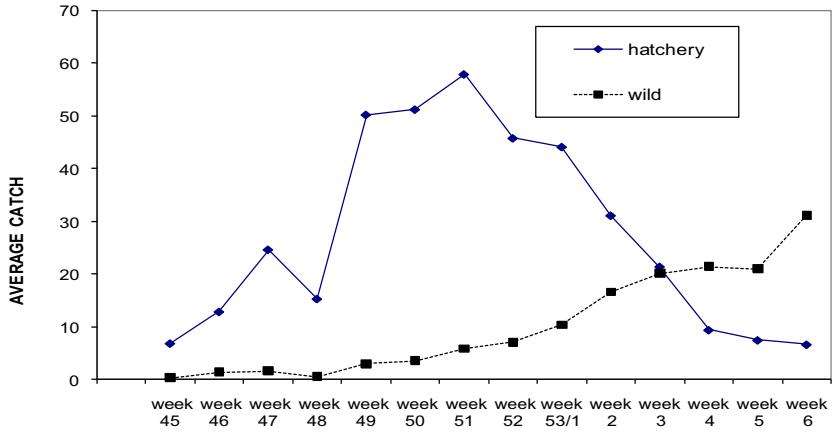

Figure 3. Average (1999-2007) tribal catch of hatchery and wild winter steelhead in the Green River (M. Mahovlich, Muckleshoot Indian Tribe, pers. comm.).

Normalized run timing curves (Mundy 1982) developed from daily counts of steelhead at the Buckley trap on the White River indicate a mean date (i.e. point at which 50% of the run has arrived) in the second week of April (Figure 4). Migration timing through the lower Puyallup and White, where harvest occurs, is not certain. The tribal chum fishery in the Puyallup occurs prior to substantial wild steelhead entry; steelhead are also caught during the tribal C&S fishery for spring Chinook in the White River in May (see Chapter 5).

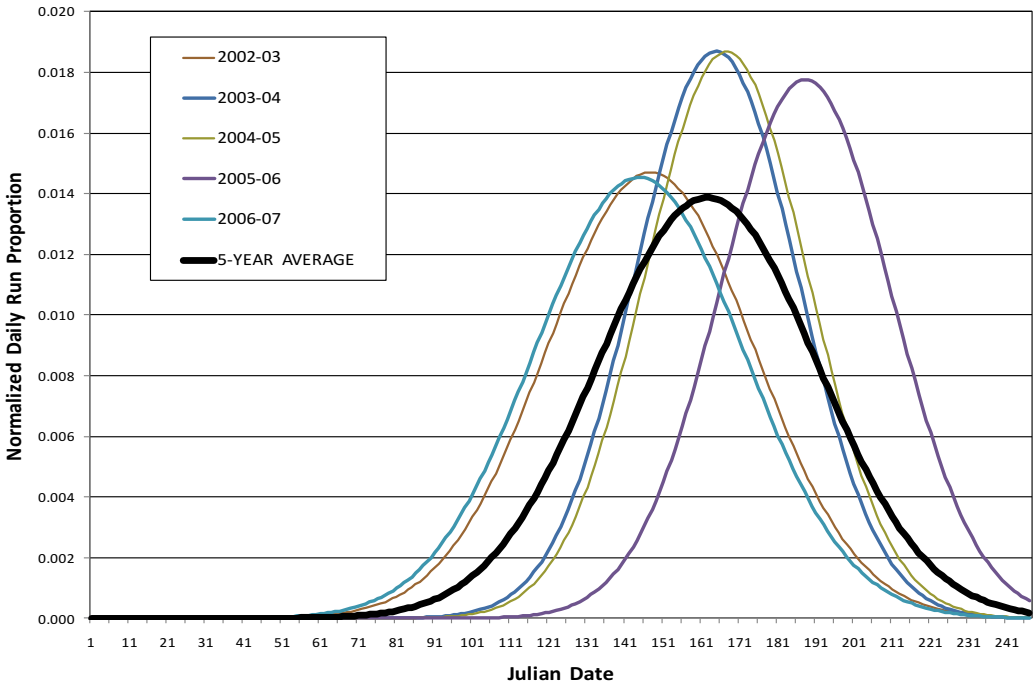

Figure 4. **Run timing of wild winter steelhead at the Buckley trap in the White River, 2003 -2007 (R. Ladley, Puyallup Tribe, pers. comm.). Julian dates adjusted to start November 1.**

Migration timing of winter steelhead in Snow Creek has been accurately described from counts at the WDFW research station weir. Normalized run timing curves (Mundy 1982) developed from data collected in from 1977 – 85 indicate a mean entry point in the second week of March (Figure 5).

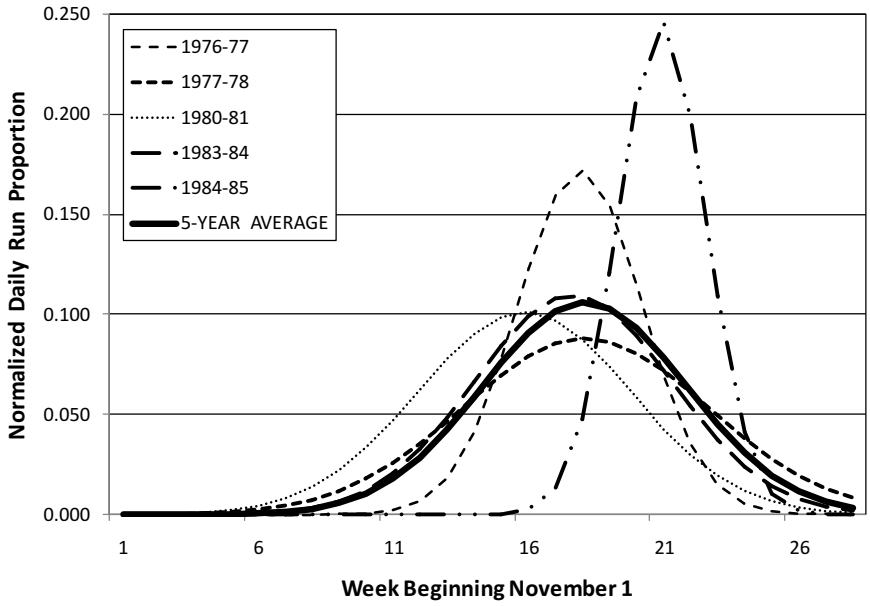

Figure 5. Migration timing of Snow Creek winter steelhead (R. Cooper, WDFW pers. comm.).

5.1 Risk assessment methods

Two methods were used to assess the effects of the current harvest regimes, relative to a zero harvest baseline, on the survival and recovery of wild steelhead populations, each suited to the availability of information on current productivity. Critical abundance benchmarks were specified for analysis of each MU, as reference points for survival. The critical threshold was defined either as the abundance (i.e. spawning escapement) associated with functional extinction or demographic instability. A viable threshold (where used) was chosen as the best available estimate of current MSY escapement, current habitat capacity, or a calculated threshold associated with 99% probability of survival for 100 years. The viable threshold, thus, represents optimal escapement under the current degraded habitat status that limits steelhead production in each MU. This viable threshold does not reflect longer-term recovery or de-listing objectives.

5.1.1 Risk Assessment Based on Current Productivity

Section 4(d) protective regulations for Puget Sound steelhead (NMFS 2008) assert that harvest should exert a very low additional risk that the population falls to critical abundance relative to the zero-harvest baseline, and also demonstrate a high probability the population will reach the viable abundance threshold (where such a threshold can be determined). These criteria address the conservation requirement that harvest-related take not appreciably reduce the probability of survival or recovery of the species.

When the current productivity (i.e. spawner recruit function) of a population can be reliably quantified, abundance and spawning escapement dynamics can be simulated under a range of exploitation rates. Simulation can incorporate the variability around spawner – recruit parameters (e.g. those estimated in fitting a Ricker or Beverton-Holt recruitment function), and management error (i.e. the difference between intended and observed harvest rates). These simulations, typically run for 25 years and iterated 1,000

times, each produce a time series of escapements from which probabilities can be calculated of abundance falling to a critical threshold, or achieving a viable thresholds or MSH escapement level. This method, known as the Risk Assessment Procedure (RAP), has previously been applied to assessing the effect of harvest on several Puget Sound Chinook populations (PSIT and WDFW 2004).

This analysis requires data to support cohort reconstruction, ideally for 20 generations: accurate escapement estimates, age structure (i.e. maturation rates), and a means of estimating harvest-related and natural mortality. Spawner and corresponding recruitment data pairs from the historical period can then be fitted to a recruitment function useful for predicting production in the aforementioned simulation. By incorporating uncertainty about recruitment, marine survival, and management error, a productivity-based analysis enables a conservative assessment of the risks associated with harvest.

Data constraints limit the current application of this method to Skagit winter steelhead. Elsewhere, escapement data are generally available but often comprise index area observations, not a spawner census. Age structure is known for only a small subset of populations. Harvest data are limited to terminal areas; pre-terminal area marine harvest impacts are believed to be low, but are unquantified, as is non-landed harvest mortality. The Skagit analysis assessed the probabilities of abundance falling to a critical level, and achieving a recovery threshold, and is described in more detail in Appendix B.

5.1.2 Population Viability Analysis

Population viability analysis (PVA) was applied to assess the relative change in extinction risk posed by the current harvest regime for many Puget Sound steelhead MUs, and to provide a risk context for the current or projected harvest levels or rates for the duration of this Plan. This is a challenging task because data and life history information of Puget Sound stocks are very limited, and do not support modeling the full complexity of steelhead life history. A life history-based model requires information on age and sex structure, fecundity, juvenile survival rates at different stages, interactions with resident fish, and other details that are not available for most Puget Sound stocks. Lacking this information, we conducted our quantitative risk assessments using available data, consisting of relatively short time series of annual abundance estimates for Puget Sound steelhead stocks.

The time series data for most MUs underestimate total run size to the terminal area and/or escapement, because harvest-related mortality and escapement are incompletely quantified. Abundance estimates do not include population components such as mature adults harvested in pre-terminal marine waters, non-landed mortality in commercial and recreational fisheries, immature fish still in marine waters or juveniles in freshwater. The sum total of all these components comprises a stock's true population at any given point in time. The data are sufficient to provide estimates of abundance trends given historic harvest rates for the very recent past, associated variances (particularly process errors), and estimates of the potential spawning population under different harvest rates, including a no harvest baseline.

PVA techniques presented in Dennis et al. (1991) and Staples et al. (2004) were used to assess harvest effects on escapement. The analysis was intended to inform the question whether harvest rate ceilings specified in the Plan can be expected to significantly

increase the risk of MU abundance falling to a quasi-extinction threshold (QET) above the risk associated with a no-harvest scenario?

Estimates of the probability of reaching the QET within a 25-year time horizon were compared for the no harvest baseline (and different levels of harvest, in the vicinity of expected rates).

Except for the Skagit MU, we do not include an analysis that calculates the probability of reaching an escapement goals, recovery goal, or viable abundance, because these have not been developed for any other MU. This precludes our ability to assess the effects of harvest on recovery potential, until other tools are developed.

The PVA involves five steps:

1) Assemble a time series of mature run size and escapement estimates. The run size includes catch and therefore the time series incorporates historic harvest rates
2) Fit a stochastic drift model to the time series data to estimate current population trend parameters and process error that is an expression of population's response to environmental stochasticity and management error
3) Use estimated trend parameter and process error to forecast population trajectories calculating extinction probabilities and their associated 90% confidence intervals with respect to lower threshold levels from the original data
4) Adjust the trend parameter estimated in step 2 to account upward to account for the effects of past harvest on population trends, then estimate extinction probabilities using the new population growth rate parameter. The adjustment is based upon the average historic harvest rates
5) Obtain the trend parameter for proposed harvest rates by adjusting the trend parameter from step 4 downward and re-calculate the associated extinction probabilities

Details of the calculations in each step are in Appendix B.

In order to gauge the risk of harvest on the trajectory forecasts, the trend parameters estimated in step 2 are altered in step 4 to account for past harvest, then again in step 5 for proposed harvest. The effects of the adjustment, and the reasoning behind them, are illustrated in Figure 6 and Figure 7. The instantaneous grow rate calculated from run size (μ_{PVA}) is lower (flatter) than if one were able to calculate μ from the spawners or the growth rate under no harvest ($\mu_{\text{No Harvest}}$) because the run size is a function of escapement only (Figure 6). In year 2, the total run size, catch plus escapement, is a function of the escaped spawners only. The run size in year 3 is, again, a function of the escaped spawners. However, if the catch had been allowed to spawn then there would have been additional recruitment, resulting in a higher population growth rate (dashed line, Figure 6). Hence, the adjustment in step 4 is a way to increase the growth rate parameter to account for the productivity that would have occurred in the absence of harvest. If instead harvest had occurred in year 2, then there would have been no additional recruitment and the population growth rate between years 1 and 3 would have been lower (Figure 7). This is the basis for the adjustment in step 5.

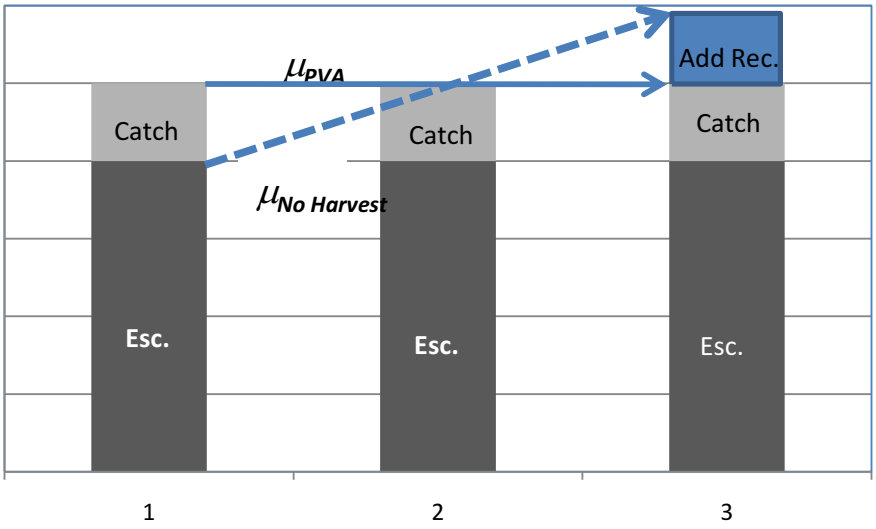

Figure 6. A comparison of the population growth rate when influenced by harvest (μPVA – solid line) and in the absence of harvest, (μNo Harvest - dashed line).

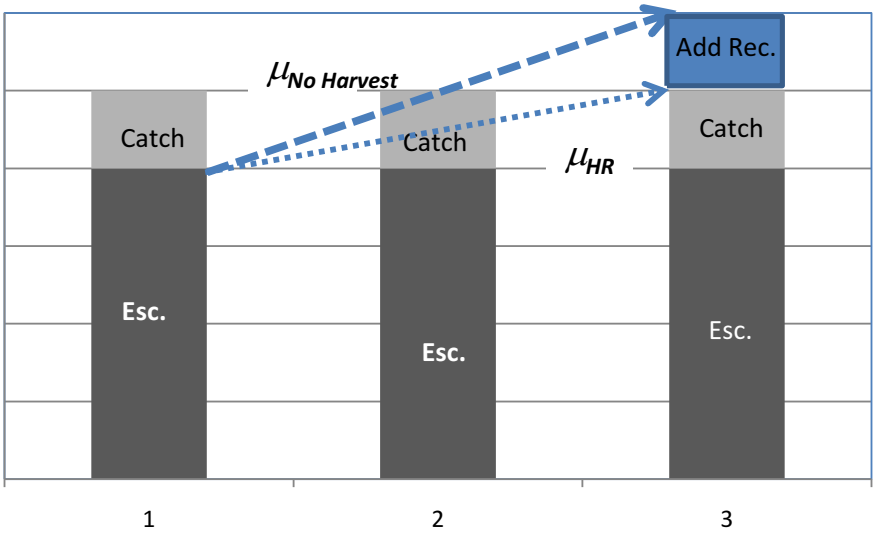

Figure 7. The effects of harvest on future run size and the difference between a no-harvest (dashed line) and the harvest-based growth rate parameter (dotted line).

Probabilities of extinction formed the basis of the risk assessment and were calculated from estimates of population trend adjusted for different harvest rates, the process error estimated from PVA, and initial population sizes that were the average of the last four observed run sizes. The final risk assessment values are the product of a two-stage probability. In the first stage, the population has to be on a trajectory to eventually reach a QET defined as Pr (*LB*). The second stage probability is that of reaching a lower bound within a specified time period, *given* that the population is on a trajectory to reach the QET. The product of the first and second stages is the joint probability that the population will reach the QET at least once within the specified time period. The risk assessment was based on this joint probability by comparing values within the range of proposed harvest rates.

The estimated population growth rate (μ) calculated from PVA is strongly influenced by the first and last data points of the time series of abundance data. Variance in the time series associated with process error and the last population size determine probabilities of reaching lower-bound thresholds. These PVA statistics do not consider the potential resilience of steelhead populations at relatively low abundance due to density dependence (Ardren and Kapuscinski 2003). Density dependent, higher recruitment rates at low spawner abundance have been demonstrated for many salmonid populations, including the Skagit winter steelhead (see Appendix B). For other Puget Sound steelhead, data are not available to support cohort reconstruction or quantify spawner density-recruitment relationships.

In further contrast to a productivity-based risk assessment (e.g. RAP), simulations in the PVA incorporate a fixed harvest rate, whereas actual harvest rates may vary substantially from ceiling rates established by the Plan. High process error results in wide confidence intervals about predicted probabilities of reaching lower-bound abundance levels.

PVA provided an informative context for assessing the additional risk of extinction associated with harvest, given the constraints of current data for most Puget Sound steelhead populations. PVA does not precisely resolve the differential risk between small increments of harvest rate. Consequently, to inform this management Plan, the behavior of extinction risk was examined within the range of proposed harvest rates. This leads to more qualitative conclusions about the risk associated with projected terminal harvest rates. For most populations harvest rates have fluctuated at levels below 15% in recent years.

Some key assumptions of the PVA analysis with regard to the population are as follows:

1) The annual mature run size is an adequate (albeit flawed) index of the total population. It is understood that the trend parameter is an underestimate of population growth typically inferred from PVA because it incorporates historical catch rates.
2) Because of (1), incidental harvests in the expected range, (e.g., 0-15%) are not likely to change the current trend parameters because these harvest levels are already contained in the base period data.

Further statistical assumptions are presented and discussed in Appendix B.

The forecasting step of PVA may exaggerate extinction risk when the historical population growth rate is negative. Once a population has taken a path toward extinction, the first stage probability, it remains on this path. In density dependent models, whether a population experiences persistent negative growth depends on the shape of the underlying spawner-recruit function, and the starting population abundance. It is possible for the population to initially decrease in abundance, and then experience stable abundance or a positive growth rate. In PVA forecast there is no such mechanism. Once the population is in decline, with stage 1 probability, it remains on that path.

Parameters used to calculate extinction probabilities in the PVA analysis are presented in Appendix B for each Puget Sound stock with sufficient time series data. Estimated growth rate parameters were less than 0 for most Puget Sound stocks, indicating declining abundance trends.

Because the historic run sizes were a function of historic harvest, we adjusted the estimated growth rate by the historic harvest rate to obtain μ_0 ($\mu_{No\ Harvest}$) and the associated extinction probabilities for each Puget Sound winter steelhead stock (Table 8). Extinction risk probabilities associated with the zero-harvest baseline and the ceiling harvest rate imposed by this Plan were calculated using growth rate parameters adjusted for the appropriate harvest rates, the process error estimated from step 3, and the average of the last 4 run size observations. The estimates used in the calculations are provided in Appendix B. Data used to quantify trends in wild steelhead consist of annual estimates of spawning escapement or terminal run size accessed from steelhead run size reconstruction data base in January, 2009. Uncertainty around the probability estimates are represented by the 90% confidence intervals associated with each extinction risk estimate (Appendix B).

Table 8. Estimated extinction risk over 25 years associated with zero harvest and harvest rate ceilings for Puget Sound winter steelhead management units.

Management Units	QET	Zero harvest baseline	Harvest rate ceiling	
		Lower Bound (estimate) Upper Bound	HR	Lower Bound (estimate) Upper Bound
Samish[a]	63	0.002 (0.162) 0.754	10%	0.004 (0.223) 0.826
Skagit[a]	189	0 (0) 0.007	16%	0 (0.0018) 0.077
Stillaguamish[a]	63	0 (0) 1	15%	N/A (1) 1
Snohomish[a]	189	0 (0) 0.027	15%	0 (0.003) 0.138
Green[a]	63	0 (0) 0	10%	0 (0) 0
Puyallup[b]	126	0.568 (0.967) 1	10%	0.874 (0.997) 1
White[b]	63	0.015 (0.444) 0.964	10%	0.163 (0.820) 0.999
Nisqually[a]	63	0 (0.086) 0.660	15%	0.005 (0.292) 0.906
Skokomish[b]	63	0.001 (0.190) 0.850	10%	0.289 (0.905) 1.00
West Hood Canal[b]	63	0 (0.349) 0.990	10%	0.001 (0.487) 0.998
East Hood Canal[b]	63	N/A (0) N/A	10%	0 (0.020) 0.331

[a] PVA used terminal run size data
[b] PVA used escapement data

5.1.3 Comparison of PVA and Productivity-Based Risk Analysis for Skagit Winter Steelhead

PVA estimated the instantaneous growth rate for Skagit (μ) to be = -0.0050 (SE (μ) = 0.0383). This statistic is not significantly different from 0 ($P > 0.10$), indicating that a negative abundance trend is not detectable. The quasi-extinction threshold (QET) was 189. For the no harvest baseline, the probability of falling to the QET at least once in 25 years was near zero (Table 8) and did not substantially increase under a harvest rate of 16% (Appendix B).

Productivity-based simulations were based on age-structured historical survival, modeled by density-dependent spawner recruit functions, in contrast to PVA that simulated only the historical time series of annual run sizes. Simulations to derive the RER were, similarly, run for 25 years. The critical abundance threshold for the productivity risk analysis was calculated to be 700, (i.e., 5% of the current capacity, derived from the

spawner-recruit function). The viable threshold was also derived from the spawner recruit function, as EMSY (i.e. either 3,208 or 3,795, depending on whether the entire or shortened cohort time series was used to fit the spawner recruit function).

The RER was, under a convention previously developed by the co-managers, and subsequently adopted by the NMFS for harvest risk analysis, selected as the harvest rate that meets the more constraining of two criteria:

- The recovery criterion: the escapement endpoint of the 25-year simulation exceeds the viable threshold 80% of the time or the probability of achieving the viable threshold is not greater than ten percent lower in comparison with the baseline of zero harvest mortality, or
- The survival criterion: considering all 25 annual escapement outcomes projected by the simulation, the probability of falling to the critical threshold is not more than 5% higher than under the zero harvest baseline.

The productivity risk analysis resembled the PVA, in that the probability of falling to either the critical threshold (700) or QET (189) was the less constraining than the recovery criterion. Among various simulations, the probabilities of abundance falling below 700 were 0% for HRs ranging from 0% to 40%, and increased to between 0.1% and 2% at a HR of 50%.

The PVA point estimates of the probability of achieving an annual escapement of 6,000[1] once in the next 25 years fell below 80% at harvest rates between 20% and 30%, and declined more than 10% from the baseline (zero harvest) at harvest rates between 10% and 20%. The productivity risk analysis, on the other hand, suggested that the recovery criterion (3,208) would be achieved at harvest rates varying from 28% to 40%, using the short, more recent cohort time series (1986 – 2001), depending on which spawner-recruit model was fit to the data. The productivity risk analysis was used to confirm that the current terminal harvest rate ceiling implemented for Skagit (16%) did not impede recovery or increase the risk of extinction. Moreover, actual harvest rates for the Skagit system are probably substantially less than 16%, i.e. rates derived from landed catch have varied from 1% to 11%, averaging 5% over the last 10 years. Some additional mortality resulting from non-landed mortality in tribal and recreational fisheries is not quantified. Because recreational harvest rates in recent years have been well under 10% in years when retention of wild steelhead was allowed, the non-landed mortality rate (assuming a 10% hooking mortality) is unlikely to exceed 1%. Pre-terminal harvest mortality is not quantified either, but the analysis in this document indicates that it does not exceed a fraction of 1%. In addition, while inclusion of the non-landed and pre-terminal mortalities would increase the harvest rates slightly, their inclusion would also increase recruitments by the same amount, which would have the compensating effect of increasing the RER. Thus, under current management, the probability of achieving the viable threshold at the end of 25 years is considerably greater than 80%.

The PVA also over-estimates the risk of extinction or criticality associated with incremented harvest rates for other Puget Sound steelhead MUs, because the population growth rate is underestimated because the historic runsize includes harvest, and because

[1] The escapement floor above which harvests may be conducted later in the season, when wild steelhead predominate in the catch.

PVA is unable to reflect density dependence (i.e., the higher productivity of steelhead populations, in terms of recruits per spawner, at low abundance), which is clearly demonstrated by the productivity functions fit for the Skagit MU.

5.2 Management Unit Harvest Guidelines and Objectives

The fisheries regimes described below for each management unit have been implemented in recent years; this Plan does not reflect a change from the recent regulatory structure, but new terminal harvest rate ceilings are established for several MUs. Harvest regulations already reflect the co-managers' focus on giving priority to the conservation needs of wild steelhead. Fishing opportunities have been limited in recent years due to concurrent declining trends in wild stock abundance and the survival of hatchery releases. Fisheries directed at hatchery-produced winter steelhead now operate in a confined period, generally December through mid-February, during which few encounters with wild steelhead occur. In the risk assessment descriptions below, this Plan provides a technical basis to support the co-managers' objective to keep incidental mortality of wild steelhead at low levels that will not significantly reduce their likelihood of survival and recovery.

Harvest-related mortality is imperfectly estimated. Tribal fisheries management agencies require their fishers to report all landed catch, whether it is sold commercially or retained for subsistence or ceremonial use. Total tribal steelhead harvest, and its wild component, may be inaccurately estimated, particularly where abundance and catch are very low. Estimates of retention of wild steelhead in recreational fisheries, as estimated from Catch Record Card analyses, is also subject to bias, due to non-response from anglers.

Pre-terminal fisheries in Puget Sound harvest a relatively small number of steelhead (see Chapter 4), but the stock composition in the various catch areas, and the relative proportions of hatchery-origin and wild steelhead are not known.

The magnitude of non-landed mortality in tribal and non-Indian net fisheries is not quantified. Hook-and-line fishing by tribal and recreational fishers also incurs non-landed mortality, particularly where regulation require release of wild steelhead. Quantification of this non-landed mortality requires estimates of hooking mortality and encounter rates that are generally not available for Puget Sound fisheries.

Estimation of harvest rates is further subject to uncertainty in estimates of escapement. Escapement estimates are frequently biased by high flow and turbidity that affect redd or adult counts. Surveys are generally limited to index reaches, rather than a more comprehensive census. Index reach data may or may not be expanded to estimate total escapement (see Chapter 6). Steelhead escapement surveys usually begin in early March. Redds counted after March 15th are assumed to quantify wild steelhead spawning, though some wild steelhead spawn earlier, and some hatchery steelhead spawn later, than this date. The extent of naturally-spawning hatchery steelhead has not been quantified in Puget Sound rivers. Bias in spawning escapement estimates will directly affect the accuracy of harvest rate estimates.

Marine mammal predation on steelhead is believed to be significant in several Puget Sound terminal area fisheries, but has not been quantified.

These factors require a cautionary approach to setting harvest rate ceilings or stating the expected or recent range of harvest rates for a given management unit. The intent of this Plan is to account for all sources of harvest-related mortality in all fisheries in Puget Sound, and, in the future, reduce uncertainty to the extent possible.

The terminal harvest rate ceilings that we have implemented for some MUs (summarized below in Table 10 and further described in Chapter 5.2) are not management targets. We do not intend to 'fish up' to those ceilings. For many MUs recent harvest rates have been substantially lower than the stated ceiling. That ceilings exceed recently observed rates should not be construed to imply that the fundamental objective that has guided steelhead harvest management in recent years has changed. That objective remains to constrain incidental harvest of wild steelhead to very low levels.

Management periods define the interval during which regulatory actions are taken to meeting conservation and allocation requirements for a stock or group of stocks, and are generally based on the central 80 percent of the run timing of a management unit or group of management units. The definition excludes the 10 percent tails at each end of the run from directed management for conservation or allocation, although directed fisheries may occur throughout the entire run timing. Methods used to establish management periods are area and species specific and depend on the availability of suitable historical data with which to construct accurate run timing profiles (WDF and NWIFC 1990). For catch accounting and allocation purposes all steelhead caught by recreational and tribal fisheries in terminal areas, between November 1 and April 30, are considered winter steelhead, and those caught between May 1 and October 31 as summer steelhead. Late fall and late spring fisheries conducted in these time periods encounter a mix of winter and summer steelhead but insufficient information exists to differentiate the run composition of catches during these time periods.

Annual management plans will be developed for each steelhead management unit, prior to the start of the winter steelhead season. These plans will include abundance forecasts of hatchery and wild stocks, management periods, fishing schedules and other regulations specific to the upcoming season, and provision for in-season management measures. Generic management periods for each MU summarized in Table 9 are administratively adjusted to the nearest weekend dates for annual management planning.

In order to provide better protection to salmon, steelhead and trout, in particular rearing juvenile anadromous salmonids in the Puget Sound DPS, WDFW is proposing a more conservative approach to the regulation of fishing in rivers, streams, and beaver ponds.

Currently, waters are open under the standard stream game fish regulations unless otherwise specified by stream name in the regulation pamphlet. This regulatory approach opens to fishing juvenile rearing habitat for both resident trout species and anadromous salmonids. The permitted use of bait in these areas increases the potential for hooking mortality.

Table 9. Generic harvest management periods for winter steelhead.

Management Unit	Management Period
Nooksack	December 15 to April 15
Samish	December 15 to April 15
Skagit	November 29 to April 14[a]
Stillaguamish	December 1 to March 30
Snohomish	December 1 to March 30
Green - Duwamish	December 1 to April 15
White	December 1 to February 28
Puyallup	December 12 to February 28[b]
Nisqually	December 1 to February 3[b]
Skokomish	December 9 to April 14
East Hood Canal	December 9 to April 14
West Hood Canal	December 9 to April 14
Sequim - Port Townsend	December 2 to April 30
Dungeness	December 12 to April 14
Port Angeles	December 7 to February 28
Elwha	December 12 to April 14

[a] Skagit River areas 1 - 5 open sequentially later
[b] Puyallup and Nisqually tribal fisheries are directed at fall and late chum, respectively

The more conservative management strategy that is under consideration by WDFW, called the "Stream Strategy", is to close all rivers, streams and beaver ponds to fishing except as listed in the "Fishing in Washington Rules Pamphlet". Rivers, streams and beaver ponds listed in the pamphlet as open to fishing will be identified for areas where stocks are robust and can support fishing pressure and in areas where reasonable recreational opportunity exists (Appendix E-3).

In general, the Stream Strategy proposal establishes conservation guidelines for minimum harvestable size and the use of bait. It prohibits the use of bait in areas with weak steelhead stocks, thereby reducing hooking mortality. The Stream Strategy proposes a 14" minimum size for trout retention in anadromous waters to reduce mortality of juvenile steelhead, bull trout, Chinook, and coho salmon. The anticipated result of these rule change proposals is a significant increase in juvenile salmonid survival.

Abundance Thresholds

We established Low Abundance Thresholds (LAT) for some MUs to guide pre-season harvest planning in response to forecasted abundance. As stated above, the LATs are set at a level substantially higher than the critical thresholds (see Table 10) so that harvest is proactively constrained to further reduce the risk that abundance will fall to the critical level.

Implementation of LATs is dependent on the availability of reliable forecasts to inform pre-season harvest planning. Consistent, accurate escapement estimates, as well as catch accounting, are requisite to forecasting terminal abundance. Ideally, forecasts are based on cohort reconstruction and a composed of the expected returns of four age classes each year. Elsewhere, providing historical escapements are consistently derived, with attention to survey conditions, the forecast is simply a recent average of terminal

abundance, but these data are adequate to project catch and escapement. For MUs lacking LATs, we will prioritize collecting the information necessary to improve the basis of forecasts.

Table 10. Harvest rate ceilings, low abundance thresholds, and upper management thresholds for Puget Sound winter steelhead.

Management Unit	Harvest Rate Ceiling(s)	Critical Threshold	Low Abundance Threshold	Upper Management Threshold
Nooksack		250		
Samish		125		
Skagit	16%	500	1,000	6,000
Stillaguamish	5-10-15%	250	1,550	3,100
Snohomish	5-10-15%	500	3,250	6,500
Lake Washington		250		
Green	10%	250	500	
White	10%	250	500	
Puyallup	10%	250	500	
Nisqually	15%	250	400	
Skokomish	10%	250		
East Hood Canal	10%	125	250	
West Hood Canal	10%	125	250	
Sequim-Port Townsend		100		
Dungeness		125		
Port Angeles		125		
Elwha		100		

5.2.1 Nooksack and Samish Management Units

Two winter steelhead management units are designated in the Nooksack-Samish region – the Nooksack River, including the independent tributaries to the Strait of Georgia (i.e. Dakota Creek, Whatcom Creek) and the Samish River. There is no directed harvest of wild winter steelhead. Annual harvest management plans are developed and agreed by the Lummi Nation, the Nooksack Tribe, and WDFW. They focus on harvest in the Nooksack River, the Samish River and immediately adjacent estuarine areas. The Swinomish and Upper Skagit tribes also participate in development of the annual Samish harvest plan.

Summer river-entry timed steelhead also exist in the Nooksack watershed, and they are considered native and wild. The Salmon and Steelhead Stock Inventory (WDF, WDW and PSIT 1993) described a stock that has historically small numbers in the South Fork, and they are thought to spawn higher in the river than salmon or winter entry timed steelhead. Adults are occasionally observed during spring Chinook escapement surveys or other Chinook life history studies, often in July, August and September. The entry timing may be as broad as May through September, although information is very limited. Late river spawning winter run steelhead are much more abundant in the Nooksack River in May and June than summer runs, and incidental harvest during this period may be mostly, or entirely winter runs. Summer-run spawning escapement is not known.

The existing fisheries restrictions are considered protective of summer run steelhead. Recreational fishers are required to release wild summer run steelhead, and there is no commercial Nooksack spring Chinook fishery, as existing habitat conditions have resulted in low productivity for those populations. The ceremonial and subsistence fishery for Chinook is very limited and occurs in April and May, which is likely before summer run steelhead arrive. Additionally, the larger Chinook mesh size restrictions also help reduce the possibility of incidental harvest of steelhead. The in-river fall Chinook fishery does not start until the beginning of August, and the large mesh size reduces the potential for incidental steelhead harvest. The South Fork is closed to all commercial, ceremonial and subsistence fishing, and recreational regulations include gear restrictions, and are required to release wild steelhead.

Regulatory structure

Fisheries in the Nooksack and Samish Management Units are structured to harvest hatchery-origin winter run steelhead returning to the Nooksack and Samish rivers, and Whatcom Creek.

There are no in-river tribal fisheries between January 15 and August 1, except the very limited spring Chinook Ceremonial and Subsistence fishery that is of short duration in April and May.

State regulated commercial fisheries in the region are not permitted to retain steelhead taken incidentally to the harvest of other species. All hatchery origin winter steelhead releases in the region are externally recognizable by the absence of an adipose fin, to allow monitoring of non-hatchery steelhead in commercial catches and to enable release of non-hatchery steelhead during recreational fisheries.

There are no directed recreational or tribal fisheries for summer steelhead in either the Nooksack or Samish MUs, though there may be minor incidental harvest in salmon-directed fisheries. No hatchery summer steelhead releases currently occur in these MUs.

Nooksack River and Independent Tributaries

Tribal winter steelhead fisheries in the Nooksack River and delta are open from mid-December through mid-January. The fall chum salmon fishery in these areas involves incidental harvest of hatchery origin winter steelhead, although the larger mesh size reduces the potential.

Recreational fishing in the Nooksack River is regulated under generic trout and game fish regulations from June 1 through the end of February. The recreational fishery in the mainstem Nooksack River, upstream to Deming, is open under salmon regulations from September 1 through December 31. From Deming to the confluence of the North and South Forks, the fishery opens October through December 31. The North Fork is only open to salmon fishing in October. The South Fork is open to salmon fishing from mid-October through December. Generic steelhead restrictions (daily limit of two marked (hatchery) fish over 20 inches) apply to late season salmon fisheries. Incidental encounters with wild and hatchery steelhead occur during salmon fisheries and subsequent winter periods under trout regulations (i.e. in January and February). Emergency in-season regulations may further restrict the recreational fishery in order to ensure hatchery escapement is achieved. The structure of these regulations reflects

management and conservation needs of steelhead, trout, and salmon populations in the MU.

Samish River

The tribes have, in the past, opened fisheries directed at hatchery winter steelhead in the delta of the Samish River from mid-December through mid-January, but there has been little to no effort in recent years, since the hatchery program was reduced.

Recreational fishing in the Samish River is regulated under generic trout and game fish regulations from June 1 through March 15. Salmon fishing regulations are in effect for the lower river (up to Thomas Road) from July 1 through December 31; and in the middle reach (from Thomas Road to I-5) from October 1 through December 31. Hatchery steelhead (up to 2 per day over 20 inches) may be retained under the game fish regulation.

Expected Harvest

Steelhead fisheries in the Nooksack and Samish terminal areas are planned based upon the pre-season estimate of the return of hatchery steelhead to the management area, and escapement requirements of the Kendall Hatchery program. Insufficient information about wild winter steelhead is available to forecast their catch or abundance.

From 2000-01 to 2007-08, landed catch of steelhead ranged from 6 to 88 in tribal fisheries, including catch in the marine areas of 7B, 7C, and 7D. Total landed catch by the recreational fishery in the Nooksack Management Unit, excluding Whatcom Creek, ranged from 177 to 447, and in the Whatcom Creek ranged from 6 to 174. In 2000-01 through 2007-08, recreational catch in the Samish River ranged from 18 to 93 (Eric Kraig WDFW pers. comm., CRC data). There has been no tribal harvest of steelhead in the Samish River in recent years. Landed catch of unmarked steelhead has been very low in recent years, under the mark selective regulations. These catch data (Table 11) include all landed steelhead, including those caught in the winter and summer accounting periods.

Freshwater entry timing of winter steelhead into the Nooksack River has not been recently described, but historical information indicates late run timing, with good fishing in February until the season closed. Information for other Puget Sound stocks suggests that termination of the mainstem tribal net fishery in mid-January minimizes the mortality of wild steelhead to levels that do not influence extinction risk or recovery.

Table 11. Landed tribal and recreational harvest of Nooksack, Whatcom, and Samish steelhead, including catch in winter and summer accounting periods.

	Nooksack R.		Whatcom Cr.	Samish R.
Year	Tribal	Recreational	Recreational	Recreational
2000-01	37	418	54	64
2001-02	7	327	174	93
2002-03	22	242	29	18
2003-04	6	245	21	66
2004-05	19	447	44	14
2005-06	8	244	26	32
2006-07	13	216	6	35
2007-08	88	177	6	26

Risk Assessment
Spawning escapement estimates for Nooksack wild winter steelhead are not available, but a review of the data, primarily from index tributaries, suggests that, in recent years, it has been in the range of 800 to 1,600 spawners. Escapement to the Samish River ranged from 698 to 930 for 2000-06. The observed low landed catch of wild steelhead, the unquantified non-landed mortality associated with tribal and recreational fisheries, and the harvest at recent levels is not likely to elevate the risk of extinction for the Nooksack and Samish management units.

5.2.2. Skagit Management Unit

A fishery management plan for winter steelhead is prepared annually by the Swinomish Tribe, Sauk-Suiattle Tribe, Upper Skagit Indian Tribe, and the WDFW. Winter steelhead fisheries in the Skagit Management Unit are directed at hatchery winter steelhead released primarily from the WDFW Cascade River (Marblemount) Hatchery and into the Baker River. Returns from these hatchery plants predominate in the catch from approximately December through February (Figure 2). The Treaty commercial fishery is generally open from December 1 through mid-March, or mid-April.

Steelhead fishery planning considers the pre-season forecasts of terminal abundance of hatchery and wild steelhead. The magnitude of the fishery also considers escapement needs identified for the hatchery program, the harvest rate ceiling and floor escapement identified for the wild population, chum fishery objectives in the November and December period, and expected fishing effort and catch rates by all parties.

Steelhead management periods for tribal fisheries in Skagit Bay and each river reach in the MU are based on the freshwater entry timing steelhead. The generic winter steelhead management periods are:

- Skagit Bay Area 8 and Skagit River Area 1 (78C): November 29–April 14.
- Skagit River Area 2 (WDFW Area 78D-2): December 6–April 14.
- Skagit River Area 3 (WDFW Area 78D-3): December 6–April 14.
- Skagit River Area 4 (WDFW Area 78D-4): December 13–April 14.
- Skagit River Area 5 (WDFW Area 78D-5): January 3–April 14.

The recreational steelhead fishery is generally open from June 1 through March 15, with a February 29 closure in the Cascade River and Upper Sauk River. The steelhead retention limit during this period is two hatchery-origin fish over 20 inches and/or trout over 14 inches, per day except where noted in Appendix E. In addition, a provision for a recreational catch-and-release fishery in the Lower Sauk River and upper main stem Skagit River is generally open March 16–April 30 if forecasted wild abundance is sufficient.

Preseason forecasts of hatchery run size are generated each year by multiplying an age-specific average hatchery smolt return rate by the corresponding hatchery smolt plant. Wild forecasts are generated from age-specific recruitment (returns/spawner) rates, or, when age-specific return data from the previous year are available, by using a sibling forecast. The time periods used in computing these return rate averages are adjusted each

year to account for trends or apparent changes in survival rates. There are currently no usable in-season updates of run size abundance, though catch trends and hatchery rack return are monitored for hatchery return abundance.

Fisheries late in the management period may be adjusted or eliminated in-season in response to gross indicators of changes in wild or hatchery abundance. For example, the Cascade River was closed to recreational fishing for a period in January 2008 by emergency regulation in response to concern about achieving the escapement goal for the Marblemount Hatchery, and the March 16–April 30, 2008 catch-and-release season was not scheduled to take place in response to a low wild steelhead forecast.

There are no directed recreational or tribal fisheries for summer-timed steelhead in this MU. No summer-timed steelhead hatchery programs operate in the Skagit River. Freshwater recreational fisheries in the summer and fall time periods in this MU are directed at trout and/or salmon, but also allow retention of stray hatchery steelhead. The recreational fishery open areas, opening/closing dates, and retention rules for trout and steelhead in this MU during the summer steelhead accounting period in 2008 are summarized in Table 29. The structure of these regulations reflects management and conservation needs of steelhead, trout, and salmon populations located in the MU. Tribal fishers may take summer-timed steelhead incidentally to other species while conducting salmon-directed fisheries, though low numbers of summer-timed steelhead encounters have been reported historically.

Harvest Guidelines

The escapement objective for hatchery steelhead is sufficient adults to achieve a smolt release of 229,000. These spawners are currently collected at Marblemount Hatchery, and the Baker River Trap.

For wild steelhead, the management objective since 1994 has been to limit the catch of wild steelhead to less than 16% of the wild run size (the mean harvest rate observed from 1988-89 through 1993-94 seasons), in order to test the productive capacity of the Skagit, and identify more precisely the optimum wild steelhead spawning level in the Skagit (for a history of the escapement goals that have been used for Skagit steelhead, see Appendix D). Following a poor wild return in 2000, the parties agreed, before the 2000-01 season, to implement a floor escapement level below which fisheries directed at wild steelhead would not be opened. Since the 2000-01 season, this floor escapement has been set at 6,000 wild steelhead. This number is somewhat above the upper end of the range of MSY escapement levels that were calculated in 1991 by WDFW and NWIFC statisticians (range of MSY escapements was 2,600 to 4,800), and that were re-calculated in 2008, using additional brood years, at 3,200 to 3,800 (see "Risk Assessment" Appendix C). Thus, the maximum allowable catch of wild steelhead during the season is the greater of either the incidental catch incurred while harvesting hatchery steelhead and other species (which cannot exceed 16% of the wild run size), or the lesser of either the amount by which the run size exceeds the 6,000-fish floor, or 16% of the wild run size. In mathematical terms, this maximum allowable catch is calculated as:

$$C_{max} = \text{Min}(\text{WTRS} * 0.16, \text{Max}(C_{inc}, \text{Min}(\text{WTRS} - 6000, \text{WTRS} * 0.16)))$$

where C_{max} is the maximum allowable catch, C_{inc} is the number of wild winter steelhead harvested incidentally to fisheries directed at hatchery steelhead and other species, WTRS

is the wild terminal run size of Skagit steelhead, "Min" means "take the minimum of the quantities listed in the parentheses", and "Max" means "take the maximum of the quantities listed in the parentheses".

The floor escapement level, 6,000 wild steelhead, and the 16% harvest rate ceiling above that floor, are both interim values that may be revised as additional information becomes available.

If, during pre-season planning, escapement is projected to fall to or below 1,000 (LAT), the terminal management regime will be further constrained to reduce mortality of wild winter steelhead. The tribal commercial fishery would stop at the end of February. Tribal subsistence or ceremonial harvest would continue beyond that date, with one 12 hour opening per week to provide the Swinomish, Sauk-Suiattle, and Upper Skagit tribes with sufficient fish to serve their cultural and religious needs. The recreational fishery would be terminated in January.

Because of the uncertainty regarding the MSY escapement level for Skagit wild winter steelhead, and the lack of in-season data on recreational catch and run size, both the recreational and the tribal fisheries are managed according to fishing schedules that are set preseason. Schedules are adjusted during the season, if there are gross indicators of changes in run size, as described above, or in the event of conditions, such as floods, that prevent fishing during a particular week. The tribal schedule consists of a total of about 30 open days, fished at 1 to 3 days/week, starting from the beginning or middle of December. If the harvest rate on wild steelhead is expected to be less than 16%, then tribal fisheries generally extend into March and April. Adjustments to the schedules may occur in the event of conditions that prevent fishing during a particular week, such as floods.

Each season, tribal staff monitor landed catch, collect biological data, including scale samples for aging from commercial and take home catch, and sample the catch to determine its hatchery- and wild-origin composition. In addition, WDFW enlists recreational fishers to collect scale samples during the recreational fishery, and conducts spawner surveys to estimate the spawning escapement. After each season, using these data, the harvest rates and escapements are computed, and compared to the management objectives. If the objectives have not been achieved, adjustments to the schedules are made in subsequent years.

Recent terminal-area harvest rates for wild Skagit winter steelhead, derived from landed catch and escapement, have ranged from 0.6% to 9.5%, averaging 4.0% for the 2000-01 through 2008-09 (Table 12). During the period that the 16% harvest rate ceiling has been in effect, since 1994, that ceiling has not been exceeded.

Non-landed mortality in the Skagit recreational fishery is not quantified, but the fishery attracts relatively high participation. Net drop-out mortality is commonly estimated to be 2% of the landed catch in terminal-area salmon fisheries, though there are few studies to verify this estimate.

Table 12. Terminal harvest rates for Skagit wild winter steelhead, calculated from landed catch and escapement.

Year	Tribal Catch	Recreational Catch	Escapement	HR
2000-01	38	62	4,584	2.1%
2001-02	106	132	5,394	4.2%
2002-03	40	0	6,818	0.6%
2003-04	198	0	7,332	2.7%
2004-05	237	0	6,382	3.6%
2005-06	277	0	6,757	3.9%
2006-07	430	0	4,113	9.5%
2007-08	260	0	4,887	5.1%

[a] Tribal catch data provided by R. Bernard (Upper Skagit Indian Tribe)

Risk Assessment

Landed catch in the terminal-area fishery, spawning escapement, and age composition data have been collected for Skagit wild winter steelhead since the 1977-78 management year, though adequate escapement or age data are lacking for brood years 1991–1997. This information enabled reconstruction of cohort abundances, and fitting spawner-recruit functions to quantify productivity. Productivity functions may be used in multi-generation simulations of the long-term effects of different exploitation rates. Simulation output, (i.e. a time series of escapement), can be examined to determine the probability of escapement either falling to prescribed critical thresholds or exceeding viable thresholds.

Analysis of residuals in the spawner-recruit regression models for brood years 1978–2001 indicated a shift to lower survival after brood year 1985. The risk analysis utilized the more recent subset of cohort data, 1986–2001 (i.e. the spawner-recruit model was re-fit to the shorter set of data) assuming survival in the next 25 years would remain similar.

Spawner-recruit models were fit with and without marine survival variables. For Ricker models, the marine survival variable was the marine survival rate for corresponding hatchery release; for Beverton-Holt models an index of marine survival was derived as the ratio of hatchery brood year survival to median survival.

The analysis first derived upper and lower thresholds as benchmarks for assessing the risk of extinction and the potential for recovery. The upper threshold was either the recovery escapement, equivalent to less than 5% extinction risk over 100 years, or the escapement conforming to optimum productivity (i.e. MSY). The value of recovery escapement varies with harvest rate imposed. MSY escapement was estimated at 3,208, for the shorter data set, and 3,795, for the entire data set. The critical escapement level associated with demographic instability was estimated as 5% of the carrying capacity (Peterman 1977).

The RER was selected from 25-year simulations at a given harvest rate. Each iteration involved varying the spawner-recruit parameters, age composition, percent of repeat spawners, and management error around the target harvest rate. RERs from the various simulations were selected as the lower of the two brood year ERs that met the following criteria:

- 5% higher probability that escapement would fall to the critical escapement level

- 80% probability that escapement would exceed MSY escapement

The primary purpose of this analysis was to determine the risks associated with the Skagit management objective, i.e. harvest rate ceiling of 16%. Under all simulations conducted, this harvest rate achieved the conservation criteria.

The highest harvest rate that would achieve the conservation criteria varied from 28% to 40% in simulations that utilized the 1986–2001 (i.e. more recent) cohort data. The RER ranged from 39% to 45% in simulations that used the 1978–2001 cohort data. The Skagit risk analysis is described in more detail in Appendix C.

5.2.3 Stillaguamish/Snohomish Allocation Unit

A fishery management plan for winter and summer steelhead is prepared annually for this allocation unit by the Tulalip Tribes, Stillaguamish Tribe, and WDFW. Winter steelhead fisheries in the Stillaguamish-Snohomish allocation unit are currently directed mainly at hatchery-produced winter steelhead, with incidental impacts to wild steelhead management units in net fisheries accounted for. Hatchery and wild steelhead harvested in fisheries directed at chum salmon are also accounted for. Fisheries are planned using a model that predicts harvest from fishing effort and the pre-season forecasts of hatchery and wild steelhead. Steelhead stocks and management units within the Stillaguamish and Snohomish allocation unit are described below (Table 13).

Table 13. Steelhead stocks and management units within the Stillaguamish-Snohomish allocation unit.

Run	Management Unit	Component Stocks (WDF et al. 1993)
Winter	Stillaguamish natural winter	Stillaguamish winter
	Stillaguamish hatchery winter	Whitehorse Ponds Hatchery winter
	Snohomish natural winter	Snohomish/Skykomish winter
		Pilchuck winter
		Snoqualmie winter
	Snohomish hatchery winter	Tokul Creek hatchery winter
Summer	Stillaguamish natural summer	Deer Creek summer
		Canyon Creek summer
		South Fork Stillaguamish summer
	Stillaguamish hatchery summer	Reiter Ponds Hatchery summer
	Snohomish natural summer	North Fork Skykomish summer
		South Fork Skykomish summer
		Tolt summer

Constraints, summarized in Table 14, include ceiling terminal harvest rates for wild management units, broodstock escapement goals for hatchery programs, tribal: non-tribal allocation objectives, and intertribal allocation objectives, in that order of priority.

All tribal harvest of summer steelhead is currently incidental to fisheries directed at Chinook, coho, and pink salmon because the tribes have chosen to take their allocation of summer steelhead in the winter fishery, pursuant to court orders. Non-tribal recreational fisheries are directed at summer hatchery-origin steelhead. Impacts to wild summer

steelhead are not projected preseason, but the incidental harvest of summer steelhead in tribal fisheries is reported on fish tickets and is very low.

Table 14. Management strategies and harvest limits for management units comprising the Stillaguamish – Snohomish steelhead allocation unit.

Run	Management Unit	Management Strategy
Winter	Stillaguamish natural	Stepped Harvest Rate ceiling
	Stillaguamish hatchery	Escapement goal (150)
	Snohomish natural	Stepped harvest rate
	Snohomish hatchery	Escapement goal (up to 900)
Summer	Stillaguamish natural	Harvest rate ≤ 10%
	Stillaguamish hatchery	Harvest rate 100%
	Snohomish natural	Harvest rate ≤ 10%
	Snohomish hatchery	Escapement goal (600)

Regulatory Structure

Tribal commercial, subsistence and ceremonial steelhead fisheries are conducted in marine areas 8A, including the Snohomish River downstream of the I-5 bridge, and 8D. The rest of the Snohomish River system and all of the Stillaguamish River are currently closed to tribal fishing during the steelhead management period. Steelhead returning to both river systems commingle in Areas 8A and 8D, and these are broken out in the model typically using relative escapement proportions. Non-tribal commercial fishing is closed to steelhead in all areas, although there is some incidental harvest mortality.

The recreational fishery directed at winter steelhead is currently open from November 1 to February 28 in specified stream reaches, as described in Appendix E. Angling regulations in this time period are structured to allow harvest of trout, marked steelhead, and/or salmon. The daily retention limit during this period is two hatchery origin (marked) steelhead over 20 inches, and/or trout over 14 inches per day, except where noted in Appendix E. The areas and time periods open to the recreational fishery are adjusted and/or closed if in-season information (i.e. monitoring the hatchery escapement) suggests a shortfall in broodstock. There is currently no accounting for the mortality of unmarked wild steelhead caught and released in this fishery. Estimated catch-and-release mortalities are included in pre-season management plans.

Pursuant to court orders, the tribes have not opened fisheries directed at hatchery-produced summer steelhead, but rather choose to pursue their allocation of summer steelhead in the winter steelhead fishery. However, fisheries directed at Chinook, pink, or coho salmon incidentally harvest a small number of summer steelhead, which are reported and recorded on fish tickets.

Hatchery summer steelhead-directed recreational fisheries occur in these MUs on hatchery releases from Whitehorse Ponds (Stillaguamish River) and Reiter Ponds (Skykomish River), and off-station releases into the S.F. Stillaguamish River, Canyon Creek (S.F. Stillaguamish River), N.F. Skykomish River, Sultan River, Snoqualmie River, Tolt River, and Raging River. The recreational fishery open areas, opening/ closing dates and retention rules for trout and steelhead in these MUs during the summer steelhead accounting period in 2008 are summarized in Appendix E. Angling regulations

in this time period are structured to allow anglers to harvest trout, marked steelhead, and/or salmon. The structure of these regulations reflects management and conservation needs of the steelhead, trout, and salmon populations located in these MUs. The area(s) and time periods open to the recreational fishery are adjusted and/or closed if in-season information suggests the hatchery program may experience a shortfall in broodstock collection goals.

Harvest Guidelines
Management objectives are specified for winter and summer, natural and hatchery management units (Table 14).

Winter
For the Stillaguamish natural management unit, the terminal-area harvest rate will not exceed 10% on average over a five-year period. However, due to inherent uncertainties in forecasting and harvest rate estimation, annual pre-season estimates may place the estimated impacts within a range of 5% to 15%. Pending reanalysis of data and implementation of an effective habitat recovery program, fisheries will be managed as they have been in recent years, which have resulted in harvest rates on Stillaguamish wild winter steelhead of less than 5%, based on post-season data. Accurate assessment of Stillaguamish winter steelhead escapement is inhibited by poor visibility due to sediment from numerous landslides. These same slides likely affect productivity of the winter steelhead, resulting in the observed decline in the population. Therefore, the most important early action for the habitat recovery program will be implementing an effective stabilization program for the major slides in the Stillaguamish system. Stillaguamish winter steelhead have continued to decline over the 25 or more years that this work has been under discussion. If harvest management restrictions are to have any chance of contributing to the recovery of this management unit, a slide stabilization program must be initiated immediately.

Stepped harvest objectives keyed to specified low abundance and upper escapement thresholds are specified for the Stillaguamish and Snohomish natural winter management unit, based on forecasted terminal abundance.

Guidelines for the Stillaguamish MU:

- If escapement is forecast not to exceed 1,550, the terminal harvest rate will not exceed 5%
- If escapement is forecast to fall between 1,550 and 3,150, the terminal harvest rate will not exceed 10%
- If escapement is forecast to exceed 3,100, harvest will not exceed the greater of 50% of the excess plus 300 or a 10% terminal harvest rate.

Guidelines for the Snohomish MU:

- If escapement is forecast not to exceed 3,250, the terminal harvest rate will not exceed 5%
- If escapement is forecast to fall between 3,250 and 6,500, the terminal harvest rate will not exceed 10%
- If escapement is forecast to exceed 6,500, harvest will not exceed the greater of 50% of the excess plus 650 or a 10% terminal harvest rate.

The upper management thresholds for the Snohomish MUs (6,500) was derived from a set of recruitment functions based on parr production potential and estimates of rearing habitat area. The relatively high spawning escapement estimates observed in the late 1970s were assumed to optimally utilize available spawning and rearing habitat (Gibbons et al. 1985). The resulting estimate of optimal escapement (i.e. that would produce maximum sustainable harvest) is still accepted as a threshold to guide the stepped harvest regime described above, although an updated analysis to reflect more recent productivity and habitat condition, or an alternate method of quantifying current productivity, is needed.

Summer

The terminal harvest rate for Stillaguamish and Snohomish natural summer steelhead will not exceed 10%. Fisheries will be managed to achieve the hatchery escapement goal for Snohomish programs, but 100% of the hatchery returns to the Stillaguamish River will be subject to harvest.

Expected harvest

Since the 1999-2000 management season, terminal harvest rates estimated from landed catch and escapement of Snohomish wild winter steelhead ranged from 0.0% to 9.1% (Table 15). Harvest rates for Stillaguamish wild steelhead are uncertain because escapement is estimated only for index reaches. Non-landed harvest mortality in terminal fisheries is also insignificant. Hooking mortality in the recreational fishery has not been quantified, but is expected to be 1% or less based on assuming a 10% mortality rate of hooked-and-released fish, 10% of the wild run being vulnerable to harvest and 100% of the vulnerable wild fish actually encountered. Net dropout would be approximately 2% of the landed net catch, based on estimates for salmon fisheries.

Table 15. Terminal-area harvest rates calculated from landed catch and escapement of Snohomish wild winter steelhead.

Year	Escapement	Recreational Catch	Tribal Catch[b]	Harvest Rate
1999-00	2,822	184	100	9.1%
2000-01	3,122	118	18	4.2%
2001-02	2,234	114	79	8.0%
2002-03	3,188	0	0	0.0%
2003-04	5,608	0	28	0.5%
2004-05	3,842	0	21	0.6%
2005-06	5,444	0	100	1.9%
2006-07	N/A[a]	0	19	N/A
2007-08	N/A[a]	0	N/A	N/A

[a] Spawning escapement not estimated due to poor observation related to high water conditions.
[b] Wild components of tribal harvest in Areas 8A and 8D, from November to April, is approximated in Tables 15 and 16 in proportion to the estimated wild escapement for each MU as a fraction of aggregate hatchery and wild escapement, and sport catch.

Winter steelhead escapement can only be consistently monitored in index reaches in Deer Creek and other tributaries of the North Fork Stillaguamish (Table 16). System escapement may be approximated, for the purposes of estimating harvest rates, by reference to analysis of steelhead rearing habitat (P. Verhey, WDFW pers. comm.)

indicating the index reaches comprise approximately 25% of total habitat in the Stillaguamish system.

Table 16. Terminal-area harvest rates calculated from landed catch and escapement of Stillaguamish wild winter steelhead.

Year	Index Escapement	Recreational Catch	Tribal Catch
1999-00	463	71	65
2000-01	630	10	14
2001-02	354	23	50
2002-03	660	0	0
2003-04	740	0	15
2004-05	462	0	1
2005-06	676	0	25
2006-07	N/A	0	25
2007-08	306	0	N/A

The number of steelhead caught in tribal fisheries in Area 8A and 8A between May and October has ranged from 0 to 18 for 2000 – 2008.

Risk Assessment

PVA of Stillaguamish winter runsize abundance estimates concludes that the instantaneous rate of increase is significantly lower than zero (Table 8). Under the no harvest baseline, the Pr(QET, 25) was estimated to be 0, however, the 90% confidence interval (90% CI) was (0,1), indicating a very high degree of uncertainty around the estimates (Table 8). The Pr(QET, 25) associated with the ceiling of 15% harvest is 1, but the 90% CI of (0,1) indicates the high uncertainty in this estimate (Table 8). We conclude that the extinction risk associated with the harvest rate ceiling is not significantly different than the risk associated with no harvest.

PVA of Snohomish winter steelhead abundance estimates the instantaneous rate of increase is not significantly different than zero, (i.e. indicating demographic stability, albeit at abundance well below the current escapement goal, through the 20-year time series) (Table 8). For the no harvest baseline, the extinction risk was estimated at < 0.001 with a 90% CI of (0, 0.0271). Under the upper range of proposed harvest rates of 15%, the extinction risk is estimated at 0.003, with a 90% CI of (0, 0.138) (Table 8). We conclude that extinction risk is not significantly different at the harvest rate ceiling than under zero harvest.

5.2.4 Lake Washington Management Unit

Recreational or tribal fisheries directed at winter or summer steelhead do not occur in the Lake Washington terminal areas. No hatchery winter or summer steelhead releases currently occur in the MU. Recreational fishery regulations for this MU are summarized in Appendix E. They reflect the need for highly conservative management of fisheries to protect the severely depleted abundance of steelhead comprising this MU.

5.2.5 Green Management Unit

Tribal commercial net, ceremonial and subsistence (C&S) net and hook & line fisheries, and recreational fisheries, are managed to harvest hatchery-origin winter and summer steelhead. A fishery management plan for winter and summer steelhead is prepared annually by the Muckleshoot Indian Tribe (MIT), Suquamish Tribe, and WDFW.

Regulatory structure

Winter steelhead

The abundance of wild winter steelhead is forecasted, but not assessed in-season. Wild fishery impacts are estimated based upon the pre-season forecast. When the pre-season forecast run size is less than the escapement goal of 2,020 fish, no directed fisheries will take place. At current depressed abundance, management intent is to minimize incidental take of wild steelhead in recreational and tribal commercial net fisheries.

The tribal net fishery will typically open the first week of December (week 49) and remain open through the mid-February (week 8). Harvest of hatchery-origin winter steelhead occurs primarily between December 15 and January 15. Starting week 53/1 the fishery can be open between one to five days a week until mid-February (week 8). If the pre-season forecast for the wild winter run is below the escapement goal, the commercial net fishery has closed at the beginning of week 3. Harvest of hatchery-origin winter steelhead occurs primarily between December 1 (week 49) and January 15 (week 3).

Tribal commercial net fishery catches are used to calculate an in-season update (ISU) of the run size of hatchery winter steelhead, which has generally proven to be more accurate than pre-season forecasts. Under some conditions (i.e. low fishing effort or poor water conditions), the ISU is not reliable, so fisheries are managed based on the pre-season forecast. The ISU is based on catches from the first week of December (week 49) through week 52. During these four weeks the fishery includes one 30-hour opening and one 54-hour opening each week that are separated by a minimum of 24 hours. If the catch statistic falls inside the historical database, it will be used as an independent variable in one of three regression equations developed from the historical database to generate the hatchery ISU. If the catch statistic falls outside of the historical data, the co-managers will meet during week 53/1 to either agree to use an alternate up-date method, or to use the pre-season hatchery forecast.

Additionally, the Muckleshoot Tribe opens a ceremonial and subsistence hook & line fishery directed at hatchery winter steelhead and some years a targeted number (75) of wild winter steelhead. The fishery starts November 1 (week 45) and typically runs until April 1 (week 14). Fishing effort and catch levels are expected to remain very low.

The recreational fishery is open November 1 to February 15 or February 28. The lower sections of the river are closed first in mid-February to reduce incidental recreational fishery impacts on wild steelhead. The retention limit during this period is two hatchery-origin steelhead over 20 inches and/or trout over 14 inches per day except where noted in Appendix E. The areas and time periods open to the recreational fishery may be adjusted and/or closed if in-season information suggests the hatchery program may experience a shortfall in brood-stock collection goals.

Summer steelhead

There are directed recreational fisheries for summer steelhead in the Green/Duwamish River to harvest hatchery-origin summer steelhead that originate from the Soos Creek Hatchery, the Icy Creek rearing pond, and the Palmer Ponds.

Retention of marked steelhead is allowed under general game fish regulations (i.e. two per day, larger than 20 inches) in June – November depending upon river reach. Retention of unmarked summer steelhead by recreational angers is allowed in the Green River during the summer steelhead management period (July – November). This regulation targets natural-origin summer steelhead that originated from hatchery releases of the Skamania stock. These summer steelhead are not listed. The month of June is only open for the retention of marked steelhead to protect late timed wild winter steelhead. Recreational regulations allow retention of one wild steelhead per angler per year, which may be caught in either the Green River, or in ten other rivers in the western Strait of Juan de Fuca and the Washington coast outside of the Puget Sound DPS. Recreational fishery regulations are summarized in Appendix E. Angling regulations are structured to allow anglers to harvest trout, steelhead, and/or salmon.

Harvest Guidelines

A terminal harvest rate ceiling of 10% is established for wild Green River winter steelhead, associated with catch in tribal and recreational fisheries. This highly constrained management regime will remain in effect when the terminal abundance of wild steelhead is forecasted not to exceed 500. Since management year 2002-03, this harvest rate, which does not include the various sources of non-landed mortality, ranged from 0.7% to 5.7% (Table 17). Terminal harvest rates were higher in some previous years, related to more abundant hatchery returns, higher effort, and less restrictive regulations.

Table 17. Harvest, spawning escapement, and harvest rates for Green River wild, winter steelhead, 1999-00 through 2007-08.

Year	Tribal Catch	Recreational Catch	Escapement	Harvest Rate
1999 - 00	288	222	1,754	22.5%
2000 - 01	270	122	1,440	21.4%
2001 - 02	137	122	1,112	18.9%
2002 - 03	48	12	1,673	3.4%
2003 - 04	10	8	2,399	0.7%
2004 - 05	69	11	1,318	5.7%
2005 - 06	71	4	1,975	3.7%
2006 - 07	84	0	1,473	5.4%
2007 - 08	18	12	854	3.4%

Creel survey data collected in 1986 – 1991 indicate that the recreational fishery, through February, encountered an average of 18% of the wild winter steelhead run. Assuming hooking mortality of 10%, the recreational fishery impact would be approximately 1% - 2%. Encounter rates in more recent years are lower, because of lower fishing effort under current regulations.

There is uncertainty about total fishing mortality, which includes non-landed mortality in tribal commercial net, C&S net and C&S hook & line fisheries, and recreational angling. The total terminal harvest rate in the Green River is expected remain in the recently observed range, providing that abundance also remains similar.

Risk Assessment

The terminal run size of wild winter steelhead in the Green River has ranged from about 900 to 2,400 in the last five years (2003-04 to 2007-08), indicating demographic stability at relatively low abundance.

PVA indicates a non-significant declining growth rate for Green River wild steelhead (μ = -0.017, SE = 0.018; Table 8). The risk of extinction is near zero (i.e., < 0.001%) for the zero-harvest baseline and the harvest rate ceiling of 10%. These extinction risk estimates also have narrow 90% CIs (Appendix B). We conclude that terminal harvest rates up to 10% will not increase extinction risk, relative to the zero-harvest baseline.

The recovery of Green River steelhead is constrained by degraded spawning and rearing habitat in the basin, particularly in the upper tributaries. The realistic objective for harvest managers is to maintain the stability of the population until the habitat limiting factors are addressed.

5.2.6. White Management Unit

Wild White River winter steelhead are subject to low incidental mortality in terminal fisheries as they migrate through the lower Puyallup River and White River. The wild population has been supplemented by a hatchery program utilizing local broodstock since brood year 2006. There is no hatchery production of early-timed winter steelhead.

Regulatory structure

The Muckleshoot Indian Tribe opens a ceremonial and subsistence net fishery in the White River from September 1 through January 15. The White River is subsequently open to C&S fishing for spring Chinook, starting as early as May 1 and finishing as late as July 31. MIT conducts a C&S hook & line fishery, stipulating non-retention of wild steelhead and juvenile fish, year round on the White River, from its mouth upstream to the Highway 410 Bridge. The MIT also opens C&S fisheries in a small portion of the Puyallup River, from the Meridian Street Bridge to the confluence of the White River. A small number of wild steelhead has been caught in these fisheries, in January through May.

The Puyallup Tribe conducts a C&S fishery for spring Chinook in the Puyallup River mainstem for five days in early June. The Puyallup tribal chum salmon fishery in the Puyallup River will operate under a fixed fishing schedule for 24 fishing days, from the first week of November through December (statistical weeks 46 through 53). The fishery occurs in the Puyallup River from the mouth upstream to the confluence with the White River. Ninety percent of the fishing effort occurs from the mouth of the Puyallup River upstream to the confluence with Clark's Creek (river mile 5.8). The tribal chum fishery involves incidental harvest of wild winter steelhead originating in the White and Puyallup systems. Tribal spring Chinook fisheries involve a small incidental harvest of steelhead (i.e. kelts or late-migrating wild steelhead), but in recent years no steelhead have been caught.

The lower White (Stuck) River (from the confluence with the Puyallup to Auburn) is open to recreational fishing under game fish regulations. From November through February, two hatchery steelhead over 20 inches may be retained per day. The reach from Auburn to Buckley is open for the month of October, and the reach upstream of Bridge Camp is open from July through October for whitefish, and November through January under general game fish regulations. Recreational fisheries on the Puyallup and White rivers are and have been managed for the release of all wild steelhead since 1999.

Harvest Guidelines

When the forecasted abundance of wild White River steelhead is 500 or less, terminal-area fisheries will be managed so as not to exceed a harvest rate of 10%. A less-constrained terminal management regime will not be implemented until forecasting capability improves, current productivity and survival are better quantified, and escapement and recovery goals are developed.

Terminal harvest rates for White River steelhead, derived from landed catch in tribal and recreational fisheries, have ranged from 0.0% to 4.4% in the last five years (Table 18). Tribal catch estimates provide the total Muckleshoot tribal catch in the White River and Puyallup tribal catch in the Puyallup mainstem, allocated to the White in proportion to annual escapement. Additional non-landed mortality, (i.e. hooking mortality and net drop-out) are not quantifiable, but are likely of lower magnitude than landed catch.

Table 18. Terminal area harvest rates for White River wild winter steelhead, derived from landed catch in tribal and recreational fisheries, 1999-00 through 2007-08.

Year	Tribal[a]	Recreational	Escapement	Harvest Rate
1999-00	15	5	598	3.2%
2000-01	14	7	570	3.6%
2001-02	5	3	614	1.3%
2002-03	5	0	309	1.6%
2003-04	10	0	338	2.9%
2004-05	11	0	238	4.4%
2005-06	0	0	325	0.0%
2006-07	0	0	327	0.0%
2007-08	0	0	254	0.0%

[a] Tribal harvest data include hatchery-origin and wild steelhead

Risk Assessment

PVA indicates that wild steelhead escapement to the White River is declining; the estimated growth rate (μ = -0.060; SE = 0.028) is significantly negative ($P < 0.10$). At the no harvest baseline, the extinction risk [Pr(QET, 25)] for the White River is 0.444 with an associated 90% CI of (0.015, 0.964), indicating the high uncertainty in this estimate (Appendix B). Extinction risk associated with the harvest rate ceiling of 10% is estimated at 0.820, with a 90% confidence interval from 0.163 to 0.999. We conclude that the extinction risk is not significantly increased under a 10% harvest rate.

The co-managers recognize that declining status of White River steelhead requires highly conservative harvest management. Mortality of juveniles and kelts as they pass downstream through Mud Mountain Dam must be rectified. The recent substantial increases in salmon escapements to the White River watershed suggest the potential for

improved steelhead production over the next 25 years. The co-managers initiated a small-scale, integrated hatchery program to determine if abundance can be supplemented. The recently implemented wild-stock hatchery supplementation program is anticipated to contribute to stability and recovery in the White River.

5.2.7 Puyallup Management Unit

The Puyallup management unit includes winter steelhead stocks originating in the Puyallup and Carbon rivers, and their tributaries. We assume these stocks comprise a single population. The White River population comprises a separate management unit. A fishery management plan for fall chum and winter steelhead fisheries is prepared annually by the Puyallup Tribe and WDFW.

Regulatory structure
Fisheries are planned based upon the pre-season forecasts of wild and Voight's Creek Hatchery steelhead, plus hatchery and wild fall chum salmon, and expected fishing effort and catch.

The Puyallup Tribe does not conduct winter steelhead-directed fisheries in the Puyallup River, but incidental steelhead mortality occurs during the fall chum fishery. The Puyallup tribal fall chum fishery in the Puyallup River is expected to operate under a fixed fishing schedule for 24 fishing days during the period from the first week of November through December (statistical weeks 46 through 53). The schedules may be modified in season due to unfishable conditions or chum conservation.

The winter steelhead-directed recreational fishery in the Puyallup River is open from November 1 to February 28. The retention limit during this period is two hatchery-origin steelhead over 20 inches, and/or trout over 14 inches per day except where noted in Appendix E-3A. Time-area closures may be implemented in the recreational fishery in a given year to meet local hatchery broodstock requirements.

The Puyallup Tribe also conducts a C&S fishery for spring Chinook in the Puyallup River mainstem for five days in early June. The Muckleshoot Indian Tribe (MIT) opens a C&S net fishery in a small section of the Puyallup River from September 1 through January 15. They also open a C&S net fishery for spring Chinook, starting as early as May 1 and finishing as late as July 31. Tribal spring Chinook fisheries involve a small incidental harvest of steelhead (i.e. kelts or late-migrating wild steelhead), but in recent years no steelhead have been encountered.

There are no directed recreational or tribal fisheries for summer steelhead in this MU. No hatchery summer steelhead releases currently occur in the MU. Freshwater stream recreational fisheries in the summer and fall time periods in this MU are directed at trout and/or salmon, but also allow retention of stray hatchery steelhead. The recreational fishery opens to trout and other game fish on July 1. Opening/closing dates and retention rules for trout and steelhead in this MU during the summer steelhead accounting period in 2009 are summarized in Appendix E-3A.

Harvest Guidelines
When the forecasted abundance of wild Puyallup River steelhead is 500 or less, terminal-area fisheries will be managed so as not to exceed a harvest rate of 10%. A less-

constrained terminal management regime will not be implemented until forecasting capability improves, current productivity and survival are better quantified, and escapement and recovery goals are developed.

Terminal-area harvest rates, calculated from landed net and recreational catch, have ranged from 0% to 15.5% since the 1999-00 management year. The average harvest rate for this 9-year period has been 3.5% (Table 19). These harvest rates are probably biased, due to several factors. Total escapement is underestimated. Non-landed mortality, including hooking mortality in the recreational fishery and net drop-out, is not accurately estimated. Therefore, for the duration of this harvest plan, total terminal harvest rates are expected to be in the range of 5-15%.

Table 19. Landed winter steelhead catch and harvest rates for Puyallup wild winter steelhead, 1999-2000 to 2007-08.

Year	Tribal catch[a]	Recreational catch[b]	Escapement	Terminal Harvest Rate
1999-00	6	6	651	1.8%
2000-01	16	4	477	4.0%
2001-02	47	13	326	15.5%
2002-03	15	0	287	5.0%
2003-04	10	0	501	2.0%
2004-05	0	0	162	0.0%
2005-06	3	0	462	0.6%
2006-07	8	0	509	1.6%
2007-08	5	0	401	1.2%

[a] Tribal catch - data via M. Scharpf, WDFW, M. M. Mahovlich, Muckleshoot Indian Tribe, and C. Phinney Puyallup Tribe pers. comm..
[b] Recreational catch from WDFW, October 12, 2009; 1961-62 to 2008-09 CRC estimates.

Risk Assessment

Estimates of the terminal abundance (only index escapement) of Puyallup wild winter steelhead, including escapement to the Puyallup mainstem and the Carbon River, has ranged from approximately 162 to 509 for 2003-08. These estimates exclude non-landed fishing mortality, and several other components of total abundance. Despite a long term declining trend, demographic stability at relatively low abundance is apparent.

Based on combined terminal run size for the mainstem Puyallup and Carbon rivers, the estimated instantaneous rate of increase ($\hat{\mu}$), is -0.0875 (SE = 0.0093), and is significantly different than zero ($P < 0.10$; Table 8). For the no harvest baseline, the estimated probability of extinction is 0.967, with a 90% CI of 0.568 to 1.00. For a harvest rate of 10%, the estimated extinction probability is 0.997, with a 90% CI of 0.874 to 1.0. We conclude that harvest up to 10% will not increase extinction risk significantly.

5.2.8 Nisqually Management Unit

Regulatory structure

Fisheries in the Nisqually River are directed at harvesting surplus Chinook, coho, and winter chum salmon. Wild winter steelhead abundance is not currently sufficient to enable directed fisheries. Fisheries directed at winter steelhead will not occur until their productivity is quantified, escapement and recovery goals developed, and abundance is

projected to exceed the escapement goal. Hatchery enhancement of steelhead fisheries was discontinued. Hatchery-origin summer steelhead were last released into the Nisqually River in 1994; the last adults from this brood returned in 1996-97. Winter steelhead were last released in 1982.

The tribal net fishery directed at wild winter chum salmon involves incidental harvest of wild winter steelhead. This fishery, in most years, is open from management week 48 (late November), through the third week of January 21.

Recreational fishing is allowed through management week 5 (the end of January) in years when harvestable winter chum are forecasted to return. Recreational anglers are required to release all unmarked (wild) winter steelhead without removing the fish from the water. The harvest of trout by recreational anglers is limited to the lower river July 1st through November 30th. Daily limit is two fish greater than 14". Recreational fishing above the military tank crossing bridge at river mile 16 is limited to catch and release only from July 1st through October 31st. Retention of two hatchery-origin steelhead per day is permitted in the upper river. Anglers fishing above the military tank crossing are limited to daylight fishing with artificial lures with a single barbless hook and no bait or scent.

Harvest Guidelines

Fisheries in the Nisqually River will be managed so that the terminal harvest rate will not exceed 15%. Estimates of the harvest rate for management years 2004-05 through 2007-08, associated with landed catch in the tribal net fishery, and accounting zero landed catch of wild fish in the recreational fishery, have ranged from 3% to 6% (Table 20).

Harvest rates for these years generally reflected a tribal fishery that closed week 3 except for 2005-06, when the fishery operated six days in week 3 and one day in week 4.

Additional, non-landed mortality associated with recreational fishing and net "drop-out" in the tribal fishery, is not quantified. The low abundance of wild steelhead in the river during December and January, as indicated by low harvest during tribal fishery, suggests that hooking mortality is low in the recreational fishery.

Estimates of total terminal harvest rate are influenced by several sources of uncertainty. Winter steelhead escapement estimates are, in many years, influenced by flow and visibility conditions that prevent accurate surveys, with the effect of underestimating actual escapement. Escapement is estimated from redd counts in the Nisqually River mainstem, the Mashel River, the Little Mashel River, and Ohop Creek. The escapement estimation method was changed in 2004, and includes verification of aerial survey data with ground surveys. The recent estimates still likely underestimate total spawning escapement. Non-landed mortality in tribal and recreational fisheries is not quantified.

Table 20. Terminal harvest rate on wild steelhead in the Nisqually River, 2004-05 through 2007-08.

Year	Tribal Catch	Recreational Catch	Escapement	Harvest Rate
2004-05	8	0	225	3.4%
2005-06	25	0	909	2.7%
2006-07	29	0	471	5.8%
2007-08	27	0	747	3.5%

Risk Assessment
The terminal run size of wild steelhead in the Nisqually has ranged from 200 to 900 in the last four years. For the no harvest baseline the PVA estimates indicates the extinction risk to be 0.086 with an associated 90% CI of 0.000 to 0.660) (Table 8).

After adjusting the growth rate parameter for recent harvest, the extinction risk Pr(QET, 25) associated with the harvest rate ceiling of 15% is estimated at 0.292, with associated 90% confidence interval of 0.004 to 0.906 (Table 8). We conclude that extinction risk associated with the harvest rate ceiling is not significantly different than under the zero harvest scenario.

5.2.9 East Kitsap and South Sound Tributaries

There is no hatchery enhancement of winter or summer steelhead in these streams, and no recreational or tribal fisheries directed at winter or summer steelhead occur in this area. Commercial net fisheries in this area operate in marine waters, and are directed at Chinook, coho, or chum salmon. This area is made up of relatively small, independent lowland drainages along the east side of the Kitsap Peninsula, extending south to include streams entering Colvos Passage, Case Inlet, and Carr Inlet, and streams draining into Pickering Passage.

Freshwater recreational angling during the steelhead catch accounting period (November through April) is only allowed in the Deschutes River and Kennedy Creek, as summarized in Appendix E. Freshwater recreational fisheries in the summer and fall time periods in this area are directed at trout and/or salmon, and reflect their conservation requirements, but may also allow retention of stray hatchery steelhead.

5.2.10 Skokomish, East Hood Canal and West Hood Canal Management Units

The co-managers have established management guidelines for the steelhead resources in streams of Hood Canal, originating in WRIA 14, WRIA 15, WRIA 16, and WRIA 17 and found in marine waters of Hood Canal (Marine Areas 9A, 12, 12A, 12B, 12C, 12D, 12H). In Hood Canal, three MUs have been defined for winter run steelhead. No Management Units have been defined for summer run steelhead because indigenous, self-sustaining populations have not been identified.

Winter steelhead MUs may include the production from one or more closely related Hood Canal watersheds. The Skokomish Management Unit includes what is believed to be a single population in the Skokomish River and its tributaries. Streams in the West Hood Canal Management Unit include the Hamma Hamma, Duckabush, Dosewallips, and Big and Little Quilcene rivers and several independent streams. Streams in the East Hood Canal Management Unit include the Union, Tahuya, and Dewatto rivers and several smaller independent streams. We recognize the need to preserve the diversity and spatial distribution of steelhead in the rivers comprising the East and West Hood Canal MUs.

Regulatory structure
Hatchery programs utilizing Chambers Creek winter steelhead and Skamania summer steelhead were discontinued, with the last hatchery summer-run smolts released in 1981 and the last hatchery winter-run smolts released in 2004. A multi-agency study, led by

the NMFS, is investigating the feasibility and effectiveness of hatchery supplementation in Hood Canal, using native wild winter steelhead broodstock, and involving adult captive rearing and smolt production techniques. A successful pilot study was done in the Hamma Hamma River beginning in 1998; its last releases occurred in 2008. New supplementation programs were implemented in each Hood Canal MU beginning in 2007 with adult releases and smolt releases planned for the South Fork Skokomish, Duckabush, and Dewatto rivers. This study is planned to continue for 15 years. This Plan applies the same principles to conserving adult production associated with these hatchery programs as are applied to listed steelhead populations.

Tribal subsistence fisheries in recent years have been opened in the Skokomish, Hamma Hamma, Dosewallips, Duckabush, Big Quilcene, Dewatto, Tahuya, and Union rivers. The current status of the stocks does not support commercial fisheries in Hood Canal rivers. A tribal commercial and subsistence fishery for steelhead is opened in Port Gamble Bay (Marine Area 9A), but no landings have occurred in recent years.

All non-treaty recreational fisheries in Hood Canal rivers are closed during the winter steelhead season. Regulations for marine recreational fisheries in Hood Canal forbid retention of wild (unmarked) steelhead. The recreational fishing season will remain closed during the winter to protect adult steelhead from harvest and during the spring to protect steelhead kelts, smolts, and juveniles from harvest. The season is open from June 1 through October 31 for game fish and wild (unmarked) steelhead, and release regulations are in effect during this period in all freshwater and marine areas. Some incidental harvest of steelhead may occur during non-treaty recreational as well as commercial net fisheries directed at harvesting other species of salmon in Hood Canal streams and in marine areas of Puget Sound (including Hood Canal).

Harvest Guidelines

Terminal area fisheries will be managed so as not to exceed a harvest rate of 10% for each of the three Hood Canal MUs. Low Abundance Thresholds of 250 are established for the West Hood Canal and East Hood Canal MUs. No LAT was established for the Skokomish MU, because a change in escapement estimation methods, beginning in 2006, did not provide a suitable database to develop and implement this threshold. LATs are set at double the theoretical critical abundance for the East Hood Canal and West Hood Canal MUs. The LATs provide a broad protection buffer within which harvest will remain very low and further reduce the risk that abundance will fall to the critical level.

Cautious management is further warranted by uncertainty about the information that managers use to forecast abundance and plan fisheries. Spawning escapement estimates are based on surveys of index reaches, and are therefore lower than actual spawner census. Index reaches are believed to comprise a substantial majority of suitable spawning habitat, but high flow and turbidity add uncertainty to survey data in some years, particularly in the South Fork Skokomish and Dosewallips. Spawning survey coverage in the Skokomish system has recently expanded, introducing a discontinuity in the escapement time series, but improving recent estimates. Forecasts would ideally be based on cohort abundance (i.e., the age structure of annual harvest and escapement); until these data accumulate, forecasts will be limited to averages of recent years' returns, with attention to any observed change in abundance. Quantification of total mortality associated with the very low landed catch in recent years is also inexact.

Should wild steelhead abundance increase and exceed the Low Abundance Thresholds, a less-constraining harvest regime will not be implemented for any MU until productivity is better quantified, escapement goals based on current habitat function are developed, and recovery goals defined. We expect that more accurate information on steelhead abundance, age structure, and freshwater survival will emerge from the aforementioned supplementation study, and as salmon and steelhead restoration is implemented pursuant to the Settlement Agreement with the City of Tacoma regarding operation of the Cushman hydroelectric project in the Skokomish watershed.

Since the 1999-2000 season, for Treaty and non-treaty fisheries combined, the estimated terminal harvest rates of winter steelhead have ranged annually from 0% to 3.1% on the Skokomish Management Unit, from 0% to 9.1% on the West Hood Canal Management Unit, and have been 0% in the East Hood Canal Management Unit (Table 21, Table 22, and Table 23). These estimated impacts are based on available winter wild steelhead index spawning escapement estimates, the reported catch from tribal fisheries, and the estimated recreational catch of unmarked (wild) steelhead derived from Catch Record Cards. Additionally, in Hood Canal terminal marine areas, there were no reported steelhead harvests during the 1999-2000 through 2007-08 seasons.

Table 21. Terminal area harvest rates calculated from landed catch and escapement of wild winter steelhead in the Skokomish Management Unit, 1999-2000 through 2007-08 seasons.

Year	Escapement	Recreational Catch	Tribal Catch	Harvest Rate
1999-00	261	2	0	0.8%
2000-01	286	0	0	0%
2001-02	156[a]	0	0	0%
2002-03	132[a]	0	0	0%
2003-04	233	0	0	0%
2004-05	No estimate	0	0	N/A
2005-06	231	0	0	0%
2006-07	405	0	4	1.0%
2007-08	285[a]	0	9	3.1%

[a] Minimum estimate.

Table 22. Terminal area harvest rates calculated from landed catch and escapement of wild winter steelhead in the West Hood Canal Management Unit, 1999-2000 through 2007-08 seasons.

Year	Escapement[a]	Recreational Catch	Tribal Catch	Harvest Rate
1999-00	148	0	0	0%
2000-01	118	8	0	6.3%
2001-02	328	33	0	9.1%
2002-03	254	0	0	0%
2003-04	279	0	0	0%
2004-05	142	0	0	0%
2005-06	167	0	0	0%
2006-07	263	0	0	0%
2007-08	299	0	0	0%

[a] Escapement numbers represent index counts from variable combinations of Hamma Hamma, Duckabush, Dosewallips, and Quilcene rivers. See Table 39 for details.

Table 23. Terminal area harvest rates calculated from landed catch and escapement of wild winter steelhead in the East Hood Canal Management Unit, 1999-2000 through 2007-08 seasons.

Year	Escapement[a]	Recreational Catch	Tribal Catch	Harvest Rate
1999-00	264	0	0	0%
2000-01	225	0	0	0%
2001-02	176	0	0	0%
2002-03	121	0	0	0%
2003-04	265	0	0	0%
2004-05	137	0	0	0%
2005-06	322	0	0	0%
2006-07	224	0	0	0%
2007-08	209	0	0	0%

[a] Escapement numbers represent index counts from variable combinations of Union, Tahuya, and Dewatto rivers. See Table 40 for details.

Risk assessment

For each Hood Canal MU, the actual extinction risk may be lower than indicated by the lower bound analysis because (1) the instantaneous rate of growth estimated by the PVA is insensitive to density dependence, and (2) escapements in Hood Canal MUs are likely under-estimated for many streams because index areas are surveyed and no expansions are made for un-surveyed areas in these streams, escapement estimates are not available for numerous small independent streams or small tributaries to mainstem rivers, and spawning surveys typically begin in March and may not fully account for earlier wild spawners.

The current fisheries regime is established with the expectation that potential impacts are not likely to exceed 10% of the winter steelhead terminal run size of each Hood Canal MU. Therefore, the PVA analyses and results for Hood Canal focus on the effect of estimated relative impacts of 0% and 10% harvest rates.

Skokomish Management Unit

Index spawner escapement estimates ranged from 370 to 1,444 wild winter steelhead during the 1984-85 through 1994-95 seasons and from 231 to 405 during 1997-98 through 2007-08 seasons (Table 21 and Table 38). Despite a declining trend in escapements between these two periods, demographic stability at relatively low abundance is apparent within each period. In addition, a new integrated conservation (supplementation) program, using indigenous stocks, was implemented beginning with brood year 2007 in the South Fork Skokomish River and is expected to contribute to the stability and recovery of the Skokomish MU.

The estimated instantaneous rate of increase, of -0.051 (SE 0.016) is significantly different than zero (p=0.10). After adjusting the growth rate (μ) for harvest the probability of extinction is 0.190 (90% CI = 0.001, 0.850) under the zero harvest baseline. Extinction risk under a 10% harvest rate is not significantly different, estimated at 0.905 (90% CI = 0.289 to 1.00). Given the conservative aspects of PVA, we conclude that harvest rates up to 10% will not significantly increase the risk of extinction.

West Hood Canal Management Unit
Index spawner escapement estimates since the 1998-99 season have ranged from 118 to 328 wild steelhead (Table 22 and Table 39), indicating demographic stability at relatively low abundance. The estimated instantaneous rate of increase (0.0039, not significantly different than zero) further indicates relative escapement stability. Additionally, a new integrated conservation (supplementation) program, using indigenous stocks, was implemented beginning with brood year 2007 in the Duckabush River and it is expected to contribute to the stability and recovery of the West Hood Canal MU.

The probabilities of index escapement reaching the quasi-extinction threshold of 63 in the next 25 years were 0.349 (CI = 0 to 0.990) and 0.487 (CI = 0 to 0.998) under the zero harvest and 10% harvest rate, respectively. We conclude that harvest rates up to 10% will not significantly increase the risk of extinction.

East Hood Canal Management Unit
Index spawner escapement estimates since the 1984-85 season have ranged from 95 to 420 wild winter steelhead for Union, Tahuya, and Dewatto rivers combined (Table 23 and Table 40). The estimated instantaneous rate of increase, of 0.010 (SE = 0.017) is not significantly different than zero and indicates demographic stability at relatively low escapements. In addition, the hatchery supplementation program implemented beginning with brood year 2007 in the Dewatto River is expected to contribute to the stability and recovery of the East Hood Canal MU.

Using the aggregate escapement to the Dewatto and Tahuya rivers, the PVA estimated the probability of extinction (QET = 63) in the next 25 years was zero under the zero harvest scenario. The probability of extinction under a harvest rate of 10% was estimated at 0.020 (90% CI = 0 to 0.331). Given the conservative aspects of PVA, we conclude that harvest rates up to 10% will not significantly increase the risk of extinction.

5.2.11 Strait of Juan de Fuca Management Units

The co-managers have designated four management units (MU) for the purposes of planning winter steelhead harvest in the Strait of Juan de Fuca region – Elwha (Elwha River), Port Angeles (Morse, Siebert, and McDonald creeks), Dungeness (Dungeness and Gray Wolf rivers), and Sequim-Port Townsend (Jimmycomelately, Salmon, Snow, and Chimacum creeks). Fishery management plans are developed annually for these management units by the Lower Elwha Klallam Tribe, the Jamestown S'Klallam Tribe, the Port Gamble S'Klallam Tribe, the Point No Point Treaty Council, and WDFW. Hatchery-origin winter steelhead are currently released only into the Dungeness and Elwha rivers.

Following the termination of hatchery releases of summer steelhead in this region, there is no current evidence of indigenous self-sustaining summer steelhead populations in any of the four MUs. Recreational fisheries in these streams during the summer and early fall time periods (summer steelhead accounting period) in these MUs are directed at trout and/or other salmon species, but also allow the retention of any marked (stray hatchery) steelhead.

Regulatory structure

Sequim - Port Townsend Management Unit

There are no tribal fisheries in the streams comprising this MU. The lower reach of Chimacum Creek, up to Ness's Corner Road, is open to recreational fishing under general game fish regulations (i.e. minimum size of 14 inches, daily bag limit 2) from June through August; the upper reach is open from June through October. Snow Creek and Salmon Creek are closed to fishing year-round. Jimmycomelately Creek is open under general game fish regulations from June through August. Encounters with wild winter steelhead are expected to occur rarely under these regulations.

Dungeness River Management Unit

Winter steelhead fisheries in the Dungeness River are directed on hatchery-origin fish from the Dungeness Hatchery. Tribal steelhead fisheries, for commercial, subsistence and ceremonial purposes, are normally open for up to four and a half days per week from the second week of December through February in Area 6D (Dungeness Bay) and in the Dungeness River. Tribal regulations permit use of nets and hook-and-line gear. Tribal fishing is excluded within a 1500-foot radius at the mouth of the Dungeness River. The tribal hook-and-line subsistence fishery in the river is open from December through mid-March, under a daily bag limit of 2 fish.

The recreational fishery in the Dungeness River is open from mid-October through February, from the mouth upstream to the Dungeness Forks Campground. Game fish regulations state the daily bag limit of two fish over 14 inches, composed of marked (hatchery origin) steelhead, sea run cutthroat, or resident trout. The Gray Wolf River is closed to recreational fishing from November through early June.

Port Angeles Management Unit

Tribal steelhead fisheries are currently limited to hook-and-line commercial and subsistence harvest opportunity in Morse Creek, from early December through February. Tribal commercial net fisheries are not anticipated to occur, but may be opened under emergency regulation. Other streams in this unit are closed during the winter steelhead accounting period.

Retention of hatchery (i.e., marked) steelhead is permitted in the recreational fishery, under a two fish daily bag limit. Morse Creek, where all steelhead harvest in this MU occurs, is open from December through February. Other streams in this management unit are closed during the winter steelhead accounting period and are only open under WDFW general game fish regulations from June through October.

Elwha River Management Unit

Steelhead fisheries in the Elwha River are directed at winter steelhead produced at the Elwha Hatchery. The tribal commercial fishery is open from early December to late February. The tribal subsistence fishery extends through mid-March. Tribal regulations allow use of net and hook-and-line gear. The daily bag limit for tribal hook-and-line commercial fishing is four steelhead per day; subsistence harvest is limited to two per day.

The recreational fishery, in the reach from mouth to the Alder Lake (Elwha) Dam, is open from October through February, with a daily bag limit of two fish over 14 inches, limited to marked (hatchery) steelhead, trout, and other game fish.

In the Elwha River, natural winter steelhead production has been confined to the reach below Elwha Dam, where habitat conditions constrain spawning success and rearing survival. Recovery is contingent upon implementation of the Elwha River recovery plan, which entails removal of the Elwha and Glines Canyon dams and restoration of access to the upper river. A conservation hatchery program is operating to maintain a gene bank for the wild stock, and provide supplementation after access to the upper river is restored.

Expected Harvest

Insufficient information is available to forecast wild winter steelhead abundance, establish spawning escapement targets, or to quantify steelhead harvest rates. Run timing information suggests that closure of fisheries after the end of February reduces incidental harvest of wild steelhead to a level that does not increase the risk of extinction or impede recovery.

Estimates of total natural spawning escapement in recent years are not available for the Dungeness or Elwha rivers. Index reach counts provide abundance trend information for some independent streams, such as Morse Creek. A lengthy time series of total escapement has been collected in Snow Creek, at the WDFW research station.

The estimated tribal winter steelhead harvest, in the Dungeness River and Dungeness Bay, has ranged from 0 to 67 in the last five years (Table 24). The estimated recreational harvest in the Dungeness River has ranged from 23 to 46 during the same period. Recreational regulations require the release of unmarked (wild) steelhead, and both recreational and treaty fisheries close at the end of February, well before the peak of wild steelhead entry.

Wild steelhead return timing to the small independent streams in the Eastern Strait of Juan de Fuca is typified by data collected at the Snow Creek trap. Figure 8 shows the average monthly percentage of the wild adult steelhead run returning to the Snow Creek trap from 1978 to 1994.

Table 24. Recreational and tribal harvest of hatchery and wild winter steelhead in the Dungeness River and Dungeness Bay, 1998-99 through 2007-08.

Year	Recreational	Tribal
1998-99	79	0
1999-00	51	0
2000-01	44	2
2001-02	200	26
2002-03	41	3
2003-04	46	0
2004-05	24	33
2005-06	32	1
2006-07	38	67
2007-08	23	14

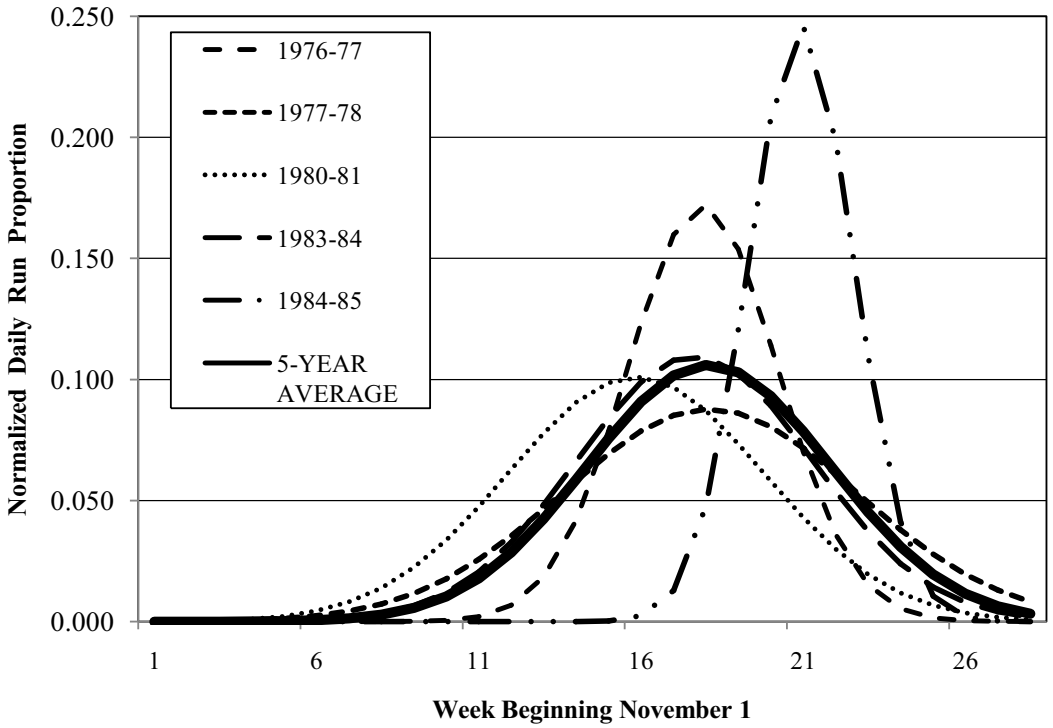

Figure 8. Wild adult steelhead run timing to Snow Creek, 1976-77 to 1984-85 (Randy Cooper, WDFW pers. comm.).

More than 90% of the tribal fishing effort occurs from statistical week 50 through week 7. Snow Creek run timing suggests that freshwater entry of wild winter steelhead in these management units does not build significantly until February, so current Elwha River fisheries should not involve significant incidental harvest of wild steelhead until the final three weeks. Tribal catch monitoring data from previous years (1982 - 1996) suggest that wild steelhead comprise approximately 6% of the catch. During these years the tribal fishery extended into March. Total tribal steelhead catch has ranged from 173 to 296 for the preceding five management years (2003-04 through 2007-08; Table 25), so an estimated 10 to 18 wild steelhead have been harvested annually by the tribal commercial fishery in the Elwha River. This approach overestimates the impacts on wild steelhead, because, in recent years, the tribal fishery is completed by the end of February.

The recreational fishery in the Elwha River closes at the end of February to reduce encounters with wild steelhead, and regulations require release of wild (unmarked) steelhead. Most encounters with wild steelhead would be expected to occur in February, when the wild steelhead begin returning in increasing numbers, but hooking mortality is not quantified.

Table 25. Return abundance of hatchery winter steelhead, and recreational and tribal steelhead harvest in the Elwha River, 1998-99 to 2007-08.

Year	Hatchery Return	Recreational harvest	Tribal harvest
1998-99	576	132	660
1999-00	133	375	295
2000-01	100	802	194
2001-02	258	344	230
2002-03	324	179	137
2003-04	106	172	230
2004-05	290	428	196
2005-06	184	403	216
2006-07	243	127	296
2007-08	147	53	173

6. Monitoring and Adaptive Management

For the duration of the Plan, annual accounting of landed catch and estimation of spawning escapement will provide the basic information needed to monitor population abundance trends and assess management performance against the harvest objectives (harvest rate ceilings and abundance thresholds) described in Chapter 5. Catch and escapement sampling to describe the age structure of populations will be key to developing analyses needed for improving the basis management, e.g. improving forecasting capability, quantifying recruitment, and developing escapement goals.

6.1 Performance Indicators

Performance indicators are identified as relevant to assessing achievement of management objectives identified in Section 2.1 and 5.2.

Performance indicators for stock status include estimates of spawning escapement and/or terminal run size, trend in abundance, age composition, productivity, and spawning distribution. Monitoring landed catch and non-landed mortality contribute to assessing annual and brood-year abundance; combined with spawning escapement will enable estimation of terminal harvest rates. Monitoring abundance requires differentiating the presence of hatchery-origin and wild steelhead in catch and escapement.

6.2 Spawning Escapement

Winter steelhead escapement surveys have been conducted on many river systems in Puget Sound since the 1970s. In general, surveys to enumerate redds and/or fish are conducted on foot, or by floating stream sections, or by fixed-wing or helicopter aerial surveys, bi-weekly from March through June (Table 26). In some systems surveys of index reaches comprise a functional census of suitable spawning areas. Index reach data may be combined or expanded to estimate system total escapement. In some systems the relationship between the index area and total escapement is unknown. High flow and turbidity typical of the spawning season often preclude following the regular survey schedule, or may confound interpretation of the data.

Estimates of wild winter steelhead escapement are based on counts of redds after March 15th. This convention is intended to exclude from the estimates any natural spawning hatchery-origin winter steelhead. Some wild steelhead spawn prior to, and some hatchery-origin steelhead spawn later than March 15th. Natural spawning of hatchery steelhead is not estimated.

Escapement is also monitored at the Buckley Trap in White River below Mud Mountain Dam, and at research weirs in Big Beef Creek and Snow Creek.

Escapement surveys are not currently conducted in the Elwha River drainage, but surveys to monitor spawner abundance and distribution in the main stem, Indian Creek, and Little River will be implemented subsequent to removal of the Elwha River dams in 2012 (McHenry and Pess 2008).

Table 26. Spawning escapement survey reaches for wild winter steelhead in Puget Sound.

Management Unit	Estimate Type	Surveyed Index Reaches
Nooksack	Index	North - Middle Fork and tributaries – aerial South Fork – not surveyed Tributaries to Middle, South and North forks
Samish	System	Samish RM 9.8 – 20.9 Friday Creek RM 0.0 – 4.3 Silver, Bear, Thunder Creeks
Skagit	System	Mainstem RM 22.0 – 94.0 Alder, Diobsud, Rocky, O'Toole, Cumberland, Day, Sorenson, Hansen and Jones Creeks Mainstem Sauk to RM 41.0, South Fork Sauk to RM 2.0 White, Dan, Murphy, and Falls Creeks Cascade R. and its tributaries
Stillaguamish	Index	North Fork RM 14.3 – 34.4 Pilchuck, Jim, Canyon, Squire Creeks, South Fork tributaries
Snohomish	System	Mainstem Snohomish R. RM 16.0 to SF Skykomish RM 51.5 Wallace R. RM 0.0 – 5.8; Sultan R. RM 0.0 – 15.0 Proctor, Elwell/Youngs, Woods, Olney, & Salmon Creeks
Green	System	Mainstem Green RM 26.0 – 60.0 Indices in Soos, Newaukum (12 RM), Covington, Jenkins
White	System	Buckley trap count @ RM 24 Lower White R. & tributaries surveyed
Puyallup	System	Mainstem RM 10.0 – 47.0 aerial Neisson, Ladout, Kellogg, Fennel, Canyon Falls, Fox, and Kapowsin Creeks Carbon RM 0.0 – 24.0; South Prairie Creek RM 0.0 – 12.6; Voight Creek
Nisqually	Index	Mainstem RM 2.4 – 42.4 aerial; Mashel River RM 0.0 – 10.6; with Little Mashel and Ohop Creek
Skokomish	System	Mainstem to RM 9; North Fork RM 9 – 13.3, with McTaggert Creek; South Fork to RM 23.5, with Vance, Brown, LeBar, and Church creeks.
East Hood Canal	Index	Dewatto to RM 5.8; Tahuya RM 1.0 – 11.0; Union RM 0.3 – 4.0
West Hood Canal	Index	Hamma Hamma RM 0.3 – 2.1 with Johns Creek; Dosewallips RM 0.3 -11; Duckabush to RM 6, with Hatchery Creek; Little Quilcene to RM – 5.4
Sequim – Port Townsend	Index	Snow Creek weir + redd count below trap (Jimmycomelately, Johnson Creeks, Gierin Creek not surveyed)
Dungeness	Index	Surveys irregular, frequent poor survey conditions
Port Angeles	Index	Morse Cr to RM 4.7, surveys irregular, frequent poor survey conditions; McDonald Cr to RM 5.4
Elwha		Not surveyed

6.3 Fisheries Monitoring

Landed catch in tribal net fisheries is sampled to assess hatchery: wild composition. Scales are collected from wild (unmarked) steelhead, and where substantial landed catch occurs (e.g., Skagit River, Stillaguamish – Snohomish terminal area, Green River) are

sufficient to estimate age composition. The trap and weirs mentioned above provide the best opportunity for biological sampling throughout the duration of the wild run. In a few rivers (e.g. Skagit), hook-and-line sampling has supplemented scale collection. Escapement surveys generally afford limited access to live or dead steelhead, but sampling is conducted opportunistically.

Tribal commercial steelhead sales, and fish taken for ceremonial and subsistence purposes, are recorded on fish receiving tickets (i.e. sales receipts) by the buyer, and compiled into a database jointly maintained by the tribes and WDFW. These data, combined with sampling of terminal-area catch composition (i.e., marked and unmarked proportions), provide the basis for monitoring land catch steelhead in tribal fisheries.

WDFW regulations require each license holder to record landed steelhead catch on Catch Record Cards (CRC). Landed catch in freshwater and marine catch is estimated for each management year (April thru March) from a subsample of CRCs. Estimates of landed catch are adjusted down to account for non-response bias, because successful anglers are more likely to return their CRCs (Alexandersdottir et al. 1994). The bias adjustment for 2000-01 large freshwater streams (streams with 20 or more fish reported on CRCs) is 1.2 (Eric Kraig, pers. comm., WDFW). There is no bias adjustment for catch estimates for small freshwater streams (streams less than 20 fish reported in CRCs).

6.3.1 Estimating non-landed mortality in recreational fisheries

In 2008, WDFW initiated a study of steelhead hooking mortality in the Samish River. This project consists of four components: 1) estimating the immediate mortality of adults captured and released; 2) estimating the post-release mortality of adults that survive immediate capture; 3) tracking movement and migration patterns of adults that survive immediate capture; and 4) estimating the encounter rate of clipped and unclipped adult steelhead in the non-treaty recreational fishery through creel surveys (Ashbrook et.al. in prep).

For the first three components, study fish will be captured with hook-and-line gear, receive a surgically implanted radio tag, and are released back into the river. Their survival will be compared with a control group of steelhead collected at the Samish Hatchery fish ladder or captured in fish traps. Morphometric data and a tissue sample for genetic analysis will be collected at time of capture. Telemetry using fixed and mobile receivers will track the fish as they migrate upriver during the spawning period and return downstream. With tags lasting approximately four years, returning adults are also documented. Preliminary results indicate that all hooked fish survive and spawn, but the proportion of hooked fish that out-migrate is significantly less than for controls.

WDFW has conducted creel surveys on the Nooksack, Skagit, Skykomish, and Carbon rivers, to estimate non-landed mortality of wild Chinook and summer steelhead encounters. Published studies estimate the hooking mortality for steelhead to be range from five to ten percent depending on water temperature (Bendock and Alexandersdottir 1993; Rawding 2000b; Schroeder et al. 1999). Contingent on the availability of funding, WDFW will implement further studies to estimate encounters rates with wild steelhead, and hooking mortality.

6.4 Annual Performance Assessment

The effectiveness of management in achieving the objectives and guidelines stated in this Plan will be evaluated annually. The annual report will compile observed landed catch by tribal fisheries in each terminal area, and a summary of Puget Sound pre-terminal area incidental landings, for the preceding management year. Landed catch in freshwater recreational fisheries will be reported by management unit, after a one-year time lag needed for Catch Record Card analysis. Annual, pre-season management agreements for individual management units will be appended to this report. Significant deviations from the pre-season agreement will be described and evaluated. Natural spawning escapement of winter steelhead will be reported by management unit. Catch and escapement data will enable estimation of terminal harvest rates associated with landed catch for comparison with harvest rate ceilings specified by this Plan. The annual report may also summarize age composition of catch and escapement of wild steelhead, and results of other fisheries or escapement monitoring. The annual report will be completed by November 30th of each year.

6.5 Data Gaps

Steelhead harvest management objectives should be based on the abundance and productivity of populations in each management unit. Quantifying the natural productivity of a population provides direct measure of habitat function, and provides a basis for setting escapement and harvest rate objectives. Conventionally, this assessment involves cohort reconstruction, based on natural spawning escapement, estimates of total fisheries-related mortality, and maturation rates (i.e. age composition of adult spawners). The incidence of repeat-spawning must be factored in. Spawner-recruit pairs from each brood year may be fit to a recruitment function, from which estimates of MSY and equilibrium escapement, and capacity, can be directly calculated. The recruitment function can then be used to simulate population dynamics, to assess the effects of a range of harvest rates. Other approaches to quantifying productivity may be evaluated, including the use of habitat-based modeling of production potential, and quantifying smolt production in some systems suited to deployment of floating traps or weirs, or new telemetry technology, as metrics of freshwater and/or early marine survival.

Currently, productivity has only been quantified for the Skagit winter steelhead stock. The Skagit productivity function will be periodically updated, if monitoring indicates productivity has changed significantly, so that harvest objectives continue to reflect population status.

Contingent on funding support, we intend to collect the data required to complete productivity analysis for additional populations of Puget Sound winter steelhead. These time and resource-intensive efforts will focus on a subset of populations representative of the spectrum of abundance and risk status. More intensive catch and escapement sampling to characterize maturation rates and repeat-spawning incidence will be required, as will surveys and studies to estimate non-landed mortality in fisheries. Fisheries-related mortality outside of terminal areas in Puget Sound will likely remain unquantified, due to the complexity of accurately estimating and determining the stock composition of catch.

Productivity assessment may also contribute to broader and improved understanding of harvest risk assessment. Procedures such as those described for the Skagit management unit in Chapter 5.1, involving forward simulation of population dynamics under different harvest regimes, can provide improved resolution of extinction risk and likelihood of recovery associated with incremental change in harvest rates.

Conserving life history diversity and spatial distribution should be addressed as monitoring programs are expanded. This implies developing methods to detect changes in spawning distribution and rearing habitat utilization.

6.6 Enforcement

The WDFW Fish & Wildlife Enforcement Division enforces regulations enacted by the Fish and Wildlife Commission for non-treaty commercial and recreational fishing regulations. These officers may assist city, county, other state, and tribal law enforcement agencies, and cooperate with the U.S. Fish and Wildlife Service, NMFS Enforcement branch, and the U.S. Coast Guard in fisheries enforcement.

Certain recreational fisheries may be assigned high priority for enforcement, and more intensively monitored. Officers are assigned to work during open fishing days and restricted periods, and conduct additional checks during closed periods. Officers carry out bank and boat patrols to check and assist anglers. Covert surveillance may also be conducted where reports of violations have been received.

Each tribe enforces commercial, subsistence, and ceremonial regulations for its on- and off-reservation fisheries. Where tribes fish in common areas, their enforcement officers can be cross-deputized, and may cooperate with state and federal fisheries enforcement agencies. Violations of tribal regulations involve fines or prosecution by tribal justice agencies.

6.7 Outreach and Education

WDFW consults recreational angler organizations, such as their Steelhead and Cutthroat Policy Advisory Group, and other interested citizens through Fish and Wildlife Commission hearings. In these forums, WDFW considers proposals for changes in recreational angling regulations, and discusses their rationale for annual regulations decisions. This process builds credibility for conservative fishing regulations and is intended to demonstrate the conservative effect of steelhead fishing regulations, and improve compliance.

Tribal fisheries management agencies develop fisheries regimes under the oversight of their tribal Councils or fisheries committees. For many tribes harvest opportunity is currently limited to harvest of a relatively small number of steelhead that are used for subsistence or ceremonial purposes. Tribal fishers or their representatives participate in tribal decision-making, and are briefed by tribal management staff on the conservation measures, such as those incorporated in this Plan. Interactions among tribal fishers and management staff ensure that tribal fishing regulations are practicable and enforceable.

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Appendix A. Puget Sound Steelhead DPS Runsize Reconstruction

Table 27. Nooksack Management Unit (includes Mainstem, North Fork, Middle Fork, and South Fork Nooksack River; Chuckanut Creek; Dakota Creek; Squalicum Creek; and Whatcom Creek).

Return	Sport Harvest[a] (1 Nov-30 Apr)			Tribal Harvest[a] (1 Nov-30 Apr)			Escapement[b,c]			Total Runsize			Smolt ~May Release
Year (N)	Hatchery	Wild	H&W Total	Hatchery	Wild	H&W Total	Hatchery	Wild	H&W Total	Hatchery	Wild	H&W Total	Return N+2
1984/85			2223	1,102	115	1,217							143,377
1985/86			802	1,260	131	1,391							110,081
1986/87	687	40	727	856	89	945							123,831
1987/88	499	22	521	931	475	1,406							130,971
1988/89	522	32	554			1,142							117,045
1989/90	132	18	150			206							109,411
1990/91	92	12	104			152							100,045
1991/92	368	13	381			16							55,010
1992/93	195	11	206			5							47,446
1993/94	64	30	94			1							81,788
1994/95	118	6	124			38							70,479
1995/96	171	20	191			68							75,977
1996/97	120	19	139			31							89,325
1997/98	55	10	65			6							43,302
1998/99	108	27	135			5							63,850
1999/00	62	5	67			NA							33,900
2000/01	313	96	409			37	*18*						35,000
2001/02	432	10	442			7	*193*						30,500
2002/03	252	0	252			22	*7*						34,800
2003/04	202	0	202			6	*73*	*1,592*	*1,665*				160,000
2004/05	491	0	491			19	*376*						175,500
2005/06	262	0	262			8							63,400
2006/07	222	0	222			13							165,000
2007/08	163	0	163			88							160,000
2008/09													160,000

[a] Catch Record Card data from 2003/04 to present are preliminary and subject to change as data are verified. Tribal harvest is also being reviewed.

[b] Total number of adults trapped (from WDFW Final Hatchery Escapement Report) only. Therefore, total hatchery runsize components such as fish that spawn or die below the hatchery, fish that are recycled or released to the stream and become trapped again, or fish that pass the trap undetected have not been accounted for.

[c] Escapement estimates (in italics) are for Nooksack River only, does not include escapement to Chuckanut, Dakota, Squalicum, or Whatcom creeks.

Table 28. Samish Management Unit – Samish River Winter-run Steelhead.

Return Year (N)	Sport Harvest[a] (1 Nov-30 Apr)			Tribal Harvest (1 Nov-30 Apr)			Escapement			Total Runsize			Smolt ~May Release Return N+2
	Hatchery	Wild	H&W Total	Hatchery	Wild	H&W Total	Hatchery	Wild	H&W Total	Hatchery	Wild	H&W Total	
1984/85			1,411			87		1,052					45,138
1985/86			750			422							30,075
1986/87	415	168	583			57		836					27,770
1987/88	226	78	304			167		606					29,904
1988/89	188	95	283			3		244					40,881
1989/90	89	43	132			0		106					39,019
1990/91	48	15	63			0							50,050
1991/92	427	38	465			0							13,920
1992/93	149	21	170			0							27,000
1993/94	55	11	66			0		941					19,632
1994/95	65	0	65			0		918					6,588
1995/96	47	12	59			0		797					39,357
1996/97	68	14	82			0							31,213
1997/98	13	0	13			0		586					22,924
1998/99	55	0	55			0		617					47,906
1999/00	28	60	88			0		698					12,117
2000/01	36	8	44			0		881					25,000
2001/02	54	31	85			0		859					30,000
2002/03	18	0	18			0		915					30,000
2003/04	35	0	35			0		930					0
2004/05	14	0	14			0		592					35,092
2005/06	30	2	32					791					35,212
2006/07	35	0	35					494					40,444
2007/08	16	0	16					432					0
2008/09								434					0

[a] Catch Record Card data from 2003/04 to present are preliminary and subject to change as data are verified.

Table 29. Skagit Management Unit – Skagit System Winter-run Steelhead (includes Baker, Cascade, Sauk, Skagit, and Suiattle rivers).

Return Year (N)	Sport Harvest[a,b] (1 Nov-30 Apr)			Tribal Harvest[b] (1 Nov-30 Apr)			Escapement[c,d]			Total Runsize			Smolt ~May Release Return N+2
	Hatchery	Wild	H&W Total	Hatchery	Wild	H&W Total	Hatchery	Wild	H&W Total	Hatchery	Wild	H&W Total	
1984/85	4,793	1,435	6,228	4,690	283	4,973	3,702	8,603	12,305	13,185	10,321	23,506	258,257
1985/86	2,525	1,916	4,441	4,706	255	4,961	1,339	11,098	12,437	8,570	13,269	21,839	336,417
1986/87	1,690	1,851	3,541	3,691	449	4,140	964	8,305	9,269	6,345	10,605	16,950	298,357
1987/88	2,206	1,922	4,128	4,191	661	4,852	1,195	13,194	14,389	7,592	15,777	23,369	136,096
1988/89	1,230	1,892	3,122	2,981	612	3,593	779	11,854	12,633	4,990	14,358	19,348	244,552
1989/90	1,283	1,351	2,634	3,186	219	3,405	840	10,017	10,857	5,309	11,587	16,896	334,284
1990/91	141	637	778	1,682	455	2,137	339	5,818	6,157	2,162	6,910	9,072	214,717
1991/92	976	51	1,027	2,272	69	2,341	611	7,514	8,125	3,834	7,651	11,485	288,968
1992/93	1,721	1,318	3,039	816	50	866	460	6,900	7,360	2,997		2,997	209,944
1993/94	600	1,052	1,652	176	46	222	143	6,412	6,555	919	7,510	8,429	409,017
1994/95	987	561	1,548	952	260	1,212	496	7,656	8,152	2,435	8,477	10,912	447,336
1995/96	1,025	470	1,495	976	23	999	392			2,393			416,206
1996/97	1,839	1,609	3,448	97	62	159	347			2,283			401,243
1997/98	347	49	396	32	45	77	449	7,448	7,897	828	7,542	8,370	349,510
1998/99	561	1,030	1,591	185	91	276	262	7,870	8,132	1,008	8,991	9,999	592,471
1999/00	497	361	858	178	46	224	96	3,780	3,876	771	4,187	4,958	445,434
2000/01	1,572	53	1,625	69	38	107	290	4,584	4,874	1,931	4,675	6,606	501,221
2001/02	2,860	128	2,988	184	106	290	427	5,394	5,821	3,471	5,628	9,099	463,460
2002/03	467	0	467	25	40	65	113	6,818	6,931	605	6,858	7,463	421,213
2003/04	936	0	936	126	198	324	392	7,332	7,724	1,454	7,530	8,984	513,330
2004/05	740	0	740	483	237	720	358	6,382	6,740	1,581	6,619	8,200	529,821
2005/06	782	0	782	95	277	372	283	6,757	7,040	1,160	7,034	8,194	466,100
2006/07	1,241	0	1,241	868	430	1,298	307	4,113	4,420	2,416	4,543	6,959	517,000
2007/08	1,372	0	1,372	347	260	607		4,887			5,147		511,600
2008/09								*2,502*					

[a] Catch Record Card data from 2003/04 to present are preliminary and subject to change as data are verified.
[b] Catch numbers are under review. Catch into June may be considered winter steelhead. One stock management is being discussed. Subject to Technical Review Team population determination.
[c] Preliminary estimate, final review by co-managers and state has not occurred. The final estimate may change slightly.
[d] 1995-2007: Source is Adult Tickets database for trapped less released for Marblemount Hatchery and Barnaby Slough.

Table 30. Stillaguamish Management Unit – Stillaguamish System Winter-run Steelhead (includes Mainstem, North Fork, and South Fork Stillaguamish River and Pilchuck and Canyon creeks).

Return	Sport Harvest[a] (1 Nov-30 Apr)			Tribal Harvest (1 Nov-30 Apr)			Escapement[b,c]			Total Runsize			Smolt ~May Release
Year (N)	Hatchery	Wild	H&W Total	Hatchery	Wild	H&W Total	Hatchery	Wild	H&W Total	Hatchery	Wild	H&W Total	Return N+2
1984/85			3285			4,614		*1,542*					109,977
1985/86			3028			4,052		*2,226*					114,618
1986/87	1,834	636	2,470			4,558		*1,892*					117,408
1987/88	1,848	640	2,488			3,407		*1,222*					128,798
1988/89	1,432	432	1,864			2,329		*1,718*					116,120
1989/90	755	250	1,005			2,247							145,227
1990/91	331	194	525			720		*950*					19,894
1991/92	1,463	319	1,782			1,547							137,991
1992/93	2,371	639	3,010			1,507		*1,178*					106,818
1993/94	798	545	1,343			203		*1,118*					172,242
1994/95	1,399	481	1,880			171		*1,556*					147,142
1995/96	694	169	863			0	210	*1,094*					135,467
1996/97	608	160	768			25	138						164,619
1997/98	190	24	214			0	94	*1,185*					119,466
1998/99	752	184	936			0	288	*917*					180,716
1999/00	1,207	71	1,278			0	188	*463*					117,833
2000/01	1,070	10	1,080			0	91	*630*					106,712
2001/02	1,404	23	1,427			0	410	*354*					140,356
2002/03	536	0	536			0	65	*660*					138,616
2003/04	512	0	512			0	188	*740*					171,957
2004/05	733	0	733			0	300	*462*					144,801
2005/06	625	0	625			0	373	*676*					152,427
2006/07	852	0	852										148,760
2007/08	521	0	521					*306*					153,900
2008/09								*120*					

[a] Catch Record Card data from 2003/04 to present are preliminary and subject to change as data are verified.
[b] Total number of adults trapped (from WDFW Final Hatchery Escapement Report) only. Therefore, total hatchery runsize components such as fish that spawn or die below the hatchery, or pass the trap undetected have not been accounted for.
[c] Data are counts from index areas, do not reflect wild escapement to the entire system.

Table 31. Snohomish Management unit – Snohomish System Winter-run Steelhead (includes Pilchuck, Raging, Skykomish, Snohomish, Snoqualmie, Sultan, Tolt, and Wallace rivers and Tokul, Purdy, and Woods creeks).

Return	Sport Harvest[a] (1 Nov-30 Apr)			Tribal Harvest[b] (1 Nov-30 Apr)			Escapement[c,d]			Total Runsize			Smolt ~May Release
Year (N)	Hatchery	Wild	H&W Total	Hatchery	Wild	H&W Total	Hatchery	Wild	H&W Total	Hatchery	Wild	H&W Total	Return N+2
1984/85			11,106	10,997	622	11,619	4,392	6,536	10,928			33,653	326,432
1985/86			9,204	7,886	765	8,651	404	7,790	8,194			26,049	359,910
1986/87	9,397	1,190	10,587	9,764	630	10,394		7,464			9,284		361,870
1987/88	10,142	2,479	12,621	5,362	979	6,341	330	7,744	8,074	15,834	11,202	27,036	230,056
1988/89	6,060	2,187	8,247	1,825	493	2,318	601	7,078	7,679	8,486	9,758	18,244	439,956
1989/90	6,349	1,888	8,237	3,705	197	3,902	700	5,498	6,198	10,754	7,583	18,337	424,911
1990/91	4,663	835	5,498	873	225	1,098	644	5,936	6,580	6,180	6,996	13,176	351,722
1991/92	10,254	1,205	11,459	1,913	35	1,948	955	8,588	9,543	13,122	9,828	22,950	347,600
1992/93	10,556	1,364	11,920	832	39	871	1,002			12,390			349,606
1993/94	5,299	411	5,710	79	6	85	688	6,992	7,680	6,066	7,409	13,475	441,519
1994/95	7,726	213	7,939	296	19	315	1,253	7,722	8,975	9,275	7,954	17,229	341,834
1995/96	5,250	397	5,647	235	17	252	1,257			6,742			288,619
1996/97	3,018	319	3,337	218	23	241	813			4,049			414,926
1997/98	2,072	100	2,172	55	3	58	536	5,250	5,786	2,663	5,353	8,016	206,290
1998/99	4,307	1,063	5,370	146	36	182	816	6,371	7,187	5,269	7,470	12,739	479,402
1999/00	3,959	184	4,143	212	165	377	403	2,822	3,225	4,574	3,171	7,745	473,550
2000/01	4,360	118	4,478	34	32	66	483	3,122	3,605	4,877	3,272	8,149	402,239
2001/02	8,642	114	8,756	416	129	545	1,148	2,234	3,382	10,206	2,477	12,683	407,616
2002/03	2,420	0	2,420	0	0	0	458	3,188	3,646	2,878	3,188	6,066	418,618
2003/04	6,845	0	6,845	44	42	86	1,362	5,608	6,970	8,251	5,650	13,901	428,208
2004/05	7,993	0	7,993	51	30	81	748	3,842	4,590	8,792	3,872	12,664	448,016
2005/06	3,943	0	3,943	107	149	256	907	5,444	6,351	4,957	5,593	10,550	429,560
2006/07	4,315	0	4,315										442,113
2007/08	3,969	0	3,969	42	12	54							456,400
2008/09													

[a] Catch Record Card data from 2003/04 to present are preliminary and subject to change as data are verified.
[b] 1999/2000 to 2007/08 hatchery/wild harvest breakout from Tulalip Tribe distribution method, December 2009.
[c] Total number of adults trapped (from WDFW Final Hatchery Escapement Report) only. Therefore, total hatchery runsize components such as fish that spawn or die below the hatchery, or pass the hatchery have not been accounted for.
[d] 1989 - 1991 all females

Table 32. Lake Washington Management Unit – Lake Washington System Winter-run Steelhead.

Return Year (N)	Sport Harvest[a] (1 Nov-30 Apr)			Tribal Harvest (1 Nov-30 Apr)			Sea Lion Predation[b]	Escapement			Total Runsize			Smolt ~May Release Return N+2
	Hatchery	Wild	H&W Total	Hatchery	Wild	H&W Total		Hatchery	Wild	H&W Total	Hatchery	Wild	H&W + sea lion Total	
1984/85			1,136	823	241	1,064	1,500	536	474	1,010			4,710	62,898
1985/86			759	813	116	929	329	90	1,816	1,906			3,923	66,376
1986/87	609	158	767	1,071	398	1,469	1,254		1,172					55,283
1987/88	198	34	232	299	238	537	1,178		858					75,200
1988/89	2	2	4	0	0	0	1,287		686					66,498
1989/90	130	0	130	41	22	63	1,065		714					48,928
1990/91	39	2	41	0	0	0	899		621					48,625
1991/92	73	8	81	0	0	0	*		599					37,940
1992/93	56	13	69	0	0	0	*		184					0
1993/94	0	3	3	0	0	0	6		70					29,771
1994/95	6	0	6	0	0	0	11		126					0
1995/96	12	4	16	0	0	0	0		234					0
1996/97	6	2	8	0	0	0	0		620					0
1997/98	0	0	0	0	0	0	0		584					yearling
1998/99	9	0	9	0	0	0	0		220					0
1999/00	2	0	2	0	0	0	0		48					12,350
2000/01	12	51	63	0	0	0	0		42					14,330
2001/02	0	0	0	0	0	0	*		38					0
2002/03	3	0	3	0	0	0	*		20					0
2003/04	6	0	6	0	0	0	*		44					0
2004/05	0	0	0	0	0	0	*		22					0
2005/06	0	0	0	0	0	0	*		32					0
2006/07	0	0	0	0	0	0	*		8					0
2007/08	5	0	5	0	0	0	*		4					0
2008/09														

[a] Catch Record Card data from 2003/04 to present are preliminary and subject to change as data are verified.
[b] "*" indicates predation not monitored. Only occasional sea lion sightings since 2001/02.

Table 33. Green Management Unit – Green (Duwamish) River Winter-run Steelhead.

Return Year (N)	Sport Harvest[a] (1 Nov-30 Apr)			Tribal Harvest (1 Nov-30 Apr)			Escapement[b]						Total Runsize			Smolt ~May Release Return N+2
	Hatchery	Wild	H&W Total	Hatchery	Wild	H&W Total	Hatchery	Wild to Basin	Above Howard Hansen	Wild Broodstock	Total Wild	H&W Total	Hatchery	Wild	H&W Total	
1984/85	6,914	306	7,220	5,631	448	6,079	1,674	2,286	0	42	2,328	4,002	14,219	3,082	17,301	221,066
1985/86	4,839	568	5,407	6,349	118	6,467	497	2,778	0	36	2,814	3,311	11,685	3,500	15,185	275,546
1986/87	4,191	802	4,993	6,036	500	6,536	158	1,685	0	34	1,719	1,877	10,385	3,021	13,406	244,183
1987/88	1,745	556	2,301	4,826	340	5,166	178	2,378	0	47	2,425	2,603	6,749	3,321	10,070	140,035
1988/89	1,411	882	2,293	1,183	188	1,371	199	1,916	0	20	1,936	2,135	2,793	3,006	5,799	183,366
1989/90	1,580	1,094	2,674	1,099	207	1,306	222	1,484	0	37	1,521	1,743	2,901	2,822	5,723	230,274
1990/91	923	155	1,078	849	251	1,100	130	944	0	19	963	1,093	1,902	1,369	3,271	225,841
1991/92	1,187	116	1,303	1,642	186	1,828	168	1,868	74	41	1,983	2,151	2,997	2,285	5,282	212,392
1992/93	1,057	127	1,184	993	131	1,124	149	1,702	20	35	1,757	1,906	2,199	2,015	4,214	137,193
1993/94	783	79	862	504	143	647	110	1,782	39	51	1,872	1,982	1,397	2,094	3,491	197,354
1994/95	1,631	110	1,741	598	30	628	230	2,198	102	46	2,346	2,576	2,459	2,486	4,945	231,213
1995/96	752	70	822	948	94	1,042	104	2,500	133	58	2,691	2,795	1,804	2,855	4,659	239,794
1996/97	800	127	927	299	176	475	113	1,882	7	39	1,928	2,041	1,212	2,231	3,443	210,889
1997/98	584	48	632	41	6	47	82	2,284	78	41	2,403	2,485	707	2,457	3,164	209,791
1998/99	608	184	792	826	167	993	86	2,480	94	40	2,614	2,700	1,520	2,965	4,485	233,188
1999/00	324	222	546	235	288	523	46	1,694	11	49	1,754	1,800	605	2,264	2,869	224,395
2000/01	390	122	512	490	270	760	54	1,402	0	38	1,440	1,494	934	1,832	2,766	290,292
2001/02	944	122	1,066	748	137	885	132	1,068	0	44	1,112	1,244	1,824	1,371	3,195	237,718
2002/03	264	12	276	179	48	227	33	1,615	0	58	1,673	1,706	476	1,733	2,209	102,183
2003/04	311	8	319	184	10	194	41	2,359	0	40	2,399	2,440	536	2,417	2,953	189,432
2004/05	238	11	249	238	69	307	32	1,298	0	20	1,318	1,350	508	1,398	1,906	102,295
2005/06	381	4	385	249	71	320	54	1,955	0	20	1,975	2,029	684	2,050	2,734	278,418
2006/07	410	0	410	163	84	247	58	1,452	0	21	1,473	1,531	631	1,557	2,188	243,246
2007/08	421	12	433	132	18	150	60	833	0	21	854	914	613	884	1,497	254,700
2008/09								304	0	7	311					

[a] Catch Record Card data from 2003/04 to present are preliminary and subject to change as data are verified.
[b] Includes fish passed above Howard Hanson Dam 1991-92 to 1999-2000 and wild broodstock 1983-84 to present.

Table 34. White Management Unit – White River Winter-run Steelhead.

Return Year (N)	Sport Harvest[a] (1 Nov-30 Apr)			Tribal Harvest (1 Nov-30 Apr)			Escapement				Total Runsize			Smolt ~May Release Return N+2
	Hatchery	Wild	H&W Total	Hatchery	Wild	H&W Total	Hatchery	Wild Above Mud Mtn Dam	Wild Below Mud Mtn Dam	Wild Total	Hatchery	Wild	H&W Total	
1984/85			4					855	184	1,039				1,380
1985/86	0	0	0		21			621	266	887		908		0
1986/87	0	0	0		20			561	166	727		747		0
1987/88	0	0	0		9			1,390	372	1,762		1,771		0
1988/89	0	0	0					1,123	301	1,424				0
1989/90	0	0	0					545	163	708				0
1990/91	0	0	0					593	175	768				0
1991/92	2	0	2					837	196	1,033				0
1992/93	2	0	2		35			420	154	574		609		0
1993/94	3	0	3		30			349	158	507		537		24,941
1994/95	31	0	31		4			313	324	637		641		19,732
1995/96	21	7	28		14			364	176	540		561		24,938
1996/97	18	0	18		4			314	82	396		400		24,000
1997/98	15	0	15		0			322	118	440		440		18,600
1998/99	20	5	25		10			252	374	626		641		19,600
1999/00	25	5	30		15			382	216	598		618		18,210
2000/01	0	7	7		14			420	150	570		591		20,000
2001/02	23	3	26		5			519	95	614		622		21,000
2002/03	17	0	17		5			162	147	309		314		20,000
2003/04	5	0	5		10			184	154	338		348		0
2004/05	0	0	0		11			153	85	238		249		0
2005/06	1	0	1	2	0	2		163	162	325		325		0
2006/07	0	0	0	1	0	1		303	24	327		327		0
2007/08	0	0	0	1	0	1		207	47	254		254		0
2008/09								165	40	205				0

[a] Catch Record Card data from 2003/04 to present are preliminary and subject to change as data are verified.

Table 35. Puyallup Management Unit – Puyallup and Carbon rivers Winter-run Steelhead.

Return Year (N)	Sport Harvest[a,b] (1 Nov-30 Apr)			Tribal Harvest (1 Nov-30 Apr)			Escapement[c]			Total Runsize			Smolt ~May Release Return N+2
	Hatchery	Wild	H&W Total	Hatchery	Wild	H&W Total	Hatchery	Wild	H&W Total	Hatchery	Wild	H&W Total	
1984/85			10,364	3,596	177	3,773	1,590	1,432	3,022			17,159	148,460
1985/86			2,456	5,080	798	5,878	325	2,880	3,205			11,539	135,553
1986/87	1,707	363	2,070	2,096	233	2,329	60	1,603	1,663	3,863	2,199	6,062	186,078
1987/88	1,027	212	1,239	1,618	290	1,908	72	1,634	1,706	2,717	2,136	4,853	132,525
1988/89	528	290	818	676	249	925	92	1,930	2,022	1,296	2,469	3,765	165,242
1989/90	800	197	997	862	76	938	139	1,242	1,381	1,801	1,515	3,316	138,615
1990/91	591	143	734	332	81	413	77	1,130	1,207	1,000	1,354	2,354	218,270
1991/92	719	112	831	261	45	306	82	1,280	1,362	1,062	1,437	2,499	196,032
1992/93	693	127	820	824	130	954	127	1,022	1,149	1,644	1,279	2,923	123,638
1993/94	311	108	419	190	62	252	42	1,124	1,166	543	1,294	1,837	311,612
1994/95	529	41	570	431	138	569	83	1,509	1,592	1,043	1,688	2,731	159,560
1995/96	532	29	561	335	0	335	66	828	894	933	857	1,790	196,575
1996/97	297	36	333	45	0	45	199	992	1,191	541	1,028	1,569	228,845
1997/98	139	0	139	10	3	13	102	763	865	251	766	1,017	280,157
1998/99	384	20	404	85	19	104	203	1,076	1,279	672	1,115	1,787	271,100
1999/00	314	6	320	30	6	36	221	651	872	565	663	1,228	222,116
2000/01	107	4	111	84	16	100	81	477	558	272	497	769	203,580
2001/02	245	13	258	226	47	273	173	326	499	644	386	1,030	126,600
2002/03	67	0	67	13	15	28	28	287	315	108	302	410	191,300
2003/04	128	0	128	59	10	69	31	501	532	218	511	729	200,000
2004/05	167	0	167	20	0	20	71	162	233	258	162	420	231,859
2005/06	157	0	157	38	3	41	45	462	507	240	465	705	207,400
2006/07	393	0	393	50	8	58	59	509	568	502	517	1,019	211,900
2007/08	106	0	106	33	5	38	23	401	424	162	406	568	128,100
2008/09								241					161,975

[a] Catch Record Card data from 2003/04 to present are preliminary and subject to change as data are verified.
[b] 2002/2003 includes 3 Nov. 2002 S. Prairie Creek WSH.
[c] Source 1996/97 is Adult Tickets database for trapped less released for Puyallup River and Voights Creek.

Table 36. Nisqually Management Unit – Nisqually River Winter-run Steelhead.

Return Year (N)	Sport Harvest[a] (1 Nov-30 Apr)			Tribal Harvest (1 Nov-30 Apr)			Escapement[b,c]				Total Runsize			Smolt ~May Release Return N+2[d]
	Hatchery	Wild	H&W Total	Hatchery	Wild	H&W Total	Hatchery	Wild Mainstem Only	Tributary Estimates	H&W Total	Hatchery	Wild	H&W Total	
1984/85			1,916	289	2,459	2,748	168	1,599		1,767			6,431	0
1985/86			1,960	146	1,482	1,628	145	1,620		1,765			5,353	0
1986/87	211	1,815	2,026	74	1,879	1,953	60	2,022		2,082	345	5,716	6,061	0
1987/88	156	2,190	2,346	107	2,565	2,672	73	1,916		1,989	336	6,671	7,007	0
1988/89	71	1,202	1,273	38	1,268	1,306	90	3,817		3,907	199	6,287	6,486	0
1989/90	68	776	844	28	797	825	40	1,853		1,893	136	3,426	3,562	0
1990/91	28	240	268	9	639	648	8	642		650	45	1,521	1,566	0
1991/92	2	13	15		234	234		2,618		2,618		2,865		0
1992/93	33	610	643		250	250		993		993		1,853		0
1993/94	6	3	9		51	51		804		804		858		0
1994/95	0	6	6		17	17		987		987		1,010		0
1995/96	0	4	4		82	82				0				0
1996/97	5	0	5		81	81		882		882		963		0
1997/98	8	2	10		81	81		721		721		804		0
1998/99	3	0	3		31	31		530		530		561		0
1999/00	0	0	0		12	12		411		411		423		0
2000/01	11	0	11		18	18		240		240		258		0
2001/02	25	11	36		59	59		353		353		423		0
2002/03	8	0	8		12	12		366		366		378		0
2003/04	2	0	2	1	10	11		750	*196*	*946*		*956*		0
2004/05	7	0	7	1	8	9		190	*35*	*225*		*233*		0
2005/06	0	0	0	0	25	25		722	*187*	*909*		*934*		0
2006/07	3	0	3	0	29	29		303	*168*	*471*		*500*		0
2007/08	0	0	0	1	27	28		515	*232*	*747*		*774*		0
2008/09								232	*68*	*300*				

[a] Catch Record Card data from 2003/04 to present are preliminary and subject to change as data are verified.
[b] 2003/04 to present, spawner surveys were expanded to include Mashel, Little Mashel, and Ohop creeks, indicated by italicized numbers.
[c] Escapements and tribal harvest from WDFW, Larry Phillips, Oct. 19, 2009 data reconciliation table.
[d] No winter steelhead smolt releases from 1984/85 to present.

Table 37. South Sound Tributaries Winter Steelhead (sport harvest estimates from Burley, Chambers, Coulter, Curley, Goldsborough, Kennedy, McLane, Mill, Percival, Sherwood, and Skookum creeks; Capitol Lake; and Deschutes River.

Return	Sport Harvest (1 Nov-30 Apr)			Tribal Harvest (1 Nov-30 Apr)			Escapement			Total Runsize			~May Release
Year (N)	Hatchery	Wild	H&W Total	Hatchery	Wild	H&W Total	Hatchery	Wild	H&W Total	Hatchery	Wild	H&W Total	Return N+2
1984/85			665										170,412
1985/86			439										128,027
1986/87	220	232	452										96,045
1987/88	88	75	163										119,494
1988/89	100	47	147										135,713
1989/90	52	52	104										98,427
1990/91	39	17	56										73,763
1991/92	47	14	61										74,836
1992/93	45	37	82										96,978
1993/94	47	3	50										88,378
1994/95	18	15	33										51,807
1995/96	63	4	67										144,978
1996/97	40	0	40										18,020
1997/98	0	0	0										6,600
1998/99	6	3	9										26,911
1999/00	12	0	12										13,511
2000/01	12	12	24										0
2001/02	79	4	83										25,000
2002/03	52	0	52										27,000
2003/04	4	0	4										14,900
2004/05	2	0	2										24,550
2005/06	6	0	6										24,550
2006/07	0	0	0										0
2007/08	9	0	9										0
2008/09													0

Table 38. Skokomish Management Unit – Skokomish Winter-run Steelhead (includes Skokomish River and Purdy and Vance creeks).

Return Year (N)	Sport Harvest[a] (1 Nov-30 Apr)			Tribal Harvest (1 Nov-30 Apr)			Escapement			Total Runsize			~May Release Return N+2
	Hatchery	Wild	H&W Total	Hatchery	Wild	H&W Total	Hatchery	Wild	H&W Total	Hatchery	Wild	H&W Total	
1984/85			327			306		968					29,558
1985/86			338			400		866					23,075
1986/87	127	37	164			274		546					20,942
1987/88	72	15	87			231		742					20,025
1988/89	46	13	59			51		1,444					44,760
1989/90	68	2	70			57		370					39,975
1990/91	14	2	16			23		729					30,033
1991/92	21	2	23			3			*172*(min)				19,934
1992/93	0	2	2			13							28,508
1993/94	8	6	14			20		473					20,049
1994/95	6	3	9			0		398					39,130
1995/96	24	0	24			0							39,296
1996/97	23	2	25			0							53,684
1997/98	10	0	10			0		373					14,688
1998/99	9	3	12			0		311					53,495
1999/00	26	2	28			0		261					46,700
2000/01	26	0	26			0		286					62,280
2001/02	100	0	100			0			*156*(min)				62,976
2002/03	16	0	16			0			*132*(min)				68,356
2003/04	26	0	26			0		233					55,803
2004/05	16	0	16			0							49,946
2005/06	6	0	6			0		231					0
2006/07	6	0	6		4			405					0
2007/08	21	0	21		9			285					0
2008/09								594					

[a] Catch Record Card data from 2003/04 to present are preliminary and subject to change as data are verified.

Table 39. West Hood Canal Management Unit – Hamma Hamma, Duckabush, Dosewalips, Quilcene, and Little Quilcene rivers Winter-run Steelhead.

Return Year (N)	Sport Harvest[a] (1 Nov-30 Apr)			Tribal Harvest (1 Nov-30 Apr)			Escapement[b,c,d]			Total Runsize			Smolt ~May Release Return N+2
	Hatchery	Wild	H&W Total	Hatchery	Wild	H&W Total	Hatchery	Wild	H&W Total	Hatchery	Wild	H&W Total	
1984/85			717			182							45,100
1985/86			428			150							40,882
1986/87	180	200	380			20							41,818
1987/88	175	96	271			9							20,002
1988/89	77	52	129			0							45,365
1989/90	86	62	148			0							45,015
1990/91	36	20	56			0							30,105
1991/92	34	24	58			0							6,570
1992/93	14	16	30			0							30,132
1993/94	25	11	36			0							37,122
1994/95	29	9	38			0		*92*[e]					29,884
1995/96	36	0	36			0		*63*[e]					10,036
1996/97	12	0	12			0		*114*[f]					22,728
1997/98	20	0	20			0		*73*[f]					0
1998/99	12	9	21			0		*178*[g]					22,572
1999/00	0	0	0			0		*148*[g]					22,977
2000/01	43	8	51			0		*118*[g]					24,204
2001/02	81	33	114			0		*328*[g]					23,920
2002/03	8	0	8			0		*254*[g]					23,021
2003/04	6	0	6			0		*279*[g]					23,442
2004/05	6	0	6			0		*142*[g]					0
2005/06	0	0	0			0		*167*[h]					2,043
2006/07	0	0	0					*263*[g]					0
2007/08	0	0	0					*299*[g]					
2008/09													

[a] Catch Record Card data from 2003/04 to present are preliminary and subject to change as data are verified.
[b] Italicized numbers indicate data are counts from index areas, do not reflect wild escapement to the entire system. Some estimates are minimums.
[c] May include minimum estimated escapement data for one or more of the watersheds in the management unit.
[d] Escapement numbers for 1996/97, 2000/02, 2004/05 and 2005/06 updated by A. Couto 10/23/09 with data from T. Johnson.
[e] Index escapement estimates from Hamma Hamma and Dosewallips rivers.
[f] Index escapement estimates from Hamma Hamma, Dosewallips and Duckabush rivers.
[g] Index escapement estimates from Hamma Hamma, Dosewallips, Duckabush, and Quilcene rivers.
[h] Index escapement estimates from Hamma Hamma, Duckabush, and Quilcene rivers.

Table 40. East Hood Canal Management Unit – Union, Tahuya, and Dewatto rivers Winter-run Steelhead.

Return Year (N)	Sport Harvest[a] (1 Nov-30 Apr)			Tribal Harvest (1 Nov-30 Apr)			Escapement			Total Runsize			Smolt ~May Release Return N+2
	Hatchery	Wild	H&W Total	Hatchery	Wild	H&W Total	Hatchery	Wild[b]	H&W Total	Hatchery	Wild	H&W Total	
1984/85			271				162	*287*[c]					32,329
1985/86			331			91	71	*174*[c]					29,428
1986/87	31	31	62			84		*122*[c]					29,902
1987/88	30	19	49			61	121	*125*[c]					13,000
1988/89	38	12	50				148	*164*[c]					35,076
1989/90	17	5	22					*164*[d]					44,650
1990/91	17	5	22					*122*[d]					20,046
1991/92	2	4	6					*73*[d]					5,000
1992/93	11	9	20					*115*[c]					10,017
1993/94	6	0	6					*95*[c]					21,285
1994/95	6	0	6					*100*[c]					34,788
1995/96	12	4	16					*131*[c]					0
1996/97	0	0	0					*155*[c]					0
1997/98	0	0	0					*199*[e]					0
1998/99	6	6	12					*420*[e]					0
1999/00	11	0	11					*264*[e]					0
2000/01	8	0	8					*225*[e]					0
2001/02	0	0	0					*176*[e]					0
2002/03	0	0	0					*121*[e]					0
2003/04	0	0	0					*265*[e]					0
2004/05	0	0	0					*137*[e]					0
2005/06	0	0	0					*322*[e]					0
2006/07	0	0	0					*224*[e]					0
2007/08	3	0	3					*209*[e]					
2008/09													

[a] Catch Record Card data from 2003/04 to present are preliminary and subject to change as data are verified.
[b] Italicized numbers indicate data are counts from index areas, do not reflect wild escapement to the entire system.
[c] Index escapement estimates from Tahuya and Dewatto rivers.
[d] Index escapement estimates from Tahuya River.
[e] Index escapement estimates from Union, Tahuya, and Dewatto rivers.

Table 41. Port Angeles Management Unit – Morse, McDonald, and Seibert creeks Winter-run Steelhead.

Return Year (N)	Sport Harvest[a,b] (1 Nov-30 Apr)			Tribal Harvest (1 Nov-30 Apr)			Escapement[c,d]			Total Runsize			Smolt ~May Release Return N+2
	Hatchery	Wild	H&W Total	Hatchery	Wild	H&W Total	Hatchery	Wild	H&W Total	Hatchery	Wild	H&W Total	
1984/85			285			351	149	*281*[e]					15,460
1985/86			237			281	54	*169*[e]					15,852
1986/87	175	60	235			200		*118*[f]					18,819
1987/88	163	27	190			283	143	*138*[f]					15,227
1988/89	178	39	217			58	60	*60*[f]					15,034
1989/90	163	26	189			45	75	*78*[f]					15,514
1990/91	78	12	90				19	*91*[f]					10,034
1991/92	113	22	135					*100*[f]					14,655
1992/93	78	18	96			12							10,058
1993/94	185	13	198										15,438
1994/95	100	17	117	2		2		*128*[f]					15,338
1995/96	300	8	308	11		11		*170*[e]					15,029
1996/97	150	3	153					*183*[f]					5,076
1997/98	71	5	76					*410*[e]					5,000
1998/99	53	0	53					*298*[e]					5,000
1999/00	110	10	120					*413*[e]					5,010
2000/01	49	0	49					*242*[e]					5,000
2001/02	156	11	167					*196*[e]					5,000
2002/03	33	0	33					*147*[e]					5,000
2003/04	36	0	36					*150*[e]					5,000
2004/05	166	0	166					*89*[g]					
2005/06	46	0	46					*330*[e]					
2006/07	42	0	42					*181*[e]					
2007/08	10	0	10										
2008/09								*87*[e]					

[a] Catch Record Card data from 2003/04 to present are preliminary and subject to change as data are verified.
[b] Seibert Creek is not open for winter steelhead harvest.
[c] Italicized numbers indicate data are counts from index areas, do not reflect wild escapement to the entire system.
[d] Escapement surveys for wild winter steelhead are not done in Seibert Creek.
[e] Index escapement estimates from Morse and McDonald creeks.
[f] Index escapement estimates from Morse Creek.
[g] Index escapement estimates from McDonald Creek.

Table 42. Dungeness Management Unit – Dungeness River Winter-run Steelhead.

Return Year (N)	Sport Harvest[a] (1 Nov-30 Apr)			Tribal Harvest (1 Nov-30 Apr)			Escapement			Total Runsize			Smolt ~May Release Return N+2
	Hatchery	Wild	H&W Total	Hatchery	Wild	H&W Total	Hatchery	Wild[b]	H&W Total	Hatchery	Wild	H&W Total	
1984/85			388			106							14,828
1985/86			226			48							15,877
1986/87	191	209	400			9							15,433
1987/88	200	209	409			44		*438*					15,545
1988/89	75	68	143			6		*429*					20,077
1989/90	117	52	169			0		*408*					20,123
1990/91	94	22	116			14		*423*					20,256
1991/92	78	37	115			4		*292*					15,000
1992/93	49	24	73			0		*338*					15,100
1993/94	140	8	148			8		*337*					15,264
1994/95	187	28	215	0	0	0							18,850
1995/96	156	12	168	0	0	0		*261*					9,900
1996/97	126	0	126	0	0	0							10,008
1997/98	20	2	22	0	0	0							9,800
1998/99	66	13	79	0	0	0							9,000
1999/00	51	0	51	0	0	0	6	*165*		57			11,000
2000/01	44	0	44			2	3	*183*		47			10,465
2001/02	188	12	200	24	2	26	12			224			12,199
2002/03	41	0	41			3	10			51			10,250
2003/04	46	0	46			0	22						13,715
2004/05	24	0	24			33	34						10,500
2005/06	32	0	32			1	18						9,825
2006/07	38	0	38			67							10,900
2007/08	23	0	23			14							10,700
2008/09													

[a] Catch Record Card data from 2003/04 to present are preliminary and subject to change as data are verified.
[b] Escapement estimates are from index areas. Due to poor water conditions in most years, escapement surveys are difficult to complete.

Table 43. Elwha Management Unit – Elwha River Winter-run Steelhead.

Return Year (N)	Sport Harvest[a] (1 Nov-30 Apr)			Tribal Harvest (1 Nov-30 Apr)			Escapement			Total Runsize			Smolt ~May Release Return N+2
	Hatchery	Wild	H&W Total	Hatchery	Wild	H&W Total	Hatchery	Wild	H&W Total	Hatchery	Wild	H&W Total	
1984/85			3,456			1,857	167						95,620
1985/86			1,232			2,767	121	834	955			4,954	90,295
1986/87	321	197	518			2,546	1	493	494			3,558	118,834
1987/88	1,607	692	2,299			1,760		499					73,630
1988/89	612	479	1,091			1,078	136	416	552			2,721	88,174
1989/90	508	166	674			1,605	185	286	471			2,750	118,440
1990/91	193	97	290			823	249	148	397			1,510	46,065
1991/92	146	146	292			423	159	560	719			1,434	90,997
1992/93	179	231	410			242	78	70	148			800	53,444
1993/94	624	153	777			809	71	225	296			1,882	229,146
1994/95	494	413	907			1,205	1,106	270	1,376			3,488	92,419
1995/96	73	211	284			989	634	47	681			1,954	94,002
1996/97	274	201	475			543	169	153	322			1,340	170,063
1997/98	84	0	84			68	187						135,145
1998/99	132	0	132			660	598						160,188
1999/00	375	21	396			295	250						119,850
2000/01	802	8	810			194	195						165,940
2001/02	344	6	350			230	533						120,000
2002/03	179	0	179			137	324						151,700
2003/04	172	0	172			230							127,745
2004/05	428	0	428			196							93,063
2005/06	403	0	403			216							62,553
2006/07	127	0	127			296							78,133
2007/08	53	0	53			173							105,700
2008/09													

[a] Catch Record Card data from 2003/04 to present are preliminary and subject to change as data are verified.

Appendix B. Example: Population viability analysis (PVA) for Winter Steelhead stocks under various harvest rates.

Section 1 - Overview and example results

Introduction

In an effort to quantify the effects of harvest mortality on steelhead in Puget Sound, we compared extinction and recovery probabilities under a range of harvest rates for all management units. Owing to limited data on these systems, we used the analytical techniques based on a population viability analysis (PVA) presented in Dennis et al (1991) and Staples et al. (2004) for estimating harvest effects on escapement. Specifically, we estimated the probabilities of reaching a quasi-extinction threshold (QET) within 25 years under different harvest rates, and compared the results to a no harvest baseline extinction risk. The techniques for estimating extinction risk parameters are similar to those described in the WDFW document *Oncorhynchus mykiss:* Assessment of Washington State's Anadromous Populations and Programs (Scott and Gill, 2008) and outlined in further detail in Section 2 of this appendix.

Extinction risk probabilities for each Puget Sound stock were calculated from estimates of stock specific trends in observed abundance (μ), its associated variance, and a last population size that was an average of the last four years of observed run sizes. The terms population rate of change, instantaneous growth rate, and abundance or population trend all refer to the parameter μ and will be used interchangeably throughout the appendix. Positive values of μ indicate increasing steelhead escapement or run size over the historic base period; negative values are associated with decreasing run sizes over the period of available steelhead data. The significance of positive or negative trends may be inferred from the standard error about the estimate of μ. Although process error and the last populations size are incorporated in the calculation of extinction risk, we estimated the effects of harvest by adjusting the population growth rate only. The adjustment to the trend will be based on the harvest rate under investigation and the mean generation time of Puget Sound steelhead.

Following is a brief description of the abundance data as it pertains to the PVA model, followed by the analytical steps specific to the extinction risk of Puget Sound steelhead, a listing of the underlying assumptions, and results from an analysis of two simulated data sets.

Data

Data used to quantify trends in wild steelhead consist of annual estimates of spawning escapement or terminal run size (i.e., escapement plus terminal harvest). These abundance estimates do not include other population components such as other harvest mortality, immature fish still in marine waters, or juveniles and residents in freshwater, so they represent a subset of the total population. However, the model's properties are flexible enough so that generally any linear combination of age or stage classes will fulfill the assumptions associated with this PVA method (Dennis et al. 1991).

Methods

The first step in estimating the population trend parameter and associated process error is to transform the run size data to the natural log scale,

$$\ln(N_t) = X_t,$$

where N_t = the observed run size in return year *t*. From the time series of the log-abundances, X_t, we calculated the population growth rate between successive observations, μ_t, by difference between successive observations in log-abundances as follows,

$$X_{i+1} - X_i = \mu_i,$$

where X_i = the ith observed run size;

X_{i+1} = the next observed run size;

μ_i = the growth rate of the population between the two observations.

The length of time between successive run sizes was generally one year; however, the model is flexible enough to accommodate missing years that would lead to unequal spacing between observations. From the time series of observed growth rates, μ_i, we estimated an average growth rate, $\hat{\mu}$ for the time period, the process error, and the covariance between each successive μ_i, which is also the measurement error of the log-abundances (natural logarithm of run size). Theoretical derivations and details of the estimation procedure are presented in Section 2. We incorporated the effects of harvest into extinction risk calculations by the adjusting the population growth rate parameter using a method suggested by Robert Kope (NOAA Fisheries, pers. comm. – see Section 3). Because there is no extinction threshold yet established specifically for steelhead, we used 63, the quasi-extinction threshold (QET) for Puget Sound Chinook (Scott and Gill 2008)

Because the time series of abundances over the base period included harvest, we had to first remove its effects to obtain a population growth rate in the absence of fishing. We then used this baseline growth rate and adjusted it using Kope's method to incorporate current and proposed harvest rate into the calculation. The analytical steps for the PVA analysis are as follows:

1. Estimate the parameters for the risk extinction calculation (μ, N_{LAST}, process error, τ^2) from the time series of abundance data using the method of Staples et al. (2004), and as described in detail in section 2 of this appendix.

2. Because the historic abundance data contains harvest, adjust the estimated rate of change parameter using the method suggested by Kope to approximate no harvest as follows,

$$\mu_0 = \hat{\mu} - \frac{\ln(1 - HR_{HIST})}{\bar{t}}$$

where $\hat{\mu}$ = the instantaneous growth rate estimated from the historic time series of runsize data;

μ_0 = the instantaneous growth rate under no harvest, i.e., HR = 0;

$\bar{t}$ = the mean generation time, assumed to be 4 years for Puget Sound Steelhead stocks;

HR_{HIST} = the average historic harvest rate.

This is now the baseline population growth rate that will be adjusted to examine harvest effects on extinction risk.

3. Calculate the probabilities of reaching the QET at least once in 25 years [Pr(QET, 25)] under no harvest with μ_0 from step 2, and the process error and N_{LAST} from step one by use of the method of Dennis et al. (1991).

4. Adjust the *baseline* population rate of change for different harvest rates as follows,

$$\mu_{HR} = \mu_0 + \frac{\ln(1 - HR)}{\bar{t}}$$

where μ_{HR} = the instantaneous growth rate under a harvest rate denoted by HR.

The adjustment for harvest rate decreases the value of the no harvest trend parameter, μ_0, regardless of its value, positive or negative

5. Re-calculate Pr(QET, 25) for μ_{HR}, N_{LAST}, and the estimated process error, τ^2, and compare to the no harvest (baseline) Pr(QET, 25).

For each of the adjusted population growth rates, we calculated the probability that a stock will fall below the QET at least once in 25 years using the estimator for extinction probabilities from Dennis et al. (1991). The extinction risk, Pr(QET, 25) is calculated as a two stage probability. The first stage probability is that of ever achieving the QET at some time in the future, expressed as $\Pr(QET)$. The second stage is the probability of reaching the lower bound within some time horizon, given that those levels will be achieved at some point in the future. The first and second stage probabilities for each harvest rate in the analysis are calculated using the estimated rate of population change adjusted for the harvest rate, the estimated process error, and the average of the last 4 observed run sizes.

The probability of a stock falling below the QET at some time in the future is estimated as follows,

$$\hat{\Pr}(QET) = \begin{cases} 1 & \mu \le 0 \\ \exp\left(-2(\mu)x_d \big/ \hat{\tau}^2\right) & \mu > 0 \end{cases}$$

where $x_d = \ln\left(\frac{N_{last}}{QET}\right)$;

N_{last} = average of the last four (4) observed run sizes;

μ_{HR} = the instantaneous rate of change under a particular harvest rate (HR);

$\hat{\tau}^2$ = estimated process error variance.

The second stage probability of arriving at a specified lower bound in 25 years is calculated as follows,

$$P[T \le t | QET] = \Phi\left(\frac{-x_d + |\mu_{HR}|t}{\hat{\tau}\sqrt{t}}\right) + e^{\frac{2x_d|\mu_{HR}|}{\tau^2}} \Phi\left(\frac{-x_d - |\mu_{HR}|t}{\hat{\tau}\sqrt{t}}\right) \qquad \textbf{Eq. 1}$$

where

T = time to extinction;

Φ = the Normal cumulative distribution function;

t = 25 years.

The probability calculated in Eq. (2) is conditional on the probability of reaching the QET at some time in the future. It is interpreted as the probability that the run size will equal or go below the QET at least once in 25 years, given that it will reach that abundance at all. All stocks with a declining population, or a last observed abundance less than the QET will have an extinction probability equal to 1. The joint probability of reaching the QET *and* reaching it at least once in 25 years, expressed mathematically as $\hat{\Pr}(QET, 25)$, is estimated as follows,

$$\hat{\Pr}(QET, 25) = \hat{\Pr}(QET) * \hat{\Pr}(T \le 25 \mid QET).$$

Confidence intervals for the joint extinction probabilities were estimated using parametric bootstrap methods, for a $\hat{\mu}_{HR} \sim N\left(\mu_{HR}, \tau^2/n\right)$, where n is the number of log-ratios of abundance in the data set, and a process error, τ^2 with a chi-square distribution of $\frac{\hat{\tau}^2}{n} \cdot \chi^2_{n-3}$. Estimates of $\hat{\mu}$, the standard error of $\hat{\mu}$, the process error, $\hat{\tau}^2$, and extinction probabilities with associated 90% confidence intervals are presented for each stock/harvest rate combination.

Assumptions

Biases in estimates of population trends and process errors will propagate to Pr(QET, 25) leading to inaccurate assessments of extinction risk. For example, under estimating the growth rate parameter will lead to a positive bias (values that are higher than expected) in Pr(QET, 25), as will overestimating the process error. Biases in parameter estimates are a result of either inaccurate sampling or violations of one or more of the underlying analytical assumptions. Most often biases are more sensitive to some assumption violations than others, such that even small departures can have large effects on the accuracy of parameter estimates. The assumptions associated with the PVA model, the time series data and calculation of extinction risk probabilities, *Pr(QET, 25)* are as follows,

1. The annual mature run size is an adequate, (albeit flawed) index of the total population. It is understood that the trend parameter is an underestimate of population growth typically inferred from PVA because it incorporates historical catch rates.
2. Because of (1), incidental harvest rates in the expected range (e.g., 0-20%) are not likely to change the current trend parameters because these harvest rates are already contained in the base period data.

3. Freshwater and marine conditions affecting productivity and survival remains stable over the period of the extinction risk projection so that changes in abundance are due to harvest only.
4. Following from (3), there are no significant natural or man-made events that dramatically change the run size.
5. Variation owing to process error is temporarily uncorrelated, i.e., correlation between errors is of lag 1 and negative.
6. The trend is constant over the base period of abundance data.
7. The mean generation time for Puget Sound steelhead is four years. (Agreed to by all co-managers).

Data that is representative of the population is one of the most basic assumptions of any analysis. Unfortunately we cannot resample the historic run size time series for each of these stocks. Unless a concerted effort is made in the future to compare previous sampling methods with more reliable, accurate or precise methodology, the appropriateness of ad-hoc corrections is questionable. The current time series provides our best assessment of population trends and is the only available data for many Puget Sound steelhead stocks. It also incorporates information on population stochasticity owing to environmental and anthropogenic effects over the time span of the base period.

Estimates of population trend can be robust to the assumption that the mature run size is an adequate index of the population. However, estimates of process error could be sensitive to this assumption. As long as run size estimates are tracking with the population as a whole, then estimate of abundance trends should be unbiased. If the index is tracking with the population, but not constantly proportionate to it, then estimates of process or measurement error will be biased depending how much of the overall variability is apportioned to either variance component.

Assumption (2) is also accounted for by adjusting estimated growth rate parameters to account for historic harvest rates. Assumption (3) is necessary in order to adequately attribute the effect of fisheries on abundance trends. Moreover, run sizes observed during the base period are reflective of the population's response to stochasticity in the freshwater and marine environment during the same period. Estimates of process error take this variability into account and are incorporated into extinction risk calculations. Hence, (3) assumes that a stock's response to perturbations in environmental conditions remains constant and that fluctuations in those conditions will be within the range of the base period. Unfortunately we do not have any data to examine relationships between demographic parameters and environmental covariates.

Assessing violations to assumption (4) requires historic knowledge of the rivers systems in each management unit. In a system with a high degree of inconsistency in run sizes it would be difficult to discern between changes in abundance that were part of the natural variability from those that are a result of catastrophic events. We can examine the degree of departure from assumption (5) through either a Durbin-Watson test (Staples et al. 2004) or a plot of the autocorrelation function (a.c.f.) of the residuals.

We can assess the validity of assumption (6), that the population growth rate is constant over the base period can be assessed graphically by through plotting the time series of residuals. Non-constant growth rate over some portion of the time series would be evident by residuals that were consistently higher or lower within a period. However, estimating the parameters of the PVA model requires at least 8 years of data. Subsequently, if there were short periods within shorter time periods, these process, trend, and measurement errors would not be estimable. Ignoring these changes could bias trend estimates and hence extinction risk if the changes occurred in the most recent past. Moreover, process error would be inflated, but this may lead to a more conservative estimate of extinction risk should Pr(QET, 25) have a positive bias. In practice, can be difficult to differentiate between short deviations from a constant trend that are a result of some shift in a stocks population dynamics from those that are a result of process error.

Example results

To illustrate the PVA analysis, we simulated two hypothetical populations, according to the theoretical distribution of the PVA model, $X(t) \sim Normal(x_o + \mu t, \tau^2 t)$, where $x_t = \ln(N_t)$, the natural logarithm of abundance at time *t* and x_0 is the natural logarithm of the first or initial population size. The first population had an initial population size (N_0) of 1000 and a positive growth rate ($\mu > 0$), the other population had an initial population size of 3500 fish and a negative growth rate ($\mu < 0$).

Data and growth rate estimates

Harvest, escapement, and run size estimates for two simulated winter steelhead population are presented in Tables Table 44 and Table 45. Estimates of the instantaneous rate of increase, $\hat{\mu}$, its associated standard error, $SE(\hat{\mu})$, the process error, $\hat{\tau}^2$, and last population size, N_{last}, estimated from the run sizes are given in Table 46.

Table 44. Harvest, escapement, and run sizes for a hypothetical winter steelhead population with a positive growth rate parameter.

Year	*t*	Catch	Escapement	Runsize
1982	0	190	810	1000
1983	1	92	1059	1151
1984	2	64	738	802
1985	3	132	966	1097
1986	4	225	1101	1326
1987	5	179	715	894
1988	6	112	824	936
1989	7	220	1000	1219
1990	8	165	934	1099
1991	9	254	1438	1691
1992	10	313	1252	1565
1993	11	497	1989	2486
1994	12	137	1822	1959
1995	13	126	1678	1804
1996	14	316	1440	1756
1997	15	232	2668	2900
1998	16	153	695	848
1999	17	386	2371	2757
2000	18	370	1806	2176
2001	19	225	2589	2814
2002	20	218	1960	2178
2003	21	140	2188	2327
2004	22	108	1088	1195
2005	23	42	805	847
2006	24	267	1140	1407
2007	25	103	1960	2063

Table 45. Harvest, escapement, and run sizes for a hypothetical winter steelhead population with a positive growth rate parameter.

Year	*t*	Catch	Escapement	Runsize
1979	0	980	2520	3500
1980	1	614	1749	2363
1981	2	1054	1957	3011
1982	3	566	1051	1617
1983	4	525	1226	1751
1984	5	221	662	882
1985	6	725	1613	2337
1986	7	303	474	777
1987	8	558	872	1430
1988	9	160	250	410
1989	10	484	757	1241
1990	11	103	161	264
1991	12	338	1648	1986
1992	13	403	1613	2016
1993	14	30	274	304
1994	15	9	148	157
1995	16	1	15	16
1996	17	36	324	360
1997	18	18	239	257
1998	19	6	115	121
1999	20	12	104	115
2000	21	16	305	321
2001	22	13	120	133
2002	23	37	486	522
2003	24	10	97	107
2004	25	24	315	339

Table 46. Estimates of the rate of population increase, $\hat{\mu}$, its associated standard error, $\widehat{SE}(\hat{\mu})$, the process error, $\hat{\tau}^2$, and last population size, N last, for two simulated winter steelhead population.

	Years of data	$\hat{\mu}$	$\widehat{SE}(\hat{\mu})$	$\hat{\tau}^2$	N_{last}	Historic Harvest Rate
Population 1	1982 - 2007	0.0201	0.0317	0.0218	1378	12%
Population 2	1979 - 2004	-0.1153	0.0577	0.0633	275	28%

Table 47. Estimated extinction risk probabilities and associated 90% confidence intervals calculated from instantaneous growth rate parameters adjusted for no harvest and the current harvest rates.

	μ_0 (No Harvest Baseline)	Pr(QET, 25) No harvest baseline	90%CI Pr(QET, 25) No Harvest baseline	Current Harvest rate	Pr(QET, 25) Current HR	90% CI Pr(QET, 25) Current HR
Population 1	0.0521	0	(0,0)	8%	0	(0, 0.0003)
Population 2	-0.0331	0.461	(0.045, 0.928)	6%	0.575	(0.082, 0.961)

Table 48. Estimated extinction risk probabilities and associated 90% confidence intervals calculated from instantaneous growth rate parameters adjusted for the upper and lower ranges of hypothetical proposed harvest rates.

	Lower harvest rate	Pr(QET,25) Lower HR	90%CI Pr(QET, 25) Low harvest	Upper harvest rate	Pr(QET,25) Upper HR	90%CI Pr(QET, 25) Upper HR
Population 1	5%	0	(0, 0.0001)	15%	0	(0, 0.002)
Population 2	0%	0.461	(0.045, 0.928)	10%	0.652	(0.120, 0.977)

Risk Assessment for the hypothetical populations

The estimated growth rate parameter for hypothetical stock 1 is not significantly different from 0 (Table 48) therefore by Eq. 1, the probability is one that this single population will eventually reach a QET of 63. With a historic harvest rate of 12%, the adjusted growth rate is 0.0521 and represents the historic abundance or run size trend in the absence of harvest, the estimated extinction risk, [Pr(QET, 25)] for the no harvest baseline is 0, and does not increase under the current harvest rate of 6% (Table 48) or for the proposed upper limit harvest of 15% (Table 48). The 90% confidence intervals associated with the extinction risk probabilities are quite narrow, probably owing to the small process error and a last run size (N_{last}) of 1378 fish.

Hypothetical stock 2 is comprised of 3 populations, hence the QET of 189 (3 times 63). The instantaneous growth rate, μ, for the historic run size was estimated as -0.115, and is significantly less than 0 at the $\alpha = 0.10$ level ($\Pr(t_{24} < -1.999) = 0.051$). Adjusting the trend to the no harvest base line, μ remains less than 0, hence Pr(QET) is 1 (Eq. 1) and Pr(QET, 25) is 0.461 with an associated 90% CI of (0.045, 0.928) (Table 47). Under a current harvest rate of 6% for this hypothetical population, the extinction risk is 57.5% with an associated 90% CI of (0.082, 0.961). The wide confidence intervals for both these estimates indicates the high degree of uncertainty in Pr(QET, 25). The low range of the proposed harvest rate is 0%, hence the estimated extinction risk is the same as that for the no harvest baseline. A harvest rate of no higher than 10% was proposed for this population and would result in a Pr(QET, 25) of 65.2% $\left[\Pr(0.120 < \Pr(QET, 25) < 0.977)) = 0.90\right]$ Table 48).

Section 2 - Population dynamics and analytical techniques with derivations

We begin this section with a discussion of definitions and concepts used in assessing population trends of steelhead stocks. Continuous and finite rates of population change are discussed, and the relationship between the two measures presented. Methods of estimating rates of change in steelhead abundance are based on the population viability analysis of Dennis et al. (1991). Variations of the Dennis method (Dennis et al 1991) have been proposed for use in assessing population trends in other salmonids (Holmes et al 2007, McClure et al 2003), however we found these methods lacking statistical rigor and therefore inappropriate for use in this analysis. Results of the PVA analysis for each SaSSI stock presented in this section should be approached with caution. Estimates of population growth rates, positive or negative, are based entirely on wild escapement and harvest numbers. Stocks of particular interest can and should include more site-specific data for a complete analysis.

Definitions and concepts

The simplest expression for the rate of population change is the deterministic equation written as follows,

$$N_{t+1} = N_t e^{\mu} \qquad \textbf{Eq. 2}$$

where,

N_t = the population at time *t* and;

μ = the instantaneous rate of population change.

For the purposes of this analysis time will be measured in years, and we will assume that estimates of escapement and harvest are obtained at the same time in the annual cycle. The growth rate parameter, μ, is greater than 0 for increasing populations, less than 0 ($\mu < 0$) for decreasing populations and for stationary populations $\mu = 0$. In Eq. 2 the number of years between the initial and ending population size is one year. Under the assumption of a constant rate of change μ, the population size at time *t* may be expressed in terms of the population size at time 0, N_0 and μ as follows,

$$N_t = N_0 e^{\mu t}, \qquad \textbf{Eq. 3.}$$

or between *t* and $t + \Delta t$ as $N_{t+\Delta t} = N_t e^{\mu \Delta t}$. The important concept is that the parameter μ is constant. The quantity e^{μ} is equivalent to the finite rate of increase λ, however, because the derivation is based on the solution to a differential equation, we use the term instantaneous growth rate.

Derivation and analytical techniques

Estimation of the continuous growth rate parameter, μ, and the associated variance are two parts of the population viability analysis (PVA) of Dennis et al. (1991). Calculation of mean time to, and the probability of, extinction at some future time *t* complete the PVA and are based upon estimates of μ and the natural variability of μ. Holmes and Fagan (2002) and McClure et al. (2003) have extended PVA to include Pacific salmon species using a running sum of spawner and/or escapement estimates. More recently, Staples et al (2004) refined the Dennis et al. (1991) method using a restricted maximum likelihood (REML) to separate natural and measurement error to further refine estimates of extinction parameters. We used the population viability analysis of Staples et al. (2004) to estimate trends in wild abundance for 83 stocks in Washington State. In this analysis, we estimated population trends between the first abundance estimate, time 0 and the last year of abundance data, time N_{last}. The derivation of the method is outlined over the next few pages.

Equations 1 through 4 are deterministic; errors from demographic, environmental and sampling processes are not taken into account. Escapement and harvest numbers are often measured with error and vary naturally from one year to the next. The parameter μ (Eq. 3) can vary from one year to another if calculated from abundance estimates that are subject to natural

and sampling variability. Subsequently, these errors should be taken into account when estimating μ and making inference to future trends in abundance. Variance estimates of μ obtained from a series of abundance indices or population estimates will include measurement errors not associated with natural demographic and environmental processes. Inclusion of measurement error will overestimate the variance used in estimating extinction parameters (Holmes and Fagan 2002), and bias these results, but not limit inferences about μ. Separating out measurement (sampling) and process (natural or non-measurement) error is often impossible in the absence of information on sampling error. The method of Staples et al (2004) offers a way to separate out process and measurement error so that probabilities of extinction, which use the process error of among the μ_t's, can be estimated.

Incorporating process error into Eq. 3, is written in terms of *t* and $t+1$ as follows,

$$N_{t+1} = N_t e^{\mu + X_t} \qquad \textbf{Eq. 4}$$

where X_t = process error, and $X_t \sim N\left(0, \tau^2\right)$. Estimates of population size include measurement error, Y_t, and is expressed in terms of the true population size as,

$$\hat{N}_{t+1} = N_{t+1} e^{Y_{t+1}} \qquad \textbf{Eq. 5}$$

where N_{t+1} = the true population size at time *t*+1;

$\hat{N}_{t+1}$ = estimated population size at time *t*+1;

Y_t = measurement error for population estimates at time *t*;

$Y_t \sim N\left(0, \sigma^2\right)$.

Incorporating Eq. 4 into Eq 5, the estimate of abundance at time $t+1$ written as follows,

$$\hat{N}_{t+1} = N_t e^{\mu + X_t + Y_{t+1}} \qquad \textbf{Eq. 6}$$

Noting that abundance estimates at time *t* is also measured with error and is expressed as, $\hat{N}_t = N e^{Y_t}$, and further dividing both sides of Eq. 6 by $\hat{N}_t$, abundance at time $t+1$ is as follows,

$$\frac{\hat{N}_{t+1}}{\hat{N}_t} = \frac{N_t e^{X_t + Y_{t+1}}}{N_t e^{Y_t}} \quad \text{or,}$$

$$\frac{\hat{N}_{t+1}}{\hat{N}_t} = e^{\mu + \left(X_t + Y_{t+1} - Y_t\right)} \qquad \textbf{Eq. 7}$$

.

Taking the natural logarithm of both sides of Eq. 7,

$$\ln\left(\frac{\hat{N}_{t+1}}{\hat{N}_t}\right) = \mu + \left(X_t + Y_{t+1} - Y_t\right).$$

Based on the use of the Central Limit Theorem, Tuljaparkur and Orzack (1980) and Heyde and Cohen (1985) showed that the distribution of $\ln\left(\frac{N_{t+1}}{N_t}\right)$ has an asymptotic normal distribution. Subsequently the use of normal errors is supported for the log ratio of abundance estimates. Using the distributions of process and measurement error, the expected value, or mean, of $\ln\left(\frac{N_{t+1}}{N_t}\right)$ is

$$E\left(\ln\left(\frac{N_{t+1}}{N_t}\right)\right) = E\left(\mu + X_t + Y_{t+1} - Y_t\right)$$
$$= \mu$$

with variance

$$Var\left(\ln\left(\frac{\hat{N}_{t+1}}{\hat{N}_t}\right)\right) = Var\left(\mu + X_t + Y_{t+1} - Y_t\right),$$

or, noting that because μ is a constant, $Var(\mu) = 0$,

$$Var\left(\ln\left(\frac{\hat{N}_{t+1}}{\hat{N}_t}\right)\right) = \tau^2 + 2\sigma^2 \qquad \textbf{Eq. 8}$$

Hence, the log-ratio of abundance estimates, $\ln\left(\frac{\hat{N}_{t+1}}{\hat{N}_t}\right)$ is normally distributed with mean μ and variance $\tau^2 + 2\sigma^2$, i.e., $N\left(\mu, \tau^2 + 2\sigma^2\right)$.

Extending the derivation to include several years, from time *t* to $t+\Delta t$ where Δt is the number of intervening years, gives as similar derivation for the variance (Eq. 8) as follows,

$$\frac{\hat{N}_{t+\Delta t}}{\hat{N}_t} = \frac{N_t e^{\left(\sum_{i=t}^{t+\Delta t-1} \mu + X_i\right) + Y_{t+\Delta t}}}{N_t e^{Y_t}},$$

and taking the natural logarithm of both sides for constant μ across all years,

$$\ln\left(\frac{\hat{N}_{t+\Delta t}}{\hat{N}_t}\right) = \mu \cdot \Delta t + \left(\sum_{i=t}^{t+\Delta t-1} X_i\right) + Y_{t+\Delta t} - Y_t.$$

Noting from above that the mean of X_t and Y_t are both zero, the expected value of the log ratio is as follows,

$$E\left(\ln\left(\frac{\hat{N}_{t+\Delta t}}{\hat{N}_t}\right)\right)=\mu\cdot\Delta t_t$$

with associated variance

$$Var\left(\ln\left(\frac{\hat{N}_{t+\Delta t}}{\hat{N}_t}\right)\right)=Var\left(\sum_{i=t}^{t+\Delta t-1}X_i+Y_{t+\Delta t}-Y_t\right)=\Delta t\tau^2+2\sigma^2.$$

Hence the log-ratios for any $\Delta t>1$ are distributed normal with mean $\mu\Delta t$ and variance $\Delta t\tau^2+2\sigma^2$, i.e., $\ln\left(\frac{\hat{N}_{t+\Delta t}}{\hat{N}_t}\right)\sim N\left(\Delta t\mu,\ \Delta t\tau^2+2\sigma^2\right)$.

The joint log-likelihood of successive ratios is written as follows,

$$\ln(L)=-\frac{n\ln(2\pi)}{2}-\ln\left(\left|\mathbf{U}'\boldsymbol{\Sigma}\mathbf{U}\right|\right)-\frac{1}{2}\left(\mathbf{U}'\mathbf{W}\right)'\left(\mathbf{U}'\boldsymbol{\Sigma}\mathbf{U}\right)^{-1}\left(\mathbf{U}'\mathbf{W}\right) \qquad \textbf{Eq. 9}$$

where, n = the number of log-ratios, or observations, for a particular stock;

$\mathbf{W}'=\left(\ln\left(\frac{\hat{N}_1}{\hat{N}_0}\right),\ln\left(\frac{\hat{N}_2}{\hat{N}_1}\right),\ldots,\ln\left(\frac{\hat{N}_T}{\hat{N}_{T-1}}\right)\right)$, the vector of log-ratios of length n;

$\mathbf{U}$ = a $(n)\times(n-1)$ matrix with $-\Delta t_n$ on the main diagonal and Δt_1 on the sub-diagonal, i.e.,

$$\mathbf{U}=\begin{bmatrix}
-\Delta t_1 & 0 & & \cdots & \cdots & & 0\\
\Delta t_2 & -\Delta t_2 & 0 & & & & \\
0 & \Delta t_3 & -\Delta t_3 & 0 & & & \vdots\\
 & 0 & \Delta t_4 & -\Delta t_4 & \ddots & & \vdots\\
\vdots & & \ddots & \ddots & \ddots & \ddots & \\
\vdots & \vdots & & \ddots & \ddots & \ddots & 0\\
 & & & & \ddots & \Delta t_{n-1} & -\Delta t_{n-1}\\
0 & & \cdots & \cdots & & 0 & \Delta t_n
\end{bmatrix}$$

Δ_i = the difference in time between the observed abundance estimates for the i^{th} element in $\mathbf{W}$.

$\boldsymbol{\Sigma}$ = the $n\times n$ variance-covariance matrix for the log-ratios of escapement observations,, i.e.,

$$\boldsymbol{\Sigma} = \begin{matrix} \sigma_1 & \sigma_2 & 0 & \cdots & 0 \\ \sigma_2 & \sigma_1 & \sigma_2 & \cdots & 0 \\ \vdots & \ddots & \ddots & \ddots & \vdots \\ 0 & \cdots & \sigma_2 & \sigma_1 & \sigma_2 \\ 0 & \cdots & 0 & \sigma_2 & \sigma_1 \end{matrix};$$

and where $\sigma_1 = \Delta t\tau^2 + 2\sigma^2$, the variance of each ratio, i.e., $Var\left[\ln\left(\frac{\hat{N}_{t+\Delta t}}{\hat{N}_t}\right)\right]$;

$\sigma_2 = -\sigma^2$, the measurement error and covariance between 2 adjacent log-ratios.

Although Eq. 9 is a restricted maximum likelihood (REML), estimators of the continuous growth rate, μ and the variance, σ^2 are still obtained using maximum likelihood methods. More about REML methods is found in Diggle et al. (1996). Expressing the matrix **U** in terms of the time lag between successive observations makes the model flexible enough to accommodate unequally space observations.

Inferences about trends in population abundance, and estimates of extinction parameters are made using the instantaneous rate of increase, μ, which is estimated as follows,

$$\hat{\mu} = \left(\mathbf{X}'\hat{\boldsymbol{\Sigma}}^{-1}\mathbf{X}\right)^{-1}\mathbf{X}'\hat{\boldsymbol{\Sigma}}^{-1}\mathbf{W} \qquad \textbf{Eq. 10}$$

where $\hat{\mu}$ = the instantaneous rate of population change;

X = a vector of ones of length n;

$\hat{\boldsymbol{\Sigma}}$ = the estimated variance-covariance matrix obtained by maximizing likelihood Eq. 9.

For each of the *i*th element of the vector **W** there is an associated rate of change, $\hat{\mu}_i$. The estimate for the instantaneous rate of change is estimated as the average of the $\hat{\mu}_i$'s (Eq. 2) across all years, weighted by the inverse of the variance-covariance matrix. The associated variance of $\hat{\mu}$ is estimated by,

$$\widehat{Var}\left(\hat{\mu}\right) = \left(\mathbf{X}'\hat{\boldsymbol{\Sigma}}^{-1}\mathbf{X}\right)^{-1},$$

where the notation is defined as above.

Section 3 - Derivation of Kope's adjustment to the trend parameter, μ.

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April 15, 2009

MEMORANDUM FOR: Annette Hoffmann (WDFW)

FROM: Robert Kope

SUBJECT: Derivation of correction to rate of population increase for PVA

In the PVA originally presented in the Puget Sound Steelhead Harvest Management Plan, the rate of change in population size was described as an instantaneous rate where, absent harvest, the population trajectory could be described as:

(1) $N_t = N_0 e^{\mu t}$

where N is terminal run size and μ is the rate of population change, and t is time in years. Absent harvest, spawning escapement (S) = N. Harvest occurs on the terminal runs and was described as a rate (h) where h = catch/N = 1-S/N. Rearranging this gives us $S = (1-h)N$. This can be rewritten in continuous form as

(2) $S_t = N_t e^{f}$

where $f = \ln(1-h)$. Substitution of equation 1 into equation(2) gives us

(3) $S_t = N_0 e^{\mu t + f} = (1-h)\, N_0 e^{\mu t}$.

However this does not account for the effects of harvest, in terms of reduced spawning potential, on future production. If we assume that there is a linear relationship between spawning escapement and future abundance, reflected in terminal run size,

(4) $N_t = N_0 e^{(\mu + f)t}$.

This yields

(5) $S_t = N_0 e^{(\mu + f)t + f} = (1-h)\, N_0 e^{(\mu + \ln(1-h))t}$.

This would be correct for an annual species with a generation time of 1 year where the reduction in recruitment attributable to harvest occurs in the following year. But, because

1

steelhead take several years to mature, the effects of harvest will not be reflected in the terminal run size in the following year. The reduction in attributable to harvest will instead be reflected in the terminal run at a lag of 1 mean generation (t_g). This means that the annual instantaneous rate of change attributable to harvest will be f/t_g. If this is substituted into equation (5), we get

$$S_t = N_0 e^{(\mu+\frac{f}{t_g})t+f} = (1-h)N_0 e^{(\mu-\frac{\ln(1-h)}{t_g})t} \quad (6)$$

Of course, when μ is estimated from historical data in the presence of harvest, the effect of that harvest should be accounted for in the historic data in a manner consistent with the same assumption of a linear relationship between escapement and recruitment, or density independence, to get the intrinsic rate of population change (μ_0). Two ways this could be accomplished are: 1) following the above logic, increase the estimated rate of population change by $\mu_0 = \mu - \frac{\ln(1-\bar{h})}{t_g}$, or 2) estimate μ_0 directly from the cohort replacement rate as, for example, natural log of the geometric mean of $(N_{t+tg})/S_t$. The first method has the advantage of being consistent with the treatment of harvest in forward projections, but assumes that harvest rates were stationary in the historic data. The second method constrains mean generation time to integer values.

Appendix C. Application of risk assessment procedure (RAP) simulation to setting harvest rate objectives for the Skagit River MU.

Calculation of Exploitation Rates that Meet Jeopardy Standards for Skagit Wild Steelhead.

INTRODUCTION

With the listing of Puget Sound wild steelhead as "Threatened" under the Endangered Species Act (ESA), take prohibitions have been established (NMFS 2008). Although NMFS found that harvest at current levels is not "a factor limiting the viability of the Puget Sound steelhead DPS into the foreseeable future" (NMFS 2006), it is nonetheless helpful to determine quantitatively the level of harvest impact that would be allowable under ESA jeopardy standards, and compare that level to current harvest levels. Appendix C describes that analysis for Skagit wild winter steelhead.

Skagit wild winter steelhead are particularly suited for this analysis because data on recreational catch, tribal catch, spawning escapement, and age composition of the wild run have been collected since the 1977-1978 season. These data allow estimates of spawner-recruit parameters that can be used in multi-generation simulations of the long-term effects of different exploitation rates. In addition, the management objectives for Skagit wild steelhead have been essentially unchanged since the 1994-95 season (Hayman 2007) – the harvest rate since that time has been capped at 16% (that includes both incidental and directed harvest, by both Treaty and sport fisheries); and, since the 2000-2001 season, the escapement must exceed 6,000 before a directed harvest can be conducted on wild steelhead (and any directed harvest must still fit under the 16% harvest rate ceiling). Thus, there has been a relatively stable regime to represent "current harvest levels", and a quantified ceiling exploitation rate objective to compare to the results of the jeopardy analysis.

DEFINITIONS

The following definitions apply to the quantities used in this analysis:

Critical Escapement (E_{crit}): In their "VSP" (viable salmonid population) paper, McElhany *et al.* (2000) referred to the critical escapement as a point of destabilization from which there is a significant probability of extinction over a short time period (e.g., 10 years).

Recovery Escapement (E_{recov}): The Puget Sound Chinook Technical Review Team (TRT), under policy direction from NMFS, defined the recovery escapement level (they called it the "viable" level) as the initial escapement from which, under current conditions, the probability that the run would go extinct at the end of 100 years is 5% (Ruckelshaus *et al.* 2002). I.e., the initial escapement for which

$$P(N_{100} < x_e) = 5\%$$

where P is probability, N_{100} is the number of fish in the escapement after the 100^{th} year, and x_e is an extinction level (I used 100 fish; 10 fish or 1 fish could also be considered an extinction level). Note that the recovery escapement varies with the assumed current exploitation rate.

Rebuilding Exploitation Rate (RER): The exploitation rate that, when used as the target, provides the highest expected long-term catch to U.S. fisheries, consistent with achieving ESA jeopardy standards.

ESA Jeopardy Standards: In their "RAP" (risk assessment procedure) paper, NMFS (2000) stated that a fishing regime would meet ESA jeopardy standards (i.e., not significantly impede progress to recovery) if it achieves the following:

1. The percentage of escapements less than the critical escapement (E_{crit}) increases by less than 5 percentage points relative to the baseline. Mathematically:

$$(\%E < E_{crit}) < ([\%E_{\text{ under baseline}} < E_{crit}] + 5\%);$$

where %E is the percentage of escapements;

and either:

2a. Escapements at the end of 25 years exceed the recovery level at least 80% of the time. Mathematically:

$$(\%E_{25} > E_{recov}) \geq 80\%$$

where $\%E_{25}$ is the percentage of escapements after 25 years, and E_{recov} is the recovery escapement level.

Or:

2b. The percentage of escapements less than the recovery level at the end of 25 years differs from the baseline by less than 10 percentage points. Mathematically:

$$(\%E_{25} < E_{recov}) < ([\%E_{25 \text{ under baseline}} < E_{recov}] + 10\%)$$

METHODS

Given these definitions, the RER could be calculated analytically. To do this analysis, I used an Excel spreadsheet (SthdVRAP 808.xls) that simulated recruitment, catches, and escapement of a single steelhead stock over a selected period of years, under conditions of

uncertainty and error in management, and environmental variation. Stock-specific inputs to this model were spawner-recruit parameters (with variability values for those parameter estimates), age composition values in the terminal area, and the distribution of management error (i.e., the percent difference between management targets and harvest rates actually applied). I set the initial spawning escapement level, selected a target exploitation rate, and ran the program for a chosen number of years (100 years for E_{recov} runs, and 25 years for RER runs). At the end of that run, the program generated a new set of underlying spawner-recruit parameters (using the uncertainty in the parameter estimates) and ran the simulation again. This process repeated for a user-selected number of runs. After all the runs were completed for a given target exploitation rate, the program output the target exploitation rate, the mean recruitment, the mean catch, the mean escapement number, the number of times escapement fell below the critical escapement, the number of runs that ended with an escapement below the recovery escapement, and the number of runs that ended with extinction. This process was then repeated for a different target exploitation rate.

Estimation of Spawner-Recruit Parameters:

Spawner-recruit parameters have been estimated previously for Skagit wild steelhead (Conrad 1992; Hahn 1992), for brood years 1978-1986. This paper extends the analysis for subsequent broods.

Wild escapement estimates have been made from redd counts each year since 1978, with the exception of 1996 and 1997, and are summarized in in-house spreadsheets.

Age composition has been estimated from scale samples taken from the tribal fishery, the recreational fishery, and the Baker trap. Prior to 1992, there were sufficient scale samples from the fisheries to stratify the age composition estimates by 2-week periods, with the age composition applied to the catches during each period. At the end of the season, the age composition of wild fish in the recreational catch was applied to the spawning escapement, to estimate the age composition of the escapement. In 1992, the recreational creel survey ended, and effort in the tribal catch decreased significantly, which reduced the number of fisheries scale samples taken in subsequent years. Consequently, we started taking scale samples from wild steelhead at the Baker trap. Because of the lower number of scale samples, we could no longer stratify the catch by 2-week periods, and instead aggregated the scale samples from wild fish over the entire season (wild steelhead are distinguishable from hatchery steelhead because they have an adipose fin), and applied this aggregated age composition sample to the entire catch and spawning escapement of wild steelhead.

Recruitment was calculated by multiplying each year's catch and escapement of wild steelhead by the corresponding age composition percentages of non-repeat spawners, to get recruitment by age by year of non-repeats, and adding together the age-specific recruitments from each brood year. The repeat spawner recruitment was calculated by lumping together all repeat spawner scale samples, regardless of their age, determining their percentage of the wild sample, and multiplying that percentage by the catch and escapement of wild steelhead. I then calculated the repeat spawner return rate by dividing the repeat spawner recruitment each year by the previous year's escapement. In all calculations of recruitment, the catches were landed

terminal area catch only – there were no expansions for preterminal catches or for release mortalities, because no estimates of those quantities exist.

Having calculated the spawners and recruits for each brood year, I then estimated the spawner-recruit parameters for a Ricker curve and for a Beverton-Holt curve. The equation for the Ricker curve is:

$$R = S*\alpha*EXP(-\beta*S) + \varepsilon$$

where R is recruitment, S is the number of spawners, α and β are constants, EXP means to raise the base of the natural logarithm function to the power of the following argument, and ε is a random error term with mean of 0 and standard deviation of the prediction standard error at S. The equation for the Beverton-Holt curve is:

$$R = a*S/((a/b) + S) + \varepsilon$$

where a is the recruitment when S equals ∞, and b is the slope at the origin.

For each equation, I used Excel's Solver function to derive the parameter estimates that minimized the sum of squares of the residuals from the spawner-recruit curves. To calculate the standard errors of the parameters, I ran a regression of ln(R/S) against S, derived the coefficients of variation (C.V.) for each parameter, and multiplied the C.V. by the parameter estimate. That may not be the correct way to do it, but I didn't know how else to calculate the standard errors of separate parameters in a non-linear equation.

I also did multiple regressions for both the Ricker and Beverton-Holt curves that added a marine survival variable. For the Ricker curve, the marine survival variable was the marine survival rate of the *hatchery* release that occurred in the second spring of the wild brood (e.g., for wild BY 1978, I used the marine survival rate of the BY 1979 hatchery release, which was released in the spring of 1980, because most of the BY 1978 wild smolts also outmigrated in the spring of 1980). The equation for the Ricker curve that includes this variable is:

$$R = S*\alpha*EXP(-\beta*S + \gamma*M) + \varepsilon$$

where γ is a constant and M is the hatchery smolt marine survival rate. For the Beverton-Holt multiple regression, the marine survival variable was the marine survival rate of a hatchery smolt release divided by the median hatchery smolt marine survival rate. Thus, this variable was an index with a median of 1.0. The equation for the Ricker curve that includes this variable is:

$$R = M^{\gamma}*a*S/((a/b) + S) + \varepsilon$$

where γ is a constant and M is the hatchery smolt marine survival *index*. As with the single variable regressions, I used Solver to estimate the parameters that minimized the sum of squares of the residuals from the spawner-recruit curves, and I estimated the standard errors of these parameters by running a regression of ln(R/S) against S and M, and multiplying the C.V. of each parameter, from the linear regression, by the parameter estimate derived from Solver.

I made two further adjustments to the spawner-recruit curves, to try to account for depensatory recruitment at low escapement levels. The first adjustment was that, for all escapements less than E_{crit}, the average recruit/spawner value was 1.0 (i.e., for all escapements less than the point of depensation, recruitment averaged replacement only). The second adjustment was that for escapements less than all previously-observed values, but greater than E_{crit}, the average recruits/spawner value was equal to the recruits/spawner value at that lowest observed escapement (hereafter abbreviated "$E_{LowObsEsc}$"). I did this because, not having observed any escapements lower than the lowest observed level, it is unknown whether productivity increases at lower escapement levels, as theorized by both the Ricker and Beverton-Holt curves. This second adjustment also reduced the degree of knife-edge increase in escapement that occurs when escapement is one fish greater than E_{crit}. Thus, the generalized shape of the spawner-recruit curve used in this analysis is as shown in Figure 9.

Critical Escapement Level (E_{crit}):

Theoretically, E_{crit} could be calculated by starting a simulation with different initial escapement levels, and running SthdVRAP 808.xls until we find the initial escapement that leads to extinction after 10 years in a significant percentage (e.g., 5%) of the runs. In actual practice, however, for stocks that have not actually experienced critical escapements, attempts to simulate this level have been unsatisfactory because it's necessary first to know the depensation level in order to find the depensation level (Hayman 1999), which is circular and uninformative. Consequently, I used Peterman's (1977) estimate that the point of destabilization is approximately 5% of the carrying capacity.

Recovery Escapement (E_{recov}):

The steps used to calculate the recovery escapement were as follows:

1. Set the E_{crit} value as the point of instability in SthdVRAP, and input the spawner-recruit parameters.

2. Set the target exploitation rate. For this exercise, this rate should be the "current" level, which, for the Skagit, has averaged 5% over the last 10 years. However, I was evaluating the ceiling rate, which is 16%, not the average rate, so I did most of these runs with a target exploitation rate of 16%. I also tried some higher rates.

3. To run SthdVRAP[2], I input spawning escapements for the first 4 years of the run, age 5 and 6 escapements[3] for year 5, and age 6 escapements for year 6 (all other escapements were generated by the model). I input the same initial escapement number for each of the first 4 years, and used the average age composition, multiplied by the initial escapement number, to input the year 5 and 6 escapements. For example, if the initial escapement that was being evaluated was 1,000, and, on average, 60% of the run has been age 4 fish, then the initial age 4 escapement in year 5 was 600.

[2] In order to save time, I created a separate spreadsheet for the recovery escapement runs, named ERecov4Sthd S08.xls.

[3] The age 6 return also includes a small added percentage to account for age 7 fish. There weren't many age 7 fish, so I combined them with age 6.

4. Set the underlying spawner-recruit parameters that were used on each 100-year run, by multiplying the standard error of each parameter by a randomnormal variable with a mean of 0 and standard deviation of 1, and adding those products to the respective spawner-recruit parameters that were derived under "Estimation of Spawner-Recruit Parameters", above.

5. Run SthdVRAP 2000 times for 100 years/run. The execution sequence for each year was:

   a) From the brood escapement, use the spawner-recruit parameters derived in Step 4 (above) to generate the Yhat of recruitment (this Yhat value is not adjusted for E_{crit} or $E_{LowObsEsc}$ – see Figure 9).

   b) Calculate the prediction standard error of recruitment at the brood escapement.

   c) Multiply that standard error by a randomnormal variable with a mean of 0 and standard deviation of 1.

   d) Add that product to the Yhat of recruitment.

   e) I put upper and lower limits on the percentage deviation allowed from the spawner-recruit curve (in order to avoid ridiculous results). Check to see whether the percentage deviation is within those limits. If not, then adjust the percentage deviation from the spawner-recruit curve so that the deviation was equal to the value of the nearer limit.

   f) Calculate the Yhat of recruitment that resulted from using the adjustments for E_{crit} and $E_{LowObsEsc}$ (Figure 9). Multiply this value by the percent deviation calculated in the step above. This product is the brood year recruitment.

   g) Randomly choose an age composition of the brood return from one of the 17 brood years for which we have estimates of the brood return age composition (Table 53). Apply this composition to the brood year recruitment.

   h) Randomly choose a percent return of repeat spawners value from one of the 19 return years for which we have an estimate of the previous year's escapement that returned as repeat spawners (Table 53). Multiply this percentage by the previous return year's spawning escapement, to get the number of repeat spawners in that return year.

   i) Sort the brood recruits by age into their respective return years, and sum the brood recruits by age for the return year, plus the repeat spawners returning that return year, to get the return year run size.

j) Multiply the target exploitation rate by a randomly-chosen management error percentage, to generate the actual exploitation rate.

k) Multiply the actual exploitation rate by the return year run size, to get the return year catch. The remainder was the brood year escapement for that return year.

l) After repeating this sequence for 100 years, repeat Step 4 before the next 100-year run.

6. Go to Step 3, and input a different initial escapement level. Continue changing the initial escapement level until you get a level that results in 19 extinctions in 2000 runs. This initial escapement is E_{recov}.

Calculation of the RER:

The steps used to calculate the RER were as follows:

1. Set the initial escapements at recently observed escapement levels. I started by setting the observed 2003 escapement, which contributed primarily to runs returning in 2007 and 2008, as the Year 1 escapement. My initial escapement inputs were: Year 1 = 6,800; Year 2 = 7,300; Year 3 = 6,400; Year 4 = 6,800; Year 5 Age 5 = 2,000; Year 5 Age 6 = 600; and Year 6 Age 6 = 700.

2. Set E_{recov} as the recovery level calculated above. SthdVRAP will tally the number of runs that end with escapements below this level.

3. Set the target exploitation rate at 0%.

4. Run SthdVRAP 2000 times for 25 yrs/run (not 100 yrs, as was done for E_{recov}). The execution sequence for each year, and the adjustment procedure for the underlying spawner-recruit parameters before each 25-year run, were as described under "Recovery Escapement" (above).

5. Record the percentage of escapements less than E_{crit}, and the percentage of runs that end with escapements below E_{recov}. This is the baseline.

6. Input a different target exploitation rate.

7. Run SthdVRAP 2000 times for 25 years/run.

8. Go to Step 6. Continue until you identify the highest target exploitation rate that achieves the jeopardy criteria.

9. Identify the target exploitation rate below that level that achieves the highest mean catch. That becomes the RER for Skagit wild steelhead.

RESULTS

Spawner-Recruit Parameters:

From the available data, I was able to construct spawner-recruit data for 17 brood years: brood years 1978-1990, and 1998-2001 (Table 49). The predominant non-repeat spawner ages were ages 4 through 6, with occasional appearances of 3-year-olds and 7-year-olds. Because, due to terrible surveying conditions, there were no escapement estimates (hence, no run size estimates) for 1996 and 1997, and because no scale samples were taken in 1997, 1999, and 2000, and an inadequate number of scale samples (5) were collected in 2001, I could not generate either spawner or recruit numbers for brood years 1991-1997. Brood years 1990 and 2001 had no scale samples for ages 6 and 7, but because those ages were a relatively minor (but not insignificant) part of each brood, I assumed the age 6 and 7 contribution to those two broods was equal to the average age 6 + 7 percent contribution (15.7%) to the other broods that I had complete data for. Brood year 2001 can be updated when the 2007 and 2008 scales are read, but for this analysis I assumed the average contribution percentage.

Table 49. Best-fit spawner-Recruit Parameters for Skagit Steelhead Brood Years 1978 - 2001, using single variable regressions.

	Ricker	Beverton-Holt
α or a	3.690	10002
β or b	1.41E-04	11.11
MSY Escapement	3795	2101
Replacement	9235	9101
Std dev of α or a	0.766	3950
Std dev of β or b	2.47E-05	1.01
Root Mean Square Error	3183	3384
Maximum Deviation Ratio	1.85	1.90
Minimum Deviation Ratio	0.55	0.52

When plotting the spawner-recruit curves, using these parameters, all the points above the curves were from brood years 1985 or earlier (Figure 10). This could be seen clearly from a plot of residuals against brood year (Figure 11), which indicates that productivity has been lower since brood year 1985. In doing forward-running simulations, it's preferable to model productivity as it's likely to be in the future, so we have to ask whether the types of productivities seen from 1978-1985 are likely to occur over the next few decades. If the answer to that question is "not likely", then the productivities observed only in the more recent years, from brood years 1986-2001, would be more likely to represent the future. I therefore also derived spawner-recruit parameters for just the brood year 1986-2001 values. The best fit spawner-recruit parameters for these data were:

Table 50. Best-fit spawner-Recruit Parameters for Skagit Steelhead, Brood Years 1986 -2001, using single variable regression.

	Ricker	Beverton-Holt
α or a	2.212	7941
β or b	1.11E-04	6.78
MSY Escapement	3208	1879
Replacement	7170	6769
Std dev of α or a	0.403	1131
Std dev of β or b	1.58E-05	1.24
Root Mean Square Error	869	836
Maximum Deviation Ratio	1.17	1.14
Minimum Deviation Ratio	0.74	0.78

These curves were considerably flatter than for the entire data series (Figure 12), with lower residuals, and the residuals didn't appear to have a trend over time (Figure 13).

For the simulations that used marine survival values (Table 49) in a multiple regression, the best-fit spawner-recruit parameters for these data were:

Table 51. Best-fit spawner-recruit parameters for Skagit steelhead, brood years 1978 - 2001, incorporating marine survival in multiple regression models.

	Ricker	Beverton-Holt
α or a	2.535	10053
β or b	1.35E-04	27.88
γ	16.30	0.2721
Root Mean Square Error	2238	2613
Maximum Deviation Ratio	1.71	1.67
Minimum Deviation Ratio	0.64	0.50
Std dev of α or a	.0571	1557
Std dev of β or b	2.08E-5	6.28
Std dev of γ	3.84	.064
MSY Escapement @:		
Median Marine Surv	3830	1543
8-Yr Avg Marine Surv	3086	1316
4-Yr Avg Marine Surv	2776	1136
Replacement @:		
Median Marine Surv	9212	9693
8-Yr Avg Marine Surv	8170	7434
4-Yr Avg Marine Surv	7306	5849

The Beverton-Holt curve had a particularly (and probably unrealistically) steep ascending limb, which resulted in very low estimates of MSY escapement, and variation about this curve, in the

range of observed escapements, was largely due to variation in hatchery marine survival. In the Ricker relation, in contrast, escapement has a greater effect on variation in recruitment in the range of observed escapements (Figure 14 and Figure 15).

Brood Year Age Composition:

For the simulations, I combined the age 3 recruits with age 4, and I combined the age 7 recruits with age 6. The resulting percentages by age of the brood year recruitments, from which the age compositions of the simulated recruitments were drawn, along with the repeat spawner percentages, are shown in Table 53.

Critical Escapement Level:

My estimate of critical escapement was 5% of the replacement level (see Methods, above); however, depending on the data series and model used, there were several possible estimates of replacement level (see above). In this exercise, I interpreted replacement as applying to "good conditions", which I further interpreted as meaning the productivity that existed for brood years 1978-1985. I therefore derived spawner-recruit parameters that applied just to those 8 brood years, and calculated the resulting replacement level. For the Ricker relation, the resulting replacement level was 11,800; for the Beverton-Holt, it was 13,900. For no good reason other than that the number was higher, I elected to use the Beverton-Holt value; thus, the critical escapement level, at 5% of replacement, was about **700**.

Recovery Escapement Level (E_{recov}):

To do the E_{recov} simulations, there were several inputs that had to be chosen. In order to evaluate the sensitivity of changes in any of these inputs, I first designated a set of "base" (most reasonable) inputs, so that I could then vary one input at a time from this base package, and thereby evaluate the model's sensitivity to that input. For the E_{recov} simulations, the "base" inputs were:

Number of Runs/Escapement Level:	2,000
Number of Years/Run:	100
Spawner-recruit model:	Ricker, with single variable (spawners)
Brood Year Data Base for Parameters:	1986-2001 (i.e., short time series)
Maximum Deviation from Curve:	120%
Minimum Deviation from Curve:	70%
E_{crit}:	700
$E_{LowObsEsc}$:	3,000
Harvest Rate Target:	16%
Harvest Rate Management Error Range:	85% to 115%

The E_{recov} simulations indicated that, at a target ER of 16%, extinctions were very infrequent for *any* initial escapements that exceeded the critical escapement level, no matter what changes were made to the other base inputs (Table 54). In these simulations, with the short (BY 1986-2001) database parameters, the recovery escapement was always the same as the critical escapement level, and with the longer database (BY 1978-2001), which includes more productive years, the recovery escapement was actually *less than* the critical escapement level.

In fact, the only way to generate extinctions from initial escapements higher than the critical level, was to increase the exploitation rate above 16%.

The results were sensitive to the target exploitation rate. With a Ricker relation, and a target harvest rate of 50%, the viability criteria could not be met for *any* initial escapement level, no matter how high. However, at an exploitation rate target of 39%, the 5% probability of extinction criterion could be met with an initial escapement of 1900, and the 1% probability criterion could be met with an initial escapement of 3700. With a Beverton-Holt relation, and a target ER of 49%, the 5% probability criterion could be met with an initial escapement of 2100, and the 1% criterion could be met with an initial escapement of 3300 (Table 54).

Since my task was to examine the effect of a 16% ER, these results were not particularly germane, except to show that, under the assumptions used in these simulations, it is unlikely that a 16% ER will cause extinction, and that escapements that satisfy the recovery escapement criteria could be quite low. Since it wouldn't be particularly informative to model E_{recov} as the same level as E_{crit}, I decided to take a different approach to setting E_{recov} in these simulations.

What I did instead was use the calculated MSY escapement as the E_{recov} value. In evaluating RERs for Puget Sound Chinook, NMFS also used the calculated MSY escapement as the recovery escapement level (NMFS 2005), and in the one case (Skagit summer/fall Chinook) where a comparison was made between the MSY escapement and the recovery escapement criteria, the MSY escapement was substantially higher than the lowest escapement that satisfied the recovery escapement criteria (Hayman 1999).

For Skagit wild steelhead, I generated several estimates of MSY escapement, depending on the model used and the length of the database, that ranged, for the Ricker relations, from about 3000 to 3800 (see Spawner-Recruit Parameters, above). These escapement levels were all well above the escapements that satisfied the recovery escapement criteria, assuming current conditions and a 16% ER target (Table 54), and were also above the lowest previously-observed escapement (2982 in 1979). Since the 1979 escapement more than replaced itself in recruitment, there is empirical evidence (beyond just the modeling done in this paper) that the MSY escapement estimates from the Ricker relation lie at levels where stock size is increasing, which indicates a low probability of going extinct. The Beverton-Holt estimates of MSY escapement, however, were quite a bit lower than the Ricker estimates, due to the steep ascending limb of this relation for values near the origin (where there are no observations); because of the lack of any data on production at these values near the origin, I did not use the Beverton-Holt MSY escapement estimates as E_{recov} in any of the RER simulations. Thus, I used only the Ricker estimates of MSY escapement as the E_{recov} values in the RER simulations. For simulations that used the BY 1986-2001 data series to generate the spawner-recruit parameters used in the simulation (for both Ricker and Beverton-Holt parameters), I used the MSY escapement from the BY 1986-2001 Ricker relation (**3208**) as E_{recov}. For simulations that used the spawner-recruit parameters (either Ricker or Beverton-Holt parameters) from the entire (BY 1978-2001) spawner-recruit data series, I used the MSY escapement from the 1978-2001 Ricker relation (**3795**) as E_{recov}.

RER Calculation:

In analyzing the RER simulations (Table 55), the first thing to realize is that I never figured out how to generate a repeating random number sequence in Excel; consequently, there was some slop in the results (e.g., a slightly higher ER might result in a slightly *higher* modeled mean escapement in one simulation run), and, if I ran the exact same simulation again, I may not get exactly the same results. That said, the results are repeatable to within ± 1 percentage point, and this random variation did not change the overall conclusions of this analysis.

For all simulations, the limiting jeopardy criterion was exceeding E_{recov} 80% of the time (i.e., the target ER that resulted in escapements exceeding E_{crit} 95% of the time was always higher than the ER that resulted in exceeding E_{recov} 80% of the time). For the base simulation, the calculated RER was 28% for the Ricker model, and 36% for the Beverton-Holt (Table 52). Changing the value of E_{crit} (compare Sim #s 1, 2, and 3), increasing the amount of deviation from the spawner-recruit curve (Sim #4), and increasing management error (Sim #6) did not affect the RER, which remained at about 28%. Biasing the management error higher (Sim #7) did affect the RER, which would be expected because biasing management error higher has the effect of increasing the target ER. Interestingly, not varying the underlying spawner-recruit parameters before each 25-year run (Sim #5) also increased the RER (to 33%). This is a significant result because I'm not sure I *should* have varied the underlying spawner-recruit parameters before each run – I already modeled variation around the spawner-recruit curves, so inserting variation into the spawner-recruit curves themselves may have been overdoing the variation. Anyway, a question for the statisticians.

The RER was sensitive to the E_{recov} value (compare simulations #1, 8, 9, 14, 15, and 16) – with E_{recov} values varying from 2000 to 4000, the RER varied from 20% to 40% for the Ricker curve, and from 25% to 48% for the Beverton-Holt. The RER was also sensitive to the spawner-recruit parameters – using the parameters from the BY 1978-2001 spawner-recruit relations resulted in RERs of 42% for the Ricker curve (Sim #10) and 39% for the Beverton-Holt curve (Sim #17).

For the multiple regression simulations with hatchery marine survival as an input variable, I chose, as the E_{recov} value, the MSY escapement that applied to the time period represented by the modeled marine survival variables. Thus, for the multiple regressions that used the recent 4-yr and 8-yr averages, I used, as E_{recov}, the MSY escapement from the BY 1986-2001 spawner-recruit analysis (3208), since those recruitments were what resulted from marine survival rates similar to those of the last 4 and 8 hatchery brood years (and, if we expect marine survival to remain at this level, that's the MSY escapement that will apply in the future). For the multiple regressions that used the entire marine survival database (these would be appropriate if we expect hatchery marine survival to return to what it was during BY 1978-2001), I used the MSY escapement from the BY 1978-2001 spawner-recruit analysis (3795) as E_{recov}. For the Ricker multiple regressions, the RERs did not vary much – from 36% with the recent 4-yr hatchery marine survival range, to 40% using all available years (Table 52). The Beverton-Holt multiple regression gave a wider range of RERs – from 29% with the recent 4-yr marine survival range, to 45% for the multiple regression that uses the entire database.

At a target ER of 16%, the jeopardy standard was achieved for all the simulations that were run (Table 55). In these simulations, no escapements fell below the E_{crit} value (even when E_{crit} was raised to 1500 – see Sim #3), which achieved the criterion that less than 5% of the escapements can fall below E_{crit}. For the Ricker simulations, the percentage of runs that ended with escapements less

than E_{recov} ranged from 0.4% (Sim #5 – underlying spawner-recruit relation didn't vary) to 15.4% (Sim #9 – E_{recov} increased to 4000). In the "base" simulation, 5.6% of the runs ended with escapements less than E_{recov}. All of these achieved the criterion that less than 20% of the runs could end with escapements less than E_{recov}. For the Beverton-Holt simulations, the percentage of runs that ended with escapements less than E_{recov} varied from 0% (E_{recov} = 2000) to 9.8% (Sim # 20 – multiple regression using the recent 4-yr range of hatchery marine survivals), with 1.5% of the runs ending below E_{recov} in the "base" simulation. All of these simulations also achieved the E_{recov} criterion.

DISCUSSION

The RER that applies to Skagit wild winter steelhead depends on what we assume about future conditions. If we assume that survival is going to continue at recent levels (i.e., survival will continue to be poorer than in the early to mid-1980s), then we should use the spawner-recruit parameters that apply to recent years to estimate RER. This analysis indicated that the RER in that case would range from about 28% to 40%. If we assume that the survival conditions of the early to mid-1980s will return, then the RER would be higher.

One aspect of this analysis that needs further discussion is whether the simulation should have varied the spawner-recruit parameters before each run. This added variability to the variability already being modeled, which may have been duplicative. My rationale for adding this variability in the parameters was that we don't know what the true spawner-recruit relation is, and, by varying the underlying parameters, I was simulating a range of possible "true" spawner-recruit parameters. If this step was improper, then Sim #5 indicates that the RER should be higher.

At any rate*, it is not necessary to specify an RER*, because the co-managers are not intending to increase their harvest rates above current levels. All that is necessary is to determine whether the RER is higher than current levels of ER.

Under current management, the ceiling ER for Skagit wild winter Chinook is 16%. All estimates of RER were well above 16%, and the 16% target harvest rate satisfied jeopardy standards by a substantial margin (Table 55). However, current management is actually more conservative than this – under current management, 16% is a ceiling, **NOT** a quota. Thus, in no year since the 16% ceiling was established, has the exploitation rate even reached 16% -- the highest ER since that time was 13% (in 1998-99), and the recent 10-yr average has been 5%. If I had used 5% as the target ER in these simulations, which is actually *closer* to the reality of current management, the jeopardy standards would have been achieved by an even more substantial margin (e.g., in the Ricker base run, only 2.7% of the runs ended with escapements below E_{recov}, vs. 5.6% of the runs under a target ER of 16%; but both ERs were well under the jeopardy standard of 20%).

In addition, the initial escapements in the simulations, which were the recent-year (since BY 2003) spawning escapements, were all between 4100 and 7300. All of these escapement levels were well above the initial escapement levels that had less than a 1% (or 5%) probability of going extinct in the next 100 years (Table 54) – in fact they were *all higher than every estimate of MSY escapement*, which would imply that, if current conditions are maintained, there is a very low probability that the Skagit wild winter steelhead run will go extinct within the next 100 years.

NMFS (2006) stated that harvest at current levels is not "a factor limiting the viability of the Puget Sound steelhead DPS into the foreseeable future". This analysis supports that conclusion – at current levels, fisheries harvests do not jeopardize the existence of wild Skagit steelhead.

SUMMARY

Important values calculated from this analysis are:

Critical Escapement: **700**
Recovery Escapement (MSY Escapement) assuming BY 1986-2001 productivity: **3208**
Recovery Escapement (MSY Escapement) assuming BY 1978-2001 productivity: **3795**
RER (assuming BY 1986-2001 productivity): **28% to 40%**
RER (assuming BY 1978-2001 productivity): **39% to 45%**
At any rate, **RER is greater than 16%**.

TABLES

Table 52. Spawner-recruit estimates for Skagit wild winter steelhead, and hatchery marine survival rates.

Brood Yr	Spawners	Recruits	Hatchery Marine Survival	Marine Survival Index
1978	5757	9743	2.12%	1.12
1979	2982	3987	1.26%	0.66
1980	5288	10607	2.95%	1.55
1981	4308	14624	5.50%	2.90
1982	9609	8685	3.27%	1.72
1983	7732	12156	2.35%	1.24
1984	8963	17238	2.40%	1.27
1985	8603	10804	2.67%	1.41
1986	11098	6824	2.60%	1.37
1987	8305	7752	0.64%	0.34
1988	13194	7069	1.90%	1.00
1989	11854	6972	1.06%	0.56
1990	10017	8096	1.07%	0.56
1998	7448	7753	0.60%	0.31
1999	7870	5372	0.04%	0.02
2000	3780	6436	0.32%	0.17
2001	4584	5654	0.34%	0.18
Mean	**7729**	**8810**	**1.83%**	**0.96**
Median	**7870**	**7753**	**1.90%**	**1.00**
4-Yr Avg	**5921**	**6304**	**0.32%**	**0.17**
8-Yr Avg	**8382**	**6888**	**0.74%**	**0.39**

Age 6 and 7 data are not available for brood years 1990 and 2001, so the age 6/7 components of those broods were assumed equal to the long-term average percentage (15.7%). The hatchery marine survival rates are for the releases that outmigrated the same spring as the wild 2-yr-old smolts (i.e., the subsequent brood year), and were used as variables in multiple regressions with spawners. The survival percentages were used in Ricker multiple regressions, and the indexes (survival percentage divided by median survival percentage) were used in Beverton-Holt multiple regressions.

Table 53. Age composition of brood year recruitments and repeat spawners as a percentage of the previous year's spawning escapement, for Skagit wild winter steelhead.

	Non-Repeat Recruits		
Brood Year	Age 4	Age 5	Age 6
1978	44.9%	50.2%	4.9%
1979	58.8%	39.4%	1.8%
1980	61.5%	31.3%	7.2%
1981	43.1%	46.8%	10.1%
1982	46.7%	41.8%	11.4%
1983	30.7%	52.7%	16.6%
1984	43.1%	47.1%	9.8%
1985	29.2%	57.2%	13.6%
1986	40.3%	49.1%	10.7%
1987	12.0%	62.8%	25.2%
1988	39.4%	36.1%	24.5%
1989	28.0%	34.7%	37.3%
1990	49.4%	34.9%	15.7%
1998	21.6%	64.8%	13.7%
1999	11.7%	59.0%	29.3%
2000	47.1%	43.8%	9.1%
2001	18.6%	65.7%	15.7%

Repeat Spawners	
Return Yr	% of Previous Esc
1979	8.2%
1980	14.3%
1981	15.2%
1982	49.1%
1983	7.3%
1984	9.4%
1985	8.6%
1986	19.5%
1987	17.0%
1988	12.4%
1989	8.9%
1990	7.6%
1991	7.3%
1993	10.0%
1994	2.1%
1995	12.3%
2004	2.0%
2005	9.1%
2006	3.0%

These percentages were drawn randomly for the simulations used to estimate the RER for Skagit steelhead. For purposes of running these simulations, the Age 4 percentages include the few Age 3's that have been observed, and the Age 6 percentages include the Age 7's.

Table 54. The initial Skagit wild steelhead spawning escapement levels from which there is less than a 5% probability (middle column) and less than a 1% probability (right column) of extinction in 100 years, under current conditions.

Run Description	Initial Escapement with P(extinction):	
	< 5%	< 1%
Base Run	700	700
Base with Beverton-Holt	700	700
E_{crit} = 500	500	500
E_{crit} = 1500	1500	1500
Target HR = 50%	none	none
Target HR = 39%	1900	3700
Beverton-Holt with Target HR = 49%	2100	3300
Max deviation from S-R = 10% to 300%	700	700
Underlying S-R Parameters Constant Each Run	700	700
HR Error Range = 65% to 135%	700	700
HR Error Range = 85% to 135%	700	700
Long BY Database (BY 1978-2001)	400	400

Modifications to the "base run" (defined in the text) are listed in the left column. For Puget Sound Chinook, the standard for the "viable" level (referred to in this paper as the "recovery escapement") is less than a 5% probability of extinction in 100 years (Ruckelshaus *et al.* 2002). The less than 1% probability level is a more stringent standard that was used for Skagit summer/fall Chinook (Hayman 1999).

Table 55. The target ERs that achieve each jeopardy standard under different modeling assumptions, for Skagit wild steelhead.

Sim #	Simulation Description	Highest Target ER That Achieves:		Target ER = 16%	
		(%E<E_{crit})<5%	(%E<E_{recov})<20%	%E<E_{crit}	%E<E_{recov}
Ricker Model Runs:					
1	Base Simulation (E_{recov} = short period MSY = 3208)	53%	28%	0%	5.6%
2	E_{crit} = 500	55%	28%	0%	4.8%
3	E_{crit} = 1500	41%	28%	0%	6.1%
4	Max deviation from S-R = 10% to 300%	51%	29%	0%	6.2%
5	Underlying S-R Parameters Constant Each Run	52%	33%	0%	0.4%
6	HR Error Range = 65% to 135%	50%	28%	0%	6.8%
7	HR Error Range = 85% to 135%	46%	26%	0%	6.4%
8	E_{recov} = 2000	51%	40%	0%	0.6%
9	E_{recov} = 4000	51%	20%	0%	15.4%
10	Long BY Database (BY 1978-2001); E_{recov}=3795	65%	42%	0%	4.9%
11	Multiple Regression: All yrs mar surv; E_{recov}=3795	63%	40%	0%	4.1%
12	Mult Regr: 8-yr mar surv; E_{recov}=86-2001 MSY (3208)	> 60%	38%	0%	4.2%
13	Mult Regr: 4-yr mar surv; E_{recov}=86-2001 MSY (3208)	> 60%	36%	0%	6.1%
Beverton-Holt Model Runs:					
14	Base Simulation (E_{recov} = short period MSY = 3208)	51%	36%	0%	1.5%
15	E_{recov} = 2000	57%	48%	0%	0.0%
16	E_{recov} = 4000	57%	25%	0%	8.0%
17	Long BY Database (BY 1978-2001); E_{recov}=3795	66%	39%	0%	4.1%
18	Multiple Regression: All yrs mar surv; E_{recov}=3795	70%	45%	0%	1.9%
19	Mult Regr: 8-yr mar surv; E_{recov}=86-2001 MSY (3208)	> 60%	40%	0%	4.7%
20	Mult Regr: 4-yr mar surv; E_{recov}=86-2001 MSY (3208)	> 60%	29%	0%	9.8%

The middle two columns list the highest ER that achieves the criterion that less than 5% of the escapements can be below E_{crit} (left), and the highest ER that achieves the criterion that less than 20% of the escapements after 25 years can be below E_{recov} (right). The right two columns list the probability of failing to meet each jeopardy criterion at a target ER of 16%.

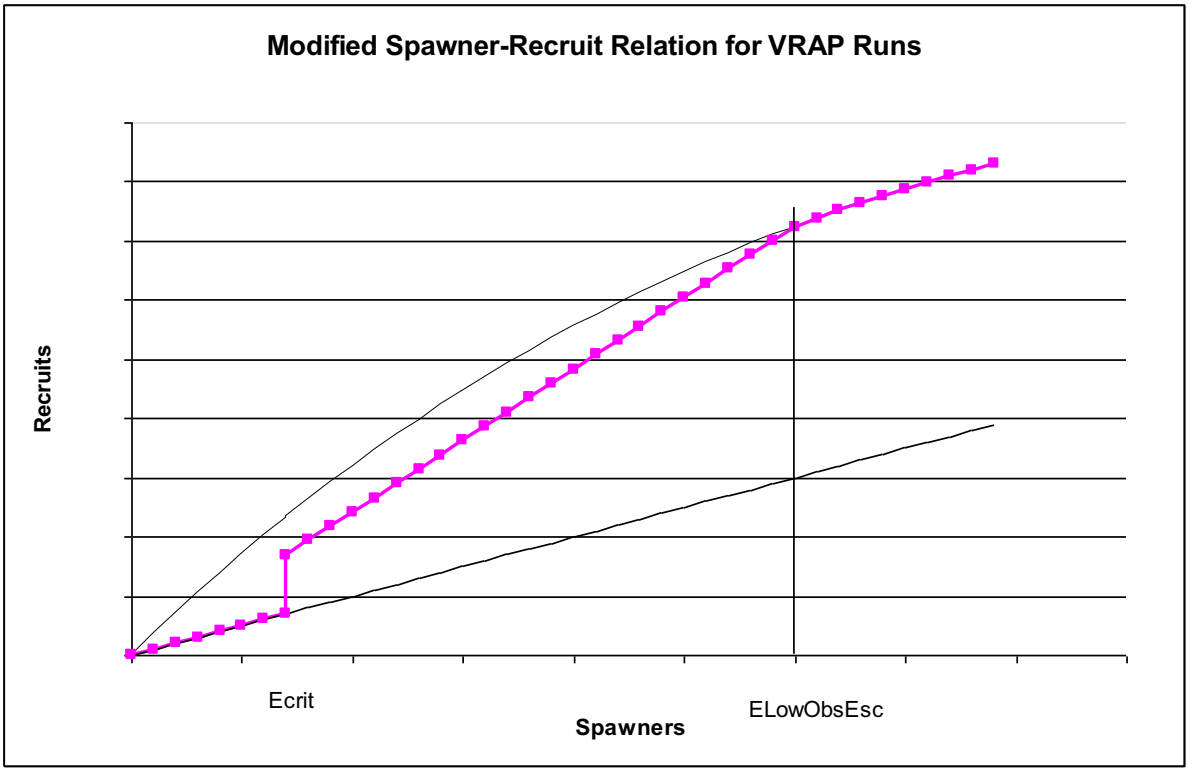

Figure 9. The generalized shape of the spawner-recruit curve used in this analysis.

The lightly-dashed line is the unadjusted spawner-recruit curve (in this example, a Ricker curve). The heavy line with the square markers is the relation actually used to generate recruitment for this analysis. Note that recruitment lies on the replacement line for values less than E_{crit}, and that, for escapements between E_{crit} and the lowest previously-observed escapement ($E_{LowObsEsc}$), the recruits/spawner value is the same as at $E_{LowObsEsc}$, and is less than in the unadjusted spawner-recruit curve.

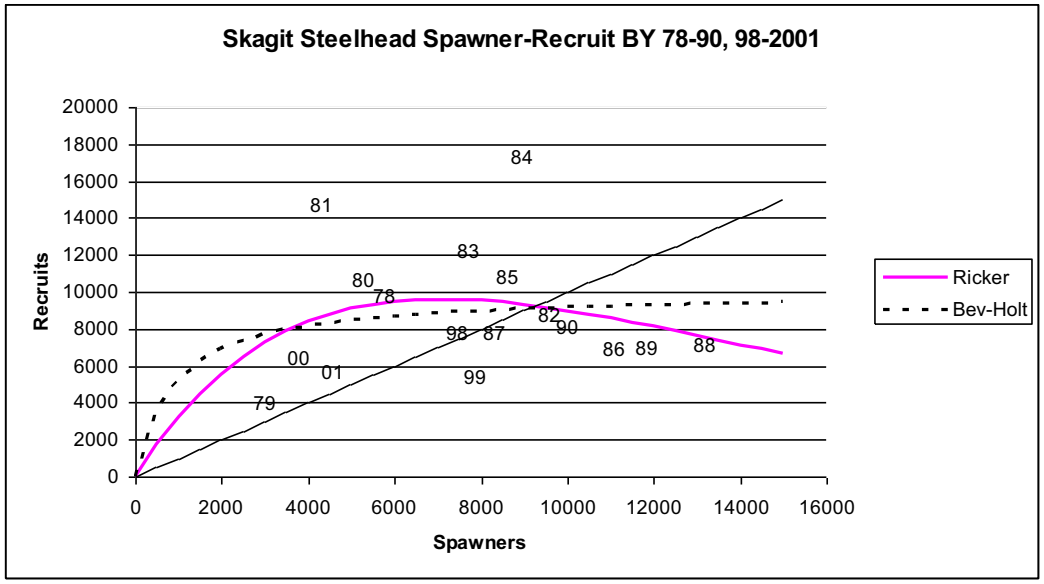

Figure 10. The Skagit wild winter steelhead spawner-recruit relation for brood years 1978-1990 and 1998-2001.

The 2-digit numbers are the points for that brood year.

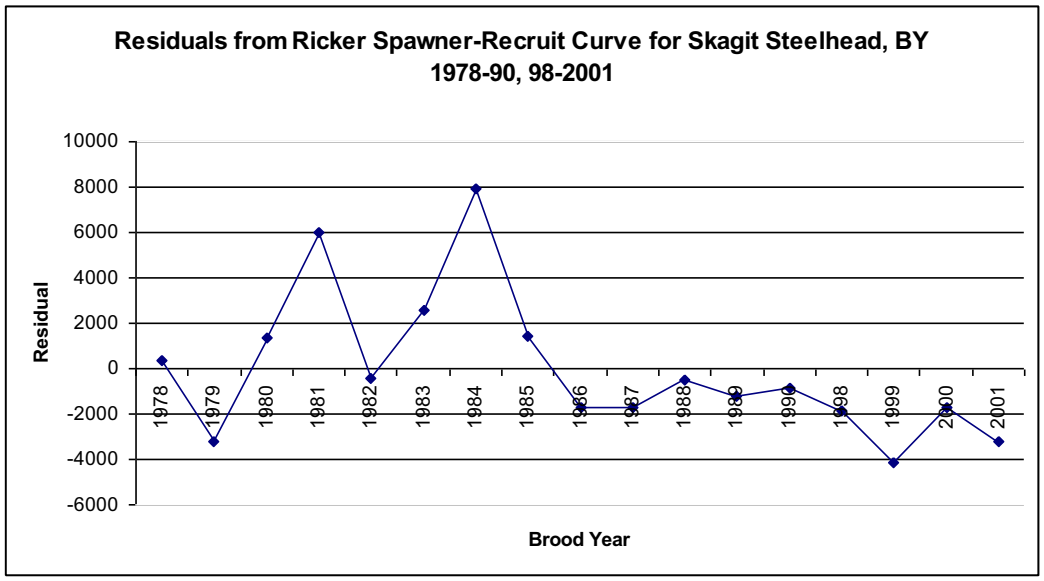

Figure 11. The residuals, by brood year, from the Ricker spawner-recruit curve shown in Figure 10.

Note that all brood years since 1986 have had negative residuals in recruitment, and 6 of the 8 broods prior to that had positive residuals.

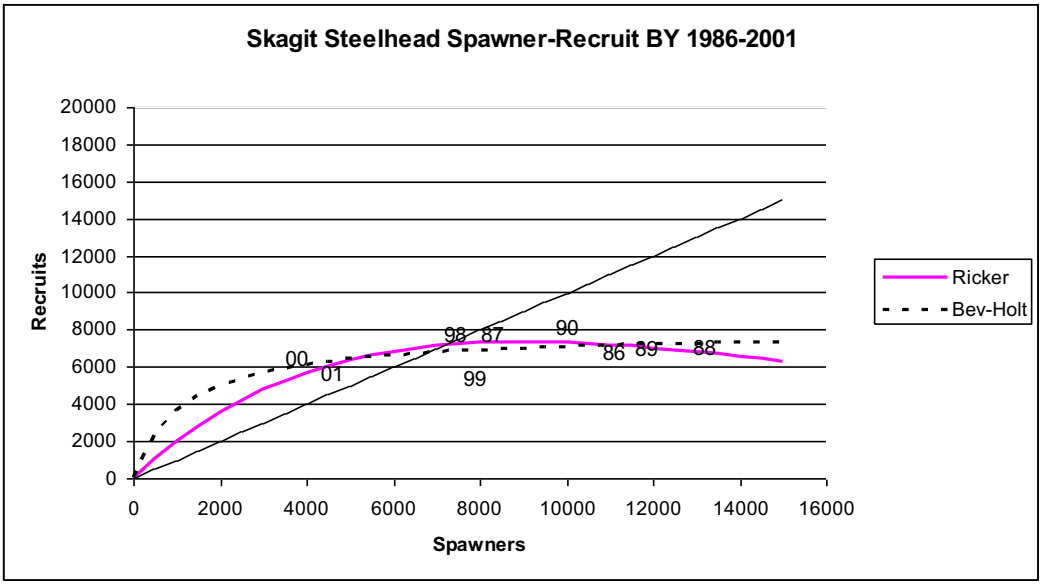

Figure 12. The Skagit wild winter steelhead spawner-recruit relation for only the brood years since brood year 1986.

The Ricker and Beverton-Holt curves are much flatter than in Figure 10 (above), indicating a loss in average productivity and capacity since the 1978-1985 broods.

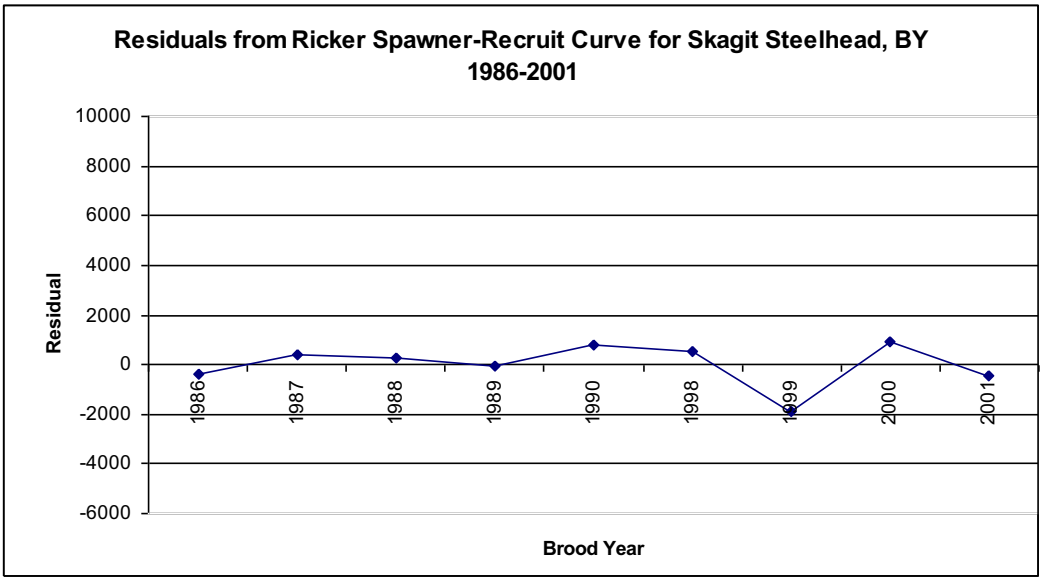

Figure 13. The residuals, by brood year, from the Ricker spawner-recruit curve shown in Figure 12.

In contrast to the BY 1978-2001 curves, the residuals are much smaller, and there is no trend in residuals over time.

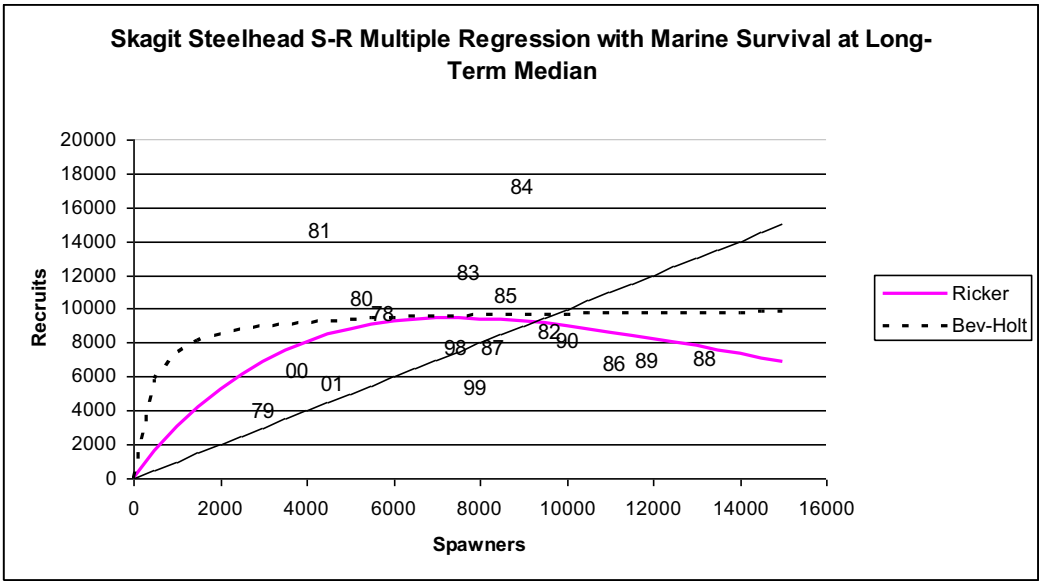

Figure 14. Spawner-recruit curves for Skagit wild steelhead using the spawner-recruit parameters derived from multiple regression with spawners and hatchery marine survival rates, at the BY 1978-2001 median marine survival rates.

Numbers refer to the wild brood years.

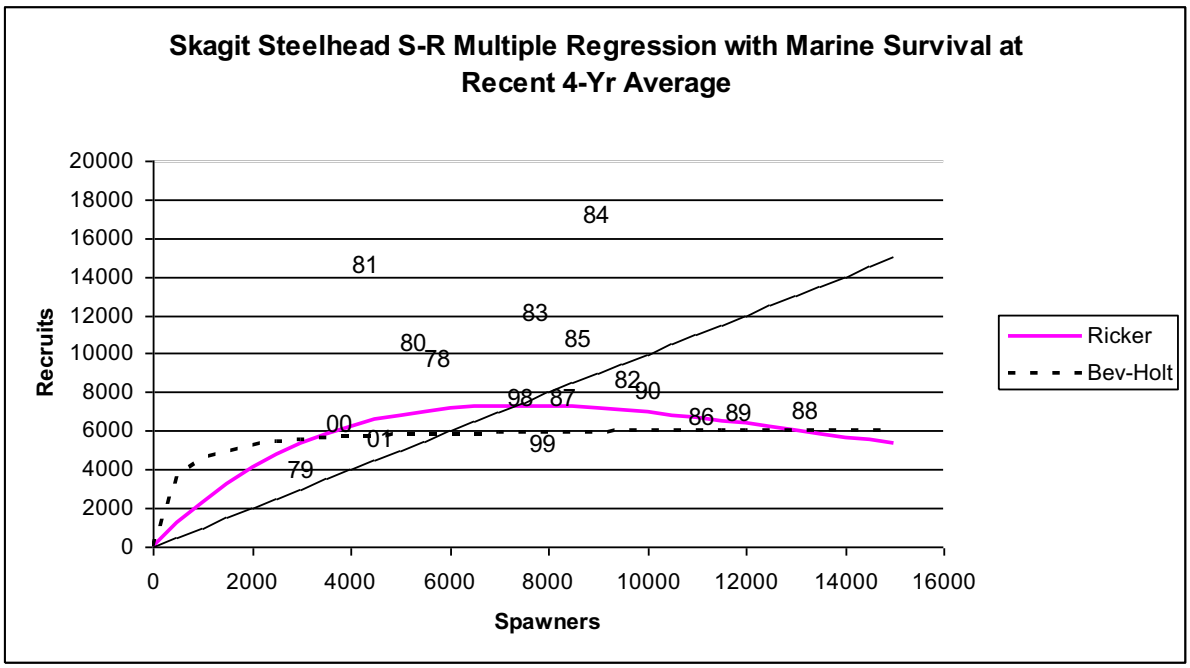

Figure 15. Spawner-recruit curves for Skagit wild steelhead using the spawner-recruit parameters derived from multiple regression with spawners and hatchery marine survival rates, at the recent 4-year average (wild brood years 1998-2001) hatchery marine survival rates.

Appendix D. Historical Review of Skagit Steelhead Escapement Goals

For all intents and purposes, steelhead management on the Skagit started in 1978. Prior to that time there were indeed opening dates and closing dates and bag limits, but sport catch estimates were highly questionable, tribal catches before 1974 were clandestine, and there were no estimates of run size or spawning escapement, and therefore no efforts to manage catches to achieve an escapement goal. Programs to estimate spawning escapement and run size, and a creel census to estimate sport catch, were implemented for the first time during the 1977-78 season.

At that time, the only data available with which to calculate harvestable numbers were previous catches and hatchery smolt releases; consequently, harvestable numbers were set equal to what had been caught in previous seasons, or as the hatchery smolt release multiplied by an average catch per smolt release. Harvestable numbers were not calculated for wild steelhead, and fisheries were front-loaded to avoid wild steelhead. It was assumed that the catches of wild steelhead during the early-season fisheries would be compensated for by an equal number of hatchery steelhead that would spawn in the wild. After 3 years of estimating wild escapements, in 1980 the Washington Department of Game (WDG) proposed a wild escapement goal of 7,000 for the Skagit (Table 56), which could be made up of both wild and hatchery fish. The next year, they proposed to increase that goal to "8,000 to 14,000", and in 1982 the goal was simply 8,000.

In 1983, following personnel changes, WDG conducted an analysis of stream area, and announced that, based on these measurements, steelhead were grossly underescaped throughout Puget Sound[4], and that there should be no steelhead fishing anywhere. This brought an outcry not only from the tribes, but also from the public, who demanded to know why they were spending money producing hatchery steelhead, when they wouldn't be allowed to catch them. WDG relented, and proposed setting the Skagit escapement goal at 9600, which was the highest previously-observed escapement, and which appeared subjectively to achieve adequate penetration throughout the system, and allowing a 10% harvest rate if run size was less than the goal. The tribes, who had been stung by salmon escapement goals that were set using inadequate data and then became immutable, resisted establishing a numerical goal for steelhead until more data were acquired, and proposed instead that fisheries continue to be front-loaded to avoid wilds, with a harvest rate ceiling of 45%, until an MSY escapement level could be calculated. Faced with this disagreement, a monumental Case Area-wide Fisheries Advisory Board meeting was held in December, which included a surprise appearance by Santa Claus, and for which no recommendation was ever issued. In the fallout from this meeting, the state and tribes agreed not to define an escapement goal that year, and set the harvestable number equal to the hatchery run size. The state then unilaterally desequestered the adipose fin for steelhead, and started ad-clipping all hatchery steelhead releases. Since the ad-clipped hatchery fish wouldn't recruit to fisheries until the 1985-86 season, the sport regulations in 1983-84 and 1984-85 required anglers to release steelhead whose dorsal fin height was greater than approximately the width of a credit card.

In order to address the escapement goal dispute, the state and tribes formed a joint technical group to study the issue. There were a handful of rivers with spawning escapement and recruitment data, but few of them had more than two or three spawner-recruit data points, which were too few data

[4] The Skagit wild escapement goal that resulted from this exercise was 31,000.

points for a river-specific spawner-recruit analysis. The technical group therefore tried to increase the number of data points by constructing a Case Area-wide spawner-recruit relation that included all the points from all the rivers in one graph. This required the group to standardize spawner-recruit data across all the rivers (e.g., calculate how many Quillayute Rivers equals one Skagit River, and expand the Quillayute data by that factor). This exercise was completed in early 1985 -- the results of this calculation, however, were highly sensitive to some untestable assumptions. While the state was willing to accept these uncertainties[5], the tribes were not, and an impasse loomed again. The impasse was eventually resolved by a policy agreement that the harvestable number would be 91.8% of the hatchery run, plus 2500 wild steelhead. This agreement was renewed annually through 1991. Thus, the wild escapement goal from 1986-1991 was to manage for a wild harvest of 2,500 (i.e., the escapement would be Wild Runsize minus 2,500). The 2,500 harvest was a negotiated number that the co-managers agreed was low enough to allow the high escapements that would test system capacity and productivity. This strategy was successful, as 4 of the following 5 escapements exceeded 10,000.

A prolonged drought, however, occurred in the late 1980s, and the 1991 wild escapement, and the 1991-92 wild preseason forecast, were both considerably lower than previous levels. This presented WDG with a particular dilemma because, although the 10,300 escapement goal they had proposed in 1985 was never agreed to by the tribes, or used in management, WDG had nonetheless publicized that number to their constituents as the escapement goal, and their constituents had accepted that as a fact. In 1991-92, however, with a preseason forecast less than 10,300, WDG could no longer justify to their constituents the wild harvestable number of 2,500 without facing a credibility crisis. At the same time, however, commercial buyers began to lose interest in steelhead, and tribal fishing effort also dropped substantially. Because of this decline in tribal effort, the co-managers agreed that haggling over the escapement goal was unnecessary, and agreed instead to fish according to fishing schedules that were set preseason, without defining an escapement goal. This strategy was used during the 1991-92, 1992-93, and 1993-94 fishing seasons (there was also a 2500 fish cap on total tribal catch in 1991-92).

By 1992, there was a sufficient spread of Skagit steelhead escapements, with their resulting recruitments, to perform a spawner-recruit analysis that used only Skagit-specific data (see Comments column for 1992-93 season in Table 56). Accordingly, the same statisticians who did the 1985 analysis, using the same analytical methods that were used in the 1985 analysis, but (because they used only Skagit-specific data) without using any cross-basin equivalency assumptions (hence, their 1992 analysis was more valid for the Skagit than the 1985 analysis), calculated that the MSY escapement level for Skagit wild steelhead was in the 3,000 to 4,500 range. Because of unease over using these numbers as the goal, the co-managers agreed to continue testing system productivity and capacity, but, in order to avoid increasing harvest impacts if run size dropped, they changed the goal to a harvest rate ceiling. This ceiling, 16%, was the mean harvest rate observed in the previous 6 seasons. By establishing the previous mean rate as the ceiling rate, the effect was to reduce mean harvest rates from what they had been. The purpose of these goals (the ceiling HR of 16%, and, before that, the wild harvest of 2,500) was to keep fishing impacts low enough to test the productivity and capacity of the system, so that we could define better the MSY escapement level. The intent when the 16% HR ceiling was established in 1994 was to continue testing system productivity and capacity for another 4 or 5 years, and then revisit the MSY

[5] They proposed a goal of 10,300, which was an average of three different estimates of MSY escapement.

escapement calculations. If system capacity was greater than the 1992 analysis indicated, then abundance would increase over that time -- if the 1992 analysis was accurate, then abundance would stabilize. The latter is closer to what occurred, as, except for a 2-year drop in 2000 and 2001, neither of which dipped below the MSY escapement range, the run size since 1991 has stabilized in the 6000 to 8000 range.

After the run size dropped during the 1999-2000 season, and the 2000-2001 forecast was for a "poor" run size, WDFW regional staff wanted to close the Skagit to wild steelhead retention by sportsmen during the 2000-2001 season. They were told, however, that the Fish and Wildlife Commission would not adopt a closure unless the run size was less than an agreed numerical threshold. Consequently, the co-managers agreed to set 6000, which was comfortably above the MSY escapement range of 3000 to 4500, as the "floor" escapement above which fisheries directed at wild steelhead could be conducted, up to the 16% harvest rate ceiling (the 16% ceiling would continue to apply at all abundance levels). Since the 2000-2001 forecast was below this floor, the Fish and Wildlife Commission closed the Skagit to wild steelhead retention by sportsmen (and did the same thing the next year). Ironically, because this floor is less than 10,300 (which was never a Skagit steelhead escapement goal, and has been refuted by subsequent analyses), some sports groups have criticized the 6000 floor as being set for the purpose of "accommodating fisheries", when, in fact, the purpose of this floor was to close a fishery.

These floor and harvest rate ceiling levels remain the current escapement goal for Skagit wild steelhead.

Table 56. Skagit Wild Steelhead Management.

Season	PSF Wild Run Size	Escapement Goal	Comments
1977-78	No PSF	None	Harvestable = Hatchery run size (HRS)
1978-79	No PSF	None	Harvestable = HRS (10000 in-season update)
1979-80	No PSF	None	Harvestable = HRS (7000). Assume wild catch = hatchery spawners
1980-81	13000 (Total H+W)	7000 (H+W) (WDG)	Total Run Size (RS) = 13000; Harvestable = 13000 – 7000 = 6000.
1981-82	?	8000(-14000) (WDG)	WDG memo referred to "some harvestable wild"
1982-83	7400	8000	Harvestable = 4000 (including 10.8% of wild run as incidentals)
1983-84	WDG = 6500-7000 SSC = 4000-10000	None Agreed	WDG proposed 9600 with 10% harvest rate (HR) if RS<9600. SSC proposed avoiding wilds, with 45% HR ceiling. Agreed plan (Harvestable = HRS and frontload fisheries to avoid wilds) accommodated both parties' goals.
1984-85	10600	None agreed/proposed	Parties awaiting further analyses. Minimize wild catch in meantime. Agreed plan (Harvestable = HRS or close Jan 16 or 34 "equivalent days") accommodated both parties' goals. River test fishery.
1985-86	14500-16000	Wild harvest = 2500	Spawner-recruit report done. WDG proposed 10300 in April 1985. SSC proposed not specifying a number yet. Mass-marks appear.
1986-87	12700-15100	Wild harvest = 2500	
1987-88	11946-15460	Wild harvest = 2500	
1988-89	12500-16000	Wild harvest = 2500	
1989-90	12900-16400	Wild harvest = 2500	Sauk-Suiattle test fishery in Sauk, Jan 2-3, 1990
1990-91	No PSF	Wild harvest = 2500	
1991-92	9303	None Agreed	End of creel census; no Swinomish buyers; no update. Agreed to fish a schedule (18 days Swinomish; 9 days Upper Skagit/Sauk-Suiattle; closed by Jan 31), with 2500 total (H+W) catch ceiling.
1992-93	12300	None Agreed	Skagit spawner-recruit analysis done; it estimated MSY escapement considerably less than in 1985 report. Agreed to schedule (19 days for Swinomish, ending in March; 10 for Upper Skagit/Sauk-Suiattle, ending mid-February), and that there are harvestable wild steelhead.
1993-94	No PSF	None Agreed	Same as 1992-93.
1994-95	8000-10300	<16% harvest rate	Agreed to "unquantified" number of harvestable wild steelhead. Same number of fishing days, with wild non-retention after Feb 28.
1995-96	8800-10800	<16% harvest rate	Same as 1994-95.

Season	PSF Wild Run Size	Escapement Goal	Comments
1996-97	No PSF	<16% harvest rate	Same as 1994-95.
1997-98	No PSF	<16% harvest rate	Upper Skagit/Sauk-Suiattle increased to 12 days; dropped Feb 28 closure. WA Trout analysis of 1992 spawner-recruit report arrives at similar estimate of MSY escapement.
1998-99	"same as recent" (7000-9000)	<16% harvest rate	Upper Skagit/Sauk-Suiattle increased to 14 days; open to mid-March.
1999-2000	"same as recent" (7000-9000)	<16% harvest rate	Same number of fishing days; Upper Skagit/Sauk-Suiattle open to end of March. Needed special notice for enforcement.
2000-01	"poor" egs: 2400 & 4200	<16% harvest rate with 6000 floor	Same number of fishing days; tribes closed mid-February; sports wild release to end of February, then complete closure (except forks).
2001-02	3000-6000	<16% harvest rate with 6000 floor	Same number of fishing days; tribes closed by end of February; sports same as 2000-01.

Appendix E. Recreational Fishing Rules in the Puget Sound Steelhead DPS

Regulatory measures (i.e. non-retention of unmarked steelhead, time and area closures, and selective gear rules) for the recreational steelhead have been implemented over time to reduce the mortality of wild summer-run and winter-run steelhead in the Puget Sound Steelhead Distinct Population Segment (DPS) recreational fisheries. Appendix E-1 and Appendix E-2 provide details on specific waters and corresponding regulations that are currently in place to limit incidental mortalities to wild steelhead.

Winter-run steelhead

The recreational winter steelhead fishery is generally open from November 1 through February 28/29 in specific stream reaches, as described in Appendix E-1. However, some rivers are open for the harvest of hatchery steelhead through March 15 (i.e., Samish and Skagit rivers). The steelhead retention limit during this period is two hatchery-origin fish over 20 inches and/or trout over 14 inches, per day except where noted in Appendix E-1. The areas and time periods open to the recreational fishery are adjusted and/or closed if in-season information (i.e. monitoring the hatchery escapement) suggests a shortfall in broodstock. In addition, a provision for a recreational catch-and-release fishery in the Lower Sauk River and upper mainstem Skagit River is generally open March 16 – April 30 if forecasted wild abundance is sufficient.

Summer-run steelhead

Retention of marked steelhead is allowed throughout the DPS under general game fish regulations (i.e., two per day, marked steelhead over 20 inches, and/or trout over 14 inches per day, except where noted in Appendix E-1) in all open waters from the first Saturday in June – November depending upon the river. Retention of unmarked summer steelhead by recreational anglers is only allowed in the Green River during the summer steelhead management period (July – November). Green River regulations target natural-origin summer steelhead that originated from hatchery releases of the Skamania stock. These summer steelhead are not listed. During the month of June, only marked hatchery-origin steelhead may be retained on the Green River to protect late timed wild winter steelhead. Statewide recreational fishing rules allow retention of one wild steelhead per angler per year, which may be caught in either the Green River, or in ten other rivers in the western Strait of Juan de Fuca and the Washington coast outside of the Puget Sound DPS.

The structure of these sport regulations and the emergency rules enacted in June 2009 (Appendix E-2) reflect management and conservation needs of wild summer steelhead throughout the DPS. The areas and time periods open to the recreational fishery are adjusted and/or closed if in-season information (i.e. monitoring the hatchery escapement) suggests a hatchery program may experience a shortfall in broodstock collection goals.

2010-2012 Sportfishing Rule Change Proposals

Rule Proposal Promoting Additional Wild Steelhead Protection
Included in the "2010-2012 Sportfishing Rule Change Proposals" (Appendix E-3 and Appendix E-3A) are proposals for earlier closing dates on the Nooksack River and forks, Pilchuck Creek, Pilchuck River, Raging River, Skykomish River, Snohomish River, Snoqualmie River, and Stillaguamish River. All the proposals are intended to provide more protection for wild steelhead present in these rivers. Current rules allow the fishing for hatchery steelhead until the end of February. Since the majority of the hatchery steelhead have cleared these areas by the middle of February, anglers are fishing for wild fish (catch-and-release) until the end of the month under current rules. The proposals for these waters would close the winter fisheries on February 15 rather than the current February 28.

The 2010-2012 regulation proposals would prohibit the retention of unmarked summer steelhead on the Green (Duwamish). Wild steelhead retention was initially allowed on the Green River because there were substantial numbers of non-native unmarked Skamania stock summer-run steelhead harvested by sport anglers. In recent years, catches of unmarked summer-run steelhead has declined substantially.

Fisheries will be closed on a number of small streams that drain into the Strait of Juan de Fuca and Puget Sound to protect juvenile anadromous fish. These proposals are included in the spreadsheets (Appendix E-3A) for the proposed new stream strategy. The steelhead fishing proposals are also in line with the Statewide Steelhead Management Plan's Recreational Fishery Management Guidelines

Stream Strategy for Puget Sound Distinct Population Segment
In order to provide better protection to salmon, steelhead and trout, in particular rearing juvenile anadromous salmonids in the Puget Sound DPS, WDFW is proposing a more conservative approach to the regulation of fishing in rivers, streams, and beaver ponds.

Waters are currently open under the standard stream game fish regulations; open to fishing from the first Saturday in June through October 31, with an 8" minimums size and a daily limit of 2 fish, unless otherwise specified by stream name in the regulation pamphlet. This regulatory approach opens to fishing juvenile rearing habitat for both resident trout species and anadromous salmonids. The permitted use of bait in these areas increases the potential for hooking mortality.

The more conservative management strategy that is under consideration by WDFW is to close all rivers, streams and beaver ponds to fishing except as listed in the "Fishing in Washington Rules Pamphlet". Rivers, streams and beaver ponds listed in the pamphlet as open to fishing will be identified for areas where stocks are robust and can support fishing pressure and in areas where reasonable recreational opportunity exists (Appendix E-3).

The Stream Strategy Tables by Watershed (Appendix E-3) present all of the recreational fishing opportunity that will be available in the Puget Sound DPS. In addition to stream closures, the Stream Strategy proposal establishes conservation guidelines for minimum harvestable size and the use of bait. It prohibits the use of bait in areas with weak steelhead stocks, thereby reducing hooking mortality. The Stream Strategy proposes a 14" minimum size for trout retention in

anadromous waters to protect rearing juvenile salmonids. The anticipated result of these rule change proposals is a significant increase in juvenile salmonid survival.

The "2010-2012 Sportfishing Rule Change Proposals" can be found on the web at http://wdfw.wa.gov/fish/regs/rule_proposals/index.htm. The Fish and Wildlife Commission is currently scheduled to vote on adoption of these rules at its February 2010 meeting.

Appendix E-1. Key Steelhead/Trout Anadromous Zone Freshwater Recreational Rules by Management Unit Summarized from WDFW "Fishing in Washington, Sport Fishing Rules 2009/10"

Release of Wild Steelhead required year-round except where noted in Green River.

Nooksack Management Unit

Tributary	Time period open for trout and/or steelhead opportunity	Rules summary
Fishtrap Creek	First Sat in June-Oct 31	Min size 8". Daily limit 2. Juvenile anglers only.
Nooksack R: from Lummi Indian Reservation to yellow marker @ FFA high school barn in Deming	First Sat in June-Feb 28	Min size 14". Daily limit 2. Night closure and anti-snagging rule First Sat in June-Nov 30.
Nooksack R: from yellow marker @ FFA high school barn in Deming to confluence of north and south forks	Oct 1-Feb 28	Min size 14". Daily limit 2. Night closure and anti-snagging rule Oct 1-Nov 30.
Nooksack R, North Fork: from mouth to Maple Cr	First Sat in June-Feb 28	Min size 14". Daily limit 2. Night closure and anti-snagging rule First Sat in June-Nov 30. No motors allowed Nov 1 Feb 28.
Nooksack R, North Fork: from Maple Cr to Nooksack Falls	First Sat in June-Feb 28	Min size 14". Daily limit 2. No motors allowed Nov 1 Feb 28.
Nooksack R, Middle Fork	First Sat in June-Feb 28	Min size 14". Daily limit 2. No motors allowed Nov 1 Feb 28.
Nooksack R South Fork: from mouth to Saxon Rd. BR	First Sat in June-Feb 28	Min size 14". Daily limit 2. Selective gear rules First Sat in June to Feb 28. Night closure First Sat in June-Nov 30.
Nooksack R South Fork: upstream from Saxon Rd. BR CLOSED WATERS: upstream from Skookum Cr	First Sat in June-June 30 and Oct 16-Feb 28	Min size 14". Daily limit 2. Selective gear rules First Sat in June – Feb 28. Night closure First Sat in June-Nov 30.
Whatcom Cr: from mouth to stone bridge @ Whatcom Falls Park	First Sat in June-Feb 28	Min size 14". Daily limit 2. Night closure and anti-snagging rule Aug 1-Dec 31.
Whatcom Cr: from stone bridge @ Whatcom Falls Park to Lake Whatcom	Last Sat in April-Oct 31	No min. size. Daily limit 2. Juvenile anglers only. Night closure and anti-snagging rule Aug 1 – Oct 31
Dakota Creek	First Sat in June-Oct 31	Min size 8". Daily limit 2.
Chuckanut Creek	First Sat in June-Oct 31	Min size 8". Daily limit 2.
Squalicum Creek	First Sat in June-Oct 31	Min size 8". Daily limit 2.

Samish River Management Unit

Tributary	Time period open for trout and/or steelhead opportunity	Rules summary
Samish R: from mouth @ Samish Island/Bayview Edison Rd BR to I-5 BR	First Sat in June-Mar 15	Min size 14". Daily limit 2. Night closure, anti-snagging rule, and stationary gear restriction Aug 1-Dec 31.
Samish R: from I-5 BR to Hickson BR	First Sat in June-Mar 15	Min size 14". Daily limit 2. Night closure and anti-snagging rule Aug 1-Dec 31.

Skagit River Management Unit

Tributary	Time period open for trout and/or steelhead opportunity	Rules summary
Baker River	Sept 1-Oct 31	Min size 14". Daily limit 2
	Dolly Varden / bull trout Sept 1–Oct 31	Min size 20". May be retained as part of TROUT daily limit.
Cascade R: from mouth to Rockport-Cascade Rd Br	June 1–July 15 & Sept 16–Feb 28	Min size 14". Daily limit 2 Night closure, anti-snagging rule and barbless hooks required Sept 1- Nov 30.
	Dolly Varden / bull trout June 1–July 15 & Sept 16–Feb 28	Min size 20". May be retained as part of TROUT daily limit.
Cascade R: upstream from Rockport-Cascade Rd Br	First Sat in June-Feb 28	Catch and Release except 2 hatchery steelhead may be retained. Selective gear rules.
Fisher Slough	First Sat in June-Oct 31	Min size 14". Daily limit 2
Sauk R: from mouth to Darrington BR	First Sat in June-April 30	Selective gear rules. Catch and release except up to 2 hatchery steelhead can be kept.
Sauk R: from Darrington BR to Whitechuck R	First Sat in June-Feb 28	Selective gear rules. Catch and release except up to 2 hatchery steelhead can be kept.
Sauk R: from Whitechuck R upstream, including North and South Forks to Elliot Cr	First Sat in June-Oct 31	Selective gear rules. Catch and release except up to 2 hatchery steelhead can be kept.
Sauk R South Fork: upstream from Elliot Cr	First Sat in June–Aug 31	Selective gear rules. Catch and release except up to 2 hatchery steelhead can be kept.
Skagit R: from mouth to Hwy 536 BR@ Mt Vernon	Year-round	Min size 14". Daily limit 2. Selective gear rules, except motors allowed Mar 1-May 31. Night closure July 9 – Aug 9.
	Dolly Varden / bull trout year-round	Min size 20". May be retained as part of TROUT daily limit. Selective gear rules, except motors allowed Mar 1-May 31. Night closure July 9 – Aug 9.
Skagit R: from Hwy 536 BR@ Mt Vernon to mouth Gilligan Cr	June 1-Mar 15	Min size 14". Daily limit 2. Night closure July 1-Nov 30. Anti-snagging rule Aug 16 – Nov 30.
	Dolly Varden / bull trout June 1–Mar 15	Min size 20". May be retained as part of TROUT daily limit. Night closure July 1-Nov 30. Anti-snagging rule Aug 16 – Nov 30.
Skagit R: from mouth Gilligan Cr to Dalles BR @ Concrete	June 1-Mar 15	Min size 14". Daily limit 2. Night closure and anti-snagging rule July 1-Nov 30.
	Dolly Varden / bull trout June 1–Mar 15	Min size 20". May be retained as part of TROUT daily limit. Night closure and anti-snagging rule July 1-Nov 30.
Skagit R: from Dalles BR @ Concrete to Hwy 530 Br @ Rockport	June 1-Mar 15	Min size 14". Daily limit 2. Night closure and anti-snagging rule July 1-Nov 30.
	Mar 16-Apr 30	Selective gear rules. Catch and release except up to 2 hatchery steelhead can be kept
	Dolly Varden / bull trout June 1 – Mar 15	Min size 20". May be retained as part of TROUT daily limit. Night closure and anti-snagging rule July 1-Nov 30.
Skagit R: from HW 530 Br @ Rockport to Cascade R	June 1-Mar 15	Min size 14". Daily limit 2. Night closure and anti-snagging rule June 1-Nov 30.

Tributary	Time period open for trout and/or steelhead opportunity	Rules summary
	Mar 16-Apr 30	Selective gear rules. Catch and release except up to 2 hatchery steelhead can be kept
	Dolly Varden / bull trout June 1 – Mar 15	Min size 20". May be retained as part of TROUT daily limit. Night closure and anti-snagging rule June 1-Nov 30.
Skagit R: from Cascade R to Gorge Dam	June 1-Mar 15	Selective gear rules. Catch and release except up to 2 hatchery steelhead can be kept.
Suiattle R	First Sat in June-Oct 31	Min size 8". Daily limit 2.
	Dolly Varden / bull trout First Sat in June–Oct 31	Min size 20". May be retained as part of TROUT daily limit.
Whitechuck R	First Sat in June-Oct 31	Min size 8". Daily limit 2.
	Dolly Varden / bull trout First Sat in June–Oct 31	Min size 20". May be retained as part of TROUT daily limit.

Stillaguamish/Snohomish Allocation Units

Tributary	Time period open for trout and/or steelhead opportunity	Rules summary
Stillaguamish River Allocation Unit		
Canyon Creek	First Sat in June-Feb 28	Min size 14". Daily limit 2.
Deer Creek	CLOSED WATERS	
Harvey Creek	CLOSED WATERS	
Little Deer Creek	CLOSED WATERS	
Pilchuck Creek	First Sat in June-Feb 28	Min size 14". Daily limit 2. Selective gear rules First Sat in June-Nov 30.
Portage Creek	CLOSED WATERS	
Stillaguamish R: from mouth and sloughs upstream to Marine Drive	Year-around	Min size 14". Daily limit 2. Night closure and anti-snagging rule Aug 1-Nov 30.
Stillaguamish R from Marine Drive upstream to forks.	First Sat in June-Nov 30	Catch and release except up to 2 hatchery steelhead can be kept. Night closure Aug 1-Nov 30. Selective gear rules, except motors allowed
	Dec 1-Feb 28	Min size 14". Daily limit 2.
Stillaguamish R, North Fork: from mouth to Swede Heaven BR	First Sat in June-Nov 30	Catch and release and Fly Fishing Only, except up to 2 hatchery steelhead can be kept.
	Dec 1-Feb 28	Min size 14". Daily limit 2. Night closure and anti-snagging rule Aug 1-Nov 30. Fishing from floating device prohibited upstream of Hwy. 530 BR. Motors prohibited downstream of Hwy. 530 BR
Stillaguamish R, South Fork: from mouth to Mt. Loop HW BR above Granite Falls	First Sat in June-Feb 28	Min size 14". Daily limit 2. Night closure and anti-snagging rule Aug 1-Nov 30.
Stillaguamish R, South Fork: from Mt. Loop HW BR above Granite Falls upstream	First Sat in June-Nov 30	Min size 8". Daily limit 2. Night closure and anti-snagging rule Aug 1-Nov 30.

Tributary	Time period open for trout and/or steelhead opportunity	Rules summary
Snohomish River Allocation Unit		
Coal Creek	Last Sat April – Oct 31	No min size. Daily limit 2. Juvenile anglers only.
Phillipa Creek	CLOSED WATERS	
Pilchuck R: from mouth to 500' downstream of the Snohomish city diversion dam.	Dec 1-Feb 28	Min size 14". Daily limit 2. Fishing from floating devices prohibited.
Purdy Creek	First Sat in June-Oct 31	Min size 8". Daily limit 2.
Raging R: from mouth to Hwy 18 BR	First Sat in June-Feb 28	Min size 14". Daily limit 2
Skykomish R: from mouth to Lewis St. BR	June 1-Feb 28	Min size 14". Daily limit 2. Night closure and anti-snagging rule Aug 1-Nov 30. No fishing from a floating device from Lewis St. bridge to 2,500' downstream Nov 1-Feb 28.
	Dolly Varden / bull trout June 1–Feb 28	Min size 20". May be retained as part of TROUT daily limit.
Skykomish R: from Lewis St. BR to Wallace R	First Sat in June-Feb 28	Min size 14". Daily limit 2. Night closure and anti-snagging rule June 1-Nov 30.
	Dolly Varden / bull trout June 1–Feb 28	Min size 20". May be retained as part of TROUT daily limit. Night closure and anti-snagging rule June 1-Nov 30.
Skykomish R: from Wallace R to forks CLOSED WATERS: June 1–Aug 1 area 1500' upstream to 1000' downstream of Reiter Ponds outlet.	June 1-Feb 28	Min size 14". Daily limit 2. Night closure and anti-snagging rule Aug 1-Nov 30. No Fishing from a floating device Aug 1 – Nov 30 from 1500' upstream to 1000' downstream of Reiter Ponds outlet.
	Dolly Varden / bull trout June 1 – Feb 28	Min size 20". May be retained as part of TROUT daily limit.
Skykomish R North Fork: from mouth to Deer Falls) CLOSED WATERS: from 1000' downstream of Bear Cr Falls to Deer Falls.	First Sat in June-Feb 28	Min size 14". Daily limit 2. Night closure and anti-snagging rule Aug 1-Nov 30.
Skykomish R North Fork: from Deer Falls upstream	First Sat in June-Oct 31	Min size 8". Daily limit 2. Night closure and anti-snagging rule Aug 1-Nov 30.
Skykomish R, South Fork: from mouth to Sunset Falls Fishway CLOSED WATERS: from Sunset Falls Fishway to 600' downstream of fishway.	First Sat in June-Feb 28	Min size 14". Daily limit 2. Night closure and anti-snagging rule Aug 1-Nov 30.
Skykomish R, South Fork: from Sunset Falls upstream	First Sat in June-Nov 30	Min size 14". Daily limit 2. Selective gear rules.
Snohomish River	First Sat in June-Feb 28	Min size 14". Daily limit 2. Night closure and anti-snagging rule Aug 1-Nov 30.
	Dolly Varden / bull trout First Sat in June–Feb 28	Min size 20". May be retained as part of TROUT daily limit. Night closure and anti-snagging rule Aug 1-Nov 30.

Tributary	Time period open for trout and/or steelhead opportunity	Rules summary
Snoqualmie R: from mouth to Snoqualmie Falls	First Sat in June-Feb 28	Min size 14". Daily limit 2. Night closure Sept 1-Nov 30. Selective gear rules except motors allowed First Sat in June-Nov 30. No fishing from a floating device from Plumb Access ramp upstream to Tokul Cr Nov 1-Feb 28.
Sultan R: from mouth to RM. 9.7 diversion dam	First Sat in June-Feb 28	Min size 14". Daily limit 2.
	Dolly Varden / bull trout First Sat in June – Feb 28	Min size 20". May be retained as part of TROUT daily limit.
Sultan R North and South forks	CLOSED WATERS	
Sunday Creek	CLOSED WATERS	
Swamp Creek	First Sat in June – Aug 31	Min size 8". Daily limit 2. Juvenile anglers only.
Tate Creek	CLOSED WATERS	
Tokul Cr: from mouth to Fish Hatchery Rd..BR	Dec 1-Feb 28	Min size 14". Daily limit 2. Anti-snagging rule. Closed 5pm to 7am daily.
Tokul Cr: from Fish Hatchery Rd..BR to railroad trestle @ RM 1.1	Jan 15-Feb 28	Min size 14". Daily limit 2. Anti-snagging rule. Closed 5pm to 7am daily.
Tolt R: from mouth to USGS cable car near confluence of North and South forks CLOSED WATERS: from USGS cable to falls on North Fork, and to dam on South Fork	First Sat in June-Feb 28	Min size 14". Daily limit 2. Selective gear rules First Sat in June – Nov 30.
Tye R: from Foss R to Alpine Falls	First Sat in June-Oct 31	Min size 14". Daily limit 2. Selective gear rules.
Wallace R: from mouth to 200' upstream of salmon hatchery water intake	First Sat in June-Feb 28	Min size 14". Daily limit 2. No fishing from a floating device Nov 1-Feb 28.
	Dolly Varden / bull trout First Sat in June – Feb 28	Min size 20". May be retained as part of TROUT daily limit. No fishing from a floating device Nov 1-Feb 28.
Wallace R: from 200' upstream of salmon hatchery water intake to Olney Cr	Nov 1-Feb 28	Min size 14". Daily limit 2. No fishing from a floating device Nov 1-Feb 28.
	Dolly Varden / bull trout Nov 1–Feb 28	Min size 20". May be retained as part of TROUT daily limit. No fishing from a floating device Nov 1-Feb 28.
Woods Creek	First Sat in June-Oct 31	Min size 8". Daily limit 2.

Lake Washington Management Unit

Tributary	Time period open for trout and/or steelhead opportunity	Rules summary
Big Bear Creek	First Sat in June-Aug 31	Min size 8". Daily limit 2. Juvenile anglers only.
Cedar River: from mouth to Cedar Falls CLOSED WATERS: From Landsburg Rd BR to Cedar Falls	First Sat in June-Aug 31	Release all trout. Selective gear rules.
Coal Creek	First Sat in June-Aug 31	Min size 8". Daily limit 2. Juvenile anglers only.

Tributary	Time period open for trout and/or steelhead opportunity	Rules summary
Issaquah Creek	First Sat in June-Aug 31	Min size 8". Daily limit 2. Juvenile anglers only.
Kelsey Creek	First Sat in June-Aug 31	Min size 8". Daily limit 2. Juvenile anglers only.
Little Bear Creek	First Sat in June-Aug 31	Min size 8". Daily limit 2. Juvenile anglers only.
May Creek	First Sat in June-Aug 31	Min size 8". Daily limit 2. Juvenile anglers only.
North Creek	First Sat in June-Aug 31	Min size 8". Daily limit 2. Juvenile anglers only.
Sammamish River	Jan 1-Aug 31	Catch and release. Selective gear rules.
Swamp Creek	First Sat in June-Aug 31	Min size 8". Daily limit 2. Juvenile anglers only.
Thornton Creek	First Sat in June-Aug 31	Min size 8". Daily limit 2. Juvenile anglers only.
Tibbets Creek	First Sat in June-Aug 31	Min size 8". Daily limit 2. Juvenile anglers only.
Lake Washington	Mar 1-June 30	Min. size 12". Daily limit 5. Release all STEELHEAD and RAINBOW TROUT over 20".
	July 1-Nov 30	Min size 8". Daily limit 2.
	Dec 1-Feb 28	No. min. size. Daily limit 5. Release all STEELHEAD and RAINBOW TROUT over 20".
Lake Sammamish	Year-round	No. min. size. Daily limit 5. Release all STEELHEAD or RAINBOW TROUT over 20" Dec 1-June 30.

Green River Management Unit

Tributary	Time period open for trout and/or steelhead opportunity	Rules summary
Green R: from 1st Ave S. BR to Old Hwy 99/Tukwila Intl. Blvd	First Sat in June-July 31 and Aug 22-Feb 15	Min size 14". Daily limit 2. Wild steelhead retention allowed July 1-31 and Aug 22-Nov 30. Night closure Aug 22-Nov 30. Anti-snagging rule Sept 1-Nov 30. Only one single-point hook measuring no more than ½" from point to shank and bait prohibited Aug 22-Aug 31. No fishing from a floating device Nov 1-Feb 15.
Green R: From Old HW 99/Tukwila Intl. Blvd to I-405	First Sat in June-July 31 and Sept 1-Feb 15	Min size 14". Daily limit 2. Wild steelhead retention allowed July 1-31 and Sept 1-Nov 30. Night closure and anti-snagging rule Sept 1-Nov 30. No fishing from a floating device Nov 1-Feb 15.

Tributary	Time period open for trout and/or steelhead opportunity	Rules summary
Green R: From I-405 to S 277th Br in Auburn	First Sat in June-July 31 and Sept 1-Feb 15	Min size 14". Daily limit 2. Wild steelhead retention allowed July 1-31 and Sept 1-Nov 30. Night closure Sept 1 – Nov 30. Anti-snagging rule Oct 1-Nov 30. Only one single-point hook measuring no more than ½" from point to shank and bait prohibited Sept 1 – Sept 30. No fishing from a floating device Nov 1-Feb 15.
Green R: From S 277th Br in Auburn to Auburn-Black Diamond Rd BR	First Sat in June-Aug 15 and Sept 16-Feb 28	Wild steelhead retention allowed July 1-Aug 15 and Sept 16-Nov 30. Night closure Sept 16-Nov 30. Anti-snagging rule Oct 16-Nov 30. Only one single-point hook measuring no more than ½" from point to shank and bait prohibited Sept 16 – Oct 15. No fishing from a floating device Nov 1-Feb 28.
Green: From Auburn-Black Diamond Rd BR to Tacoma Headworks Dam	First Sat in June-Feb 28	Wild steelhead retention allowed July 1-Nov 30. Night closure and anti-snagging rule Aug 1-Nov 30.
Newaukum Creek	First Sat in June-Oct 31	Min size 8". Daily limit 2.
Soos Cr: from mouth to salmon hatchery rack	First Sat in June-Aug 31	Min size 14". Daily limit 2.

Puyallup and White River Management Units

Tributary	Time period open for trout and/or steelhead opportunity	Rules summary
Carbon R: from mouth to Voights Creek	Sept 1-Feb 28	Min size 14". Daily limit 2. Night closure, anti snagging rule, and barbless hooks required Sept 1-Nov 30.
Carbon R: from Voights Creek to Hwy 162 Br	July 1-Aug 15 and Dec 1-Feb 28	Min size 14". Daily limit 2.
Clearwater River	July 1-Oct 31	Min size 14". Daily limit 2. Selective gear rules.
Greenwater River	July 1-Oct 31	Min size 14". Daily limit 2. Selective gear rules.
Puyallup R: from 11th St Br to City of Puyallup Outfall Structure across the river from junction of Freeman and N. Levee roads.	July 1-Aug 22 and Aug 24-Feb 28	Min size 14". Daily limit 2. Night closure, anti-snagging rule, and barbless hooks required Aug 1- Nov 30.
Puyallup R: from City of Puyallup Outfall Structure to Carbon River	July 1-Feb 28	Min size 14". Daily limit 2. Night closure, anti-snagging rule, and barbless hooks required Aug 1- Nov 30.
Puyallup R: from Carbon R to Electron Power Plant outlet	July 1-Feb 28	Min size 14". Daily limit 2.
Puyallup R: from Electron Power Plant outlet upstream	July 1-Oct 31	Catch and release. Selective gear rules.
White (Stuck) R: from mouth to River Street BR in Auburn	Oct 1-Oct 31	Catch and release, fly fishing only. Night closure and anti-snagging rule Oct 1-Oct 31.
	Nov 1-Feb 28	Min size 14". Daily limit 2. Night closure and anti-snagging rule Nov 1-Nov 30.

Tributary	Time period open for trout and/or steelhead opportunity	Rules summary
White (Stuck) R: from River Street BR in Auburn to HW 410 BR @ Buckley CLOSED WATERS: Puget Power Canal	Oct 1-Oct 31	Min size 14". Daily limit 2. Night closure and anti-snagging rule Oct 1-Oct 31.
White (Stuck) R: upstream from Weyerhaeuser 6000 Rd. BR	July 1-Oct 31	Min size 14". Daily limit 2. Selective gear rules. Night closure and anti-snagging rule Oct 1-Oct 31.

Nisqually River Management Unit

Tributary	Time period open for trout and/or steelhead opportunity	Rules summary
Mashel River	July 1-Oct 31	Catch and release except 2 hatchery steelhead may be retained. Selective gear rules.
Muck Creek	First Sat in June-Oct 31	Min size 8". Daily limit 2. Release all trout. Selective gear rules.
Murray Creek	CLOSED WATERS	
Nisqually R: Mouth to Tank Crossing (one mile upstream of Muck Cr mouth)	July 1-Nov 30	Min size 14". Daily limit 2. Night closure and anti-snagging rule Aug 1-Nov 30.
Nisqually R: From Tank Crossing to 400' below La Grande Powerhouse.	July 1-Oct 31	Catch and release except 2 hatchery steelhead may be retained. Selective gear rules. Night closure and anti-snagging rule Aug 1-Oct 31.
Ohop Creek	July 1-Oct 31	Catch and release except 2 hatchery steelhead may be retained. Selective gear rules.

South Sound Tributaries Management Unit

Tributary	Time period open for trout and/or steelhead opportunity	Rules summary
Burley Creek	First Sat in June-Oct 31	Min size 14". Daily limit 2
Campbell Creek	CLOSED WATERS	
Capitol Lake from outlet to 400' below Tumwater Falls fish ladder CLOSED WATERS: Percival Cove, west of markers on western shoreline of south basin.	First Sat in June-July 31	Min size 8". Daily limit 5.
	Aug 1- March 31	Min size 14". Daily limit 2. Night closure and anti-snagging rule Aug 1 – Nov 30.
Chambers Cr: from mouth to markers 400' below the Boise-Cascade Dam	July 1-Nov 15	Min size 14". Daily limit 2. Night closure and anti-snagging rule.
Coulter Creek	First Sat in June-Oct 31	Min size 14". Daily limit 2
Curley Creek	First Sat in June-Oct 31	Min size 14". Daily limit 2
Deer Creek	CLOSED WATERS	
Deschutes R: from the Old HW 99 Br in Tumwater upstream to Henderson Blvd BR near Pioneer Park	First Sat in June-March 31	Min size 14". Daily limit 2. Night closure and anti-snagging rule Aug 1 – Nov 30.
Deschutes R: From Henderson Blvd BR near Pioneer Park upstream	Year-round	Catch and release except 2 hatchery steelhead may be retained. Selective gear rules.
Goldsborough Creek	First Sat in June-Oct 31	Min size 14". Daily limit 2
Gorst Creek CLOSED WATERS: upstream from the lower bridge on Old Belfair Hwy .	First Sat in June-Oct 31	Min size 14". Daily limit 2

Tributary	Time period open for trout and/or steelhead opportunity	Rules summary
Gosnell Creek	First Sat in June-Oct 31	Min size 14". Daily limit 2
Johns Creek	CLOSED WATERS	
Kennedy Creek	First Sat in June-Feb 28	Min size 14". Daily limit 2. Night closure and anti-snagging rule Oct 1-Dec 31.
McAllister Creek	First Sat in June-Oct 31	Min size 14". Daily limit 2. Night closure and anti-snagging rule Aug 1-Oct 31.
McLane Creek	First Sat in June-Oct 31	Min size 14". Daily limit 2. Night closure and anti-snagging rule Aug 1-Oct 31.
Mill Creek	First Sat in June-Oct 31	Min size 14". Daily limit 2.
Minter Creek	First Sat in June-Oct 31	Min size 14". Daily limit 2.
Percival Creek	First Sat in June-Oct 31	Min size 14". Daily limit 2.
Shelton Creek	CLOSED WATERS	
Sherwood Creek	First Sat in June-Oct 31	Min size 14". Daily limit 2.
Skookum Creek	First Sat in June-Oct 31	Min size 14". Daily limit 2.
Uncle John Creek	CLOSED WATERS	
Woodland Creek	First Sat in June-Oct 31	Min size 14". Daily limit 2.

Skokomish River Management Unit

Tributary	Time period open for trout and/or steelhead opportunity	Rules summary
Purdy Creek	First Sat in June-July 31	Catch and release. Selective gear rules.
Skokomish R: from mouth to Hwy 101 BR	First Sat in June to July 31 and Oct 1-Dec 15	Catch and release. Night closure, anti-snagging rule, and barbless hooks required Aug 1- Nov 30.
Skokomish R: from Hwy 101 BR to forks	First Sat in June-Oct 31	Catch and release. Selective gear rules.
Skokomish R North Fork: from mouth to lower dam	First Sat in June-Oct 31	Catch and release. Selective gear rules.
Skokomish R North Fork: above Lake Cushman to Olympic Nat. Park boundary	First Sat in June-Aug 31	Catch and release. Selective gear rules.
Skokomish R South Fork: from mouth to Rule Creek CLOSED WATERS: from Church Cr to Rule Cr	First Sat in June-Oct 31	Catch and release. Selective gear rules.
Skokomish R, South Fork: upstream from Rule Cr	First Sat in June-Oct 31	Min size 12". Daily limit 2. Selective gear rules.
Vance Creek	First Sat in June-Oct 31	Min size 14". Daily limit 2.

East and West Hood Canal Management Units

Tributary	Time period open for trout and/or steelhead opportunity	Rules summary
Big Beef Creek	First Sat in June-Aug 31	Catch and release. Selective gear rules.
Dewatto River	First Sat in June-Oct 31	Catch and release. Selective gear rules. Night closure Sept 16 – Oct 31.
Dosewallips River	First Sat in June-Aug 31	Catch and release. Selective gear rules.

Tributary	Time period open for trout and/or steelhead opportunity	Rules summary
Duckabush River	First Sat in June-Aug 31	Catch and release. Selective gear rules.
Hamma Hamma River	First Sat in June-Aug 31	Catch and release. Selective gear rules.
Lilliwaup River	First Sat in June-Aug 31	Catch and release. Selective gear rules.
Little Quilcene River CLOSED WATERS: from mouth to 101 BR Sept 1-Oct 31.	First Sat in June-Oct 31	Catch and release. Selective gear rules.
(Big) Quilcene R: from mouth to Rodgers St.	First Sat in June-Aug 15	Catch and release. Selective gear rules.
(Big) Quilcene R: from Rodgers St. to electric weir @ Quilcene National Fish Hatchery	First Sat in June-Oct 31	Catch and release. Selective gear rules First Sat in June-Aug 15. Night closure and only 1 single-point barbless hook may be used Aug 16-Oct 31.
Tahuya R: from mouth to marker approx. 1 mile above North Shore Rd bridge	First Sat in June-Oct 31	Catch and release. Selective gear rules. Night closure Sept 16-Oct 31.
Tahuya R: above marker approx. 1 mile above North Shore Rd bridge	First Sat in June-Oct 31	Catch and release. Selective gear rules.
Union R: from mouth to North Shore Rd BR	First Sat in June-Oct 31	Catch and release.
Union R: from North Shore Rd BR to lower BR on Old Belfair Hwy	First Sat in June-Aug 15	Catch and release. Selective gear rules.
Union R: from lower BR on Old Belfair Hwy upstream to watershed boundary.	First Sat in June-Oct 31	Catch and release. Selective gear rules.

Sequim-Port Townsend & Port Angeles Management Units

Tributary	Time period open for trout and/or steelhead opportunity	Rules summary
Chimacum Cr: from mouth to Ness's Corner Rd	First Sat in June-Aug 31	Min size 14". Daily limit 2
Chimacum Cr: upstream from Ness's Corner Rd	First Sat in June-Oct 31	Min size 14". Daily limit 2
Jimmycomelately Creek	First Sat in June-Aug 31	Min size 14". Daily limit 2
McDonald Creek	First Sat in June-Oct 31	Min size 14". Daily limit 2
Morse Creek: from mouth to Port Angeles Dam	Dec 1-Feb 28	Min size 14". Daily limit 2
Peabody Creek	First Sat in June-Oct 31	Min size 8". Daily limit 2. Juvenile anglers only.
Salmon Creek	CLOSED WATERS	
Siebert Creek	First Sat in June-Oct 31	Min size 14". Daily limit 2
Snow Creek	CLOSED WATERS	
Valley Creek	First Sat in June-Oct 31	Min size 8". Daily limit 2. Juvenile anglers only.

Dungeness River Management Unit

Tributary	Time period open for trout and/or steelhead opportunity	Rules summary
Dungeness R: from mouth to Gold Creek CLOSED WATERS: from the forks at Dungeness Forks Campground to Gold Creek.	Oct 16-Feb 28	Min size 14". Daily limit 2
Dungeness R: upstream from Gold Creek	First Sat in June-Oct 31	Min size 14". Daily limit 2
Gray Wolf River CLOSED WATERS: from mouth to bridge at RM 1.	First Sat in June-Oct 31	Min size 14". Daily limit 2. Selective gear rules.

Elwha River Management Unit

Tributary	Time period open for trout and/or steelhead opportunity	Rules summary
Elwha R: from mouth to Aldwell Lake Dam	Oct 16-Feb 28	Min size 14". Daily limit 2

Appendix E-2. Emergency Game Fish Rules Enacted During the Summer 2009 to Protect Key Wild Summer Steelhead Populations in the Puget Sound Distinct Population Unit

Fishing Rule Change

WASHINGTON DEPARTMENT OF FISH AND WILDLIFE
600 Capitol Way North, Olympia, Washington 98501-1091
Internet Address: wdfw.wa.gov

June 3, 2009

Game fish closures and gear rule changes for protection of wild summer steelhead

Actions:

1. Change the game fish rules on the South Fork Nooksack River and North Fork Skykomish River to: All game fish – catch and release, except up to 2 hatchery steelhead may be retained. Selective gear rules. Night closure in effect.

2. Change the game fish rules on the Tolt River and Canyon Creek: All game fish – catch and release, except up to 2 hatchery steelhead may be retained. Selective gear rules.

3. Finney Creek will close to all fishing.

Effective dates: June 6, 2009 until further notice.

Species affected: Trout and all game fish.

Locations and Fishing Rule Changes:

1. South Fork Nooksack River:
   (a) From mouth to Skookum Creek confluence: All game fish – catch and release, except up to 2 hatchery steelhead may be retained. Selective gear rules. Night closure in effect.
   (b) The waters from Skookum Creek upstream remain closed.

2. North Fork Skykomish River:
   (a) From mouth to 1,000 feet below Bear Falls: All game fish – catch and release, except up to 2 hatchery steelhead may be retained. Selective gear rules. Night closure in effect.
   (b) The area from 1,000 feet below Bear Falls to Deer Falls (located about ¼ mile upstream of Goblin Creek) remains closed.

(c) From Deer Falls (located about ¼ mile upstream of Goblin Creek) upstream: All Game Fish – Statewide minimum size/daily limit.

3. Tolt River:
   (a) From mouth to USGS trolley cable near confluence of North and South Forks: All game fish – catch and release, except up to 2 hatchery steelhead may be retained. Selective gear rules.

4. Canyon Creek (South Fork Stillaguamish River):
   (a) From mouth to forks: All game fish – catch and release, except up to 2 hatchery steelhead may be retained. Selective gear rules.

5. Finney Creek: From mouth upstream: Closed Waters.

Reasons for action: Wild summer steelhead inhabiting the affected waters are part of the Puget Sound Steelhead Distinct Population Segment, which is listed as threatened under the Endangered Species Act. The fishing gear rule changes and fishing closure are intended to protect wild summer steelhead from incidental fishing mortality.

Information Contact:
Aaron Bosworth, Region 4 - Regional Fisheries Manager, 425-775-1311 x101,
Aaron.Bosworth@dfw.wa.gov

*Fishers must have a current Washington fishing license. Check the current WDFW "Fishing in Washington" rules pamphlet or the Fishing section of the WDFW webpage at **wdfw.wa.gov** for details on fishing seasons and regulations. Fishing regulations are subject to change. Check the WDFW Fishing hotline for the latest rule information at (360) 902-2500; press 2 for recreational rules; call the Shellfish Rule Change hotline, (360) 796-3215, or toll free 1 (866) 880-5431.*

Fishing Rule Change

WASHINGTON DEPARTMENT OF FISH AND WILDLIFE
600 Capitol Way North, Olympia, Washington 98501-1091
Internet Address: http://wdfw.wa.gov

June 3, 2009

Game fish gear rule changes for protection of wild summer steelhead

Actions:

1. Change the game fish rules on the Skokomish River to: All game fish – catch and release. June 6 through July 31, selective gear rules in effect, except fishing from a motorized vessel allowed.
2. Change the game fish rules on the South Fork Skokomish River to: All game fish – catch and release, selective gear rules.
3. Change the game fish rules on the Dungeness River to: All game fish – catch and release. Selective gear rules.

Effective dates: June 6, 2009 until further notice.

Species affected: Trout and All game fish.

Locations and Fishing Rule Changes:

(1) Skokomish River – from the mouth to Hwy. 101 Bridge: All game fish – catch and release. June 6 through July 31, selective gear rules in effect, except fishing from a motorized vessel allowed.
(2) South Fork Skokomish River - From Rule Creek upstream: All game fish – catch and release, selective gear rules in effect.
(3) Dungeness River - from Gold Creek upstream: All game fish – catch and release. Selective gear rules.

Reasons for action: Wild summer steelhead inhabiting the affected waters are part of the Puget Sound Steelhead Distinct Population Segment, which is listed as threatened under the Endangered Species Act. The fishing gear rule changes are intended to protect wild summer steelhead from incidental fishing mortality.

Information Contact: Bill Freymond, Region 6 - Regional Fisheries Manager, 360-753-2600, ext. 225. William.Freymond@dfw.wa.gov

*Fishers must have a current Washington fishing license. Check the current WDFW "Fishing in Washington" rules pamphlet or the Fishing section of the WDFW webpage at **wdfw.wa.gov** for details on fishing seasons and regulations. Fishing regulations are subject to change. Check the WDFW Fishing hotline for the latest rule information at (360) 902-2500; press 2 for recreational rules; call the Shellfish Rule Change hotline, (360) 796-3215, or toll free 1 (866) 880-5431.*

Fishing Rule Change

WASHINGTON DEPARTMENT OF FISH AND WILDLIFE
600 Capitol Way North, Olympia, Washington 98501-1091
Internet Address: http://wdfw.wa.gov

June 5, 2009

Rule change for protection of wild summer steelhead

Actions: Change the game fish rules on the Gray Wolf River to: All game fish – catch and release. Selective gear rules in effect.

Effective dates: June 6, 2009 until further notice.

Species affected: Trout and all game fish.

Location: From the mouth at Dungeness Forks Campground upstream to the Olympic National Park boundary.

Reasons for action: Wild summer steelhead inhabiting the affected waters are part of the Puget Sound Steelhead Distinct Population Segment, which is listed as threatened under the Endangered Species Act. The fishing gear rule changes are intended to protect wild summer steelhead from incidental fishing mortality.

Information Contact: Bill Freymond, Region 6 - Regional Fisheries Manager, 360-753-2600, ext. 225. William.Freymond@dfw.wa.gov.

*Fishers must have a current Washington fishing license. Check the current WDFW "Fishing in Washington" rules pamphlet or the Fishing section of the WDFW webpage at **wdfw.wa.gov** for details on fishing seasons and regulations. Fishing regulations are subject to change. Check the WDFW Fishing hotline for the latest rule information at (360) 902-2500; press 2 for recreational rules; call the Shellfish Rule Change hotline, (360) 796-3215, or toll free 1 (866) 880-5431.*

Appendix E-3. "2010-2012 Sportfishing Rule Change Proposals"

2010-2012
Sportfishing Rule Change Proposals

Washington Department of FISH and WILDLIFE

September 2009

Table of Contents

Statewide Rules

#1. Anti-Snagging Gear Rule

Proposal: "Anti-snagging rule" means:
Except when fishing with a buoyant lure (with no weights added to the line or lure), or trolling from a vessel or floating device, terminal fishing gear is restricted to a lure or bait with one single point hook. Only single point hooks measuring not more than 3/4 inch from point to shank may be used, and all hooks must be attached to or below the lure or bait. Weights may not be attached below or less than 12 inches above the lure or bait.
Explanation: Anglers have expressed concerns that the current anti-snagging rule does not allow the use of floating gear with treble hooks in areas where the rule is applied. They argue that floating gear is not used to snag fish, and it should be exempted from the rule. The proposal allows anglers who are trolling or who are using a floating lure without weight attached to the line to use treble hooks, while still restricting the use of gear that can be used to snag fish.

#2. Buoyant Lure Definition

Proposal: A buoyant lure is defined as a lure that floats on the surface of fresh water when no additional weight is applied to the line or lure, and when not being retrieved by a line.
Explanation: This clarifies what is meant by a buoyant lure in the anti-snagging gear rule definition.

#3. Trolling Definition

Proposal: Trolling is defined as a method of fishing from a vessel or floating device that is underway and under power.
Explanation: This clarifies what is meant by trolling in the anti-snagging gear rule definition.

Legislative Requirements

#4. Definition of Opening Day of Lowland Lake Season

Proposal: Define the opening day of fishing on lowland lakes as the last Saturday in April
Explanation: Substitute House Bill 1778, passed in the 2009 legislative session, states that "d) Except for active duty military personnel serving in any branch of the United States armed forces, the temporary combination fishing license is not valid on game fish species for an eight-consecutive-day period beginning on the opening day of the lowland lake fishing season as defined by rule of the commission." This proposal provides that definition.

#5. Areas Where Columbia River Endorsement is Required

Proposal: Beginning January 1, 2010, in addition to a recreational fishing license, a Columbia River salmon and steelhead endorsement is required for a person fifteen years or older to fish for salmon or steelhead in the following areas:

Mainstem Columbia River from the Rocky Point/Tongue Point line to Chief Joseph Dam
Deep River and tributaries
Grays River and tributaries
Skamokawa River and tributaries
Elochoman River and tributaries
Mill Creek and tributaries
Abernathy Creek and tributaries
Germany Creek and tributaries
Coal Creek and tributaries
Cowlitz River and tributaries
Coweeman River and tributaries
Toutle River and tributaries, including North and South Forks
Green River and tributaries
Cispus River and tributaries
Kalama River and tributaries
Lewis River and tributaries, including North and East Forks
Salmon Creek and tributaries
Washougal River and tributaries
Hamilton Creek and tributaries
Rock Creek and tributaries
Wind River and tributaries
White Salmon River and tributaries
Klickitat River and tributaries
Walla Walla River and the following tributaries:
- Mill Creek
- Gardena Creek
- Pine Creek
- Mud Creek
- Dry Creek

Touchet River and the following tributaries:
- Coppei Creek
- Whisky Creek
- North Fork Touchet
- Wolf Fork Touchet
- South Fork Touchet

Grande Ronde River and the following tributaries:
- Rattlesnake Creek
- Cottonwood Creek
- Cougar Creek
- Menachee Creek
- Grouse Creek
- Wenaha River

Snake River mainstem – and the following tributaries
- Palouse River (below the falls)
- Alkali Flat Creek
- Alpowa Creek
- Almota Creek
- Tenmile Creek
- Penawawa Creek
- Wawawai Canyon Creek
- Couse Creek
- Asotin Creek
- North Fork Asotin Creek

Tucannon River
- Pataha Creek (Tucannon River trib)

Yakima River
Crab Creek
Sand Hollow Creek
Whiskey Dick
Skookumchuck
Quilomene Creek
Brushy Creek
Tekison Creek
Trinidad Creek
Tarpiscan Creek
Colockum Creek
Rock Island Creek
Stemilt Creek
Squilchuck Creek
Wenatchee River and tributaries
Swakane Creek
Entiat River and tributaries
Chelan River
Antoine Creek
Methow River and tributaries
Okanogan River and tributaries
Foster Creek

Explanation: Engrossed Substitute Senate Bill 5421 mandates this endorsement as a pilot program with the goal of increasing recreational selective fishing opportunities on the Columbia River and its tributaries. The endorsement is required in the Columbia River and its tributaries

from the Rocky Point-Tongue Point line to Chief Joseph Dam. The Department is charged with creating a list of the tributaries where this stamp is required.

#6. Two Pole Endorsement

Proposal: Substitute House Bill 1778 allows the Department to sell a two-pole endorsement, and to adopt rules that state where the endorsement is valid. Anglers who purchase the two-pole endorsement may use up to 2 lines while fishing.

Explanation: The Department proposes to allow anglers to use the two-pole endorsement in all lakes statewide, with exclusions based on the criteria listed below:

a. Lakes with ESA-listed species present excluded on a case-by-case basis
b. Lakes connected to anadromous waters during fisheries for anadromous fish
c. Lakes managed for natural trout production
d. Juvenile-only lakes
e. Fly fishing only waters
f. Lakes with selective gear rules and a reduced daily limit for trout

NOTE: The two pole endorsement is not valid on the Columbia or Snake rivers mainstem, except Lake Roosevelt and Rufus Woods Reservoir.

All other rules such as daily limits, and seasons, remain unchanged. Gear rules apply to the tackle on each line (for instance, 3 hooks are allowed in most areas – this would translate to three hooks on each line).

This rule was put in place by emergency rule, beginning August 15, 2009, to allow sale of the two-pole endorsement this summer. The permanent rule would take effect May 1, 2010, along with other proposed rules in this package.

The following lakes are proposed as exceptions – anglers would NOT be allowed to fish with two poles in the lakes listed below. The reason for the exception is listed for each lake.

AMBER LAKE (Spokane Co.)	Selective gear rules
BAYLEY LAKE (Stevens Co.)	Fly Fishing Only
BEAR LAKE (Spokane Co.)	Juvenile anglers
BIG FOUR LAKE (Columbia Co.)	Fly Fishing Only
BROWNS LAKE (Pend Oreille Co.)	Fly Fishing Only
COFFEEPOT LAKE (Lincoln Co.)	Selective gear rules
DAYTON POND (Columbia Co.)	Juvenile anglers
GARFIELD JUVENILE POND (Whitman Co.)	Juvenile anglers
HEADGATE POND (Asotin Co.)	Juvenile anglers
JEFFERSON PARK POND (Walla Walla Co.)	Juvenile anglers
LIONS PARK POND (Walla Walla Co.) (College Place)	Juvenile anglers
LONG LAKE (Ferry Co.)	Fly Fishing Only
LUCKY DUCK POND (Stevens Co.)	Juvenile anglers
MCDOWELL LAKE (Stevens Co.)	Fly Fishing Only
MEDICAL LAKE (Spokane Co.)	Selective gear rules
MUSKEGON LAKE (Pend Oreille Co.)	Selective gear rules
NORTH SILVER LAKE (Spokane Co.)	Selective gear rules
RIGLEY LAKE (Stevens Co.)	Selective gear rules
AENEAS Lake (Okanogan Co.)	Fly Fishing Only

BEDA LAKE (Grant Co.)	Selective gear rules
BIG TWIN LAKE (Okanogan Co.)	Selective gear rules
BLACK LAKE (Okanogan Co.)	ESA fish species present.
BLACKBIRD ISLAND PD (Chelan Co.)	Juvenile anglers
BLUE LAKE (Okanogan Co.) (near Wannacut Lake)	Selective gear rules
BLUE LAKE (Okanogan Co.)(Sinlahekin Creek)	Selective gear rules
BROOKIES LAKES (Grant Co.)	Selective gear rules
CAMPBELL LAKE (Okanogan Co.)	Selective gear rules
CHOPAKA LAKE (Okanogan Co.)	Fly Fishing Only
COUGAR LAKE (Okanogan Co.) (Lost River)	ESA fish species present.
DAVIS LAKE (Okanogan Co.)	Selective gear rules
DRY FALLS LAKE (Grant Co.)	Selective gear rules
DUSTY LAKE (Grant Co.)	Selective gear rules
ELL LAKE (Okanogan Co.)	Selective gear rules
GREEN LAKE (Okanogan Co.)	Selective gear rules
GREEN LAKE, LOWER (Okanogan Co.)	Selective gear rules
GRIMES LAKE (Douglas Co.)	Selective gear rules
Hidden LAKE (Okanogan Co.) (Lost River)	ESA fish species present.
HOMESTEAD LAKE (Grant Co.)	Selective gear rules
LENICE LAKE (Grant Co.)	Selective gear rules
LENORE LAKE (Grant Co.)	Selective gear rules
MERRY LAKE (Grant Co.)	Selective gear rules
NUNNALLY LAKE (Grant Co.)	Selective gear rules
PARA-JUVENILE LAKE (Grant/Adams Co.)	Juvenile anglers
PING POND (Grant Co.)	Juvenile anglers
PIT LAKE (Douglas Co.)	Juvenile anglers
QUAIL LAKE (Adams Co.)	Fly Fishing Only
RAT LAKE (Okanogan Co.)	Selective gear rules
SILVERNAIL LAKE (Okanogan Co.)	Juvenile anglers
WENATCHEE, LAKE (Chelan Co.)	ESA fish species present.
BUMPING LAKE (RESERVOIR) (Yakima Co.)	ESA fish species present.
CLEAR LAKE (Yakima Co.)	ESA fish species present.
COLUMBIA PARK POND (Benton Co.)	Juvenile anglers
EASTON LAKE (Kittitas Co.)	ESA fish species present.
KACHESS LAKE (RESERVOIR) (Kittitas Co.)	ESA fish species present.
KEECHELUS LAKE (RESERVOIR) (Kittitas Co.)	ESA fish species present.
KIWANIS POND (Kittitas Co.)	Juvenile anglers
LEECH LAKE (Yakima Co.) (White Pass area)	Fly Fishing Only
MUD LAKE (Yakima Co.)	Selective gear rules
MYRON LAKE (Yakima Co.)	Selective gear rules
NANEUM POND (Kittitas Co.)	Juvenile anglers
RIMROCK LAKE (RESERVOIR) (Yakima Co.)	ESA fish species present.
SARGE HUBBARD PARK POND (Yakima Co.)	Juvenile anglers
YAKIMA SPORTSMEN'S PARK PONDS (Yakima Co.)	Juvenile anglers
BAKER LAKE (Whatcom Co.)	ESA fish species present.
DIABLO LAKE (Whatcom Co.)	ESA fish species present.
EBEY LAKE (Snohomish Co.) (Little Lake)	Fly Fishing Only
FORTSON MILL POND #2 (Snohomish Co.)	Juvenile anglers
GISSBURG POND, NORTH (Snohomish Co.)	Juvenile anglers

GORGE LAKE (Whatcom Co.)	ESA fish species present.
GRANITE LAKES (Skagit Co.) (near Marblemount)	Native fish concerns
JENNINGS PARK POND (Snohomish Co.)	Juvenile anglers
MILL POND (King Co.) (Auburn)	Juvenile anglers
MONTE CRISTO LAKE (Snohomish Co.)	ESA fish species present.
NORTHERN STATE HOSPITAL POND (Skagit Co.)	Juvenile anglers
OLD FISHING HOLE POND (King Co.) (Kent)	Juvenile anglers
PASS LAKE (Skagit Co.)	Fly Fishing Only
PORTAGE BAY (King Co.)	ESA fish species present.
RATTLESNAKE LAKE (King Co.)	Selective gear rules
RAVENSDALE LAKE (King Co.)	Selective gear rules
ROSS LAKE (RESERVOIR) (Whatcom Co.)	ESA fish species present.
SALMON BAY	ESA fish species present.
SAMMAMISH, LAKE (King Co.)	Potential ESA fish species present.
SPADA LAKE (RESERVOIR) (Snohomish Co.)	Selective gear rules
SQUALICUM LAKE (Whatcom Co.)	Fly Fishing Only
SWANS MILL POND (King Co.)	Same regulation at the creek
UNION, LAKE (King Co.)	ESA fish species present.
VOGLER LAKE (Skagit Co.)	Fly Fishing Only
WASHINGTON SHIP CANAL, LAKE (King Co.) (including Lake Union, Portage Bay, and Salmon Bay) waters east of a north-south line 400' west of the Chittenden Locks to the Montlake Bridge	ESA fish species present.
WASHINGTON, LAKE (King Co.) including that portion of Sammamish River from 68th Ave. NE Bridge downstream	ESA fish species present.
WHATCOM, LAKE (Whatcom Co.) (See DOH Fish Consumption Advisories, page 32)	Native fish concerns
BLUE LAKE (Cowlitz Co.)	Selective gear rules
CASTLE LAKE (Cowlitz Co.)	Selective gear rules
COLDWATER LAKE (Cowlitz Co.)	Selective gear rules
COWLITZ FALLS RESERVOIR	ESA fish species present.
DRANO LAKE (Skamania Co.) (Little White Salmon River) downstream of markers on point of land downstream and across from Little White Salmon National Fish Hatchery and upstream of Hwy. 14 Bridge	ESA fish species present.
FORT BORST PARK POND (Lewis Co.)	Juvenile anglers
LEWIS RIVER POWER CANAL (Cowlitz Co.) and old Lewis River streambed between Swift No.1 Powerhouse and Swift No. 2 Powerhouse	ESA fish species present.
MAYFIELD LAKE (RESERVOIR) (Lewis Co.) from Mayfield Dam to Mossyrock Dam	ESA fish species present.
MERRILL LAKE (Cowlitz Co.)	Fly Fishing Only
PACKWOOD LAKE——————————— (Lewis Co.)	Selective gear rules
SCANEWA LAKE (Lewis Co.) (Cowlitz Falls Reservoir)	ESA fish species present.
SILVER LAKE (Cowlitz Co.)	ESA fish species present.
SWIFT RESERVOIR (Skamania Co.) from dam to	ESA fish species present.

markers approximately mile below Eagle Cliff Bridge	
VANCOUVER LAKE (Clark Co.) and all other waters west of Burlington-Northern Railroad from Columbia River drawbridge near Vancouver downstream to Lewis River	ESA fish species present.
WALUPT LAKE——————————————— (Lewis Co.)	Selective gear rules
WILLAME LAKE (Lewis Co.)	Selective gear rules
ALDWELL LAKE (Clallam Co.)	Lake will be gone when dams are removed - 2010
ANDERSON LAKE——————————————— (Jefferson Co.)	Selective gear rules
BEAVER LAKE (Clallam Co.)	Selective gear rules
BRADLEY LAKE (Pierce Co.)	Juvenile anglers
CADY LAKE (Mason Co.)	Fly Fishing Only
CARRIE BLAKE POND (Clallam Co.)	Juvenile anglers
CASES POND (Pacific Co.)	Juvenile anglers
CUSHMAN RESERVOIR (Mason Co.)	ESA fish species present.
DAMON LAKE (Grays Harbor Co.)	Anadromous fish present
DE COURSEY POND (Pierce Co.)	Juvenile anglers
DICKEY LAKE (Clallam Co.)	Anadromous fish present
GIBBS LAKE (Jefferson Co.)	Selective gear rules
HORSESHOE LAKE (Jefferson Co.)	Selective gear rules
KENNEDY CREEK POND (Thurston Co.)	Native fish concerns
KOENEMAN LAKE (Kitsap Co.) (formerly Fern Lake)	Selective gear rules
LINCOLN POND (Clallam Co.)	Juvenile anglers
LONG'S POND (Thurston Co.)	Juvenile anglers
MCLANE CREEK PONDS (Thurston Co.)	Native fish concerns
MIDDLE NEMAH POND (Pacific Co.)	Anadromous fish present
MILL CREEK POND (Grays Harbor Co.)	Juvenile anglers
MOOSES POND (Pacific Co.)	Anadromous fish present
MUNN LAKE (Thurston Co.)	Selective gear rules
OHOP LAKE (Pierce Co.)	Anadromous fish present
OWENS POND (Pacific Co.)	Anadromous fish present
PLEASANT, LAKE (Clallam Co.)	Anadromous fish present
PRICES LAKE (Mason Co.)	Selective gear rules
PROMISED LAND POND (Grays Harbor Co.)	Anadromous fish present
QUIGG LAKE - local name (Grays Harbor Co.) Located at Friends Landing near Montesano.	Anadromous fish present
SHYE LAKE (Grays Harbor Co.)	Anadromous fish present
SOUTH BEND MILL POND (Pacific Co.)	Juvenile anglers
STUMP LAKE (Mason Co.)	Anadromous fish present
SUTHERLAND LAKE (Clallam Co.)	Future anadromy when Elwha dams are removed (2010)
TANWAX LAKE (Pierce Co.)	Anadromous fish present
TEAL LAKE (Jefferson Co.)	Selective gear rules
VANCE CREEK POND #1 (Grays Harbor Co.)	Juvenile anglers
VANCE CREEK POND #2 (Grays Harbor Co.)	Consistency with Pond #1 because of close proximity

WAPATO LAKE (Pierce Co.)	Juvenile anglers
WYNOOCHEE RESERVOIR (Grays Harbor Co.)	Anadromous fish present

Marine Rules

Salmon and other Marine Fish Rules

#7. Unclassified Marine Fish and Invertebrates

Proposal: This proposal would close all harvest of unclassified marine fish and invertebrates.
Explanation: Unclassified marine invertebrates consist of animals such as starfish, sand dollars, shore crabs and unclassified marine fish are animals such as blennies, tubesnouts and tide pool sculpins. Existing regulations prohibit these animals from being taken in a commercial fishery and limit recreational harvest to two unclassified fish (per species) per day and 10 unclassified invertebrates (lower limits exist for moon snails and nudibranchs) The intent of this regulation is to provide additional conservation benefit to these species. The current harvest is not actively managed or monitored. Eliminating harvest would provide a precautionary approach to management of these species. A second benefit would be improved populations of these animals at public beaches to increase non-consumptive use of these resources through viewing, photography and education.
This proposal would not change regulations regarding the collection of shells. For example if this proposal is enacted, no collection of live moon snails would be allowed but a person could still collect the shells of dead moon snails.

#8. Daily Limit for Other Food Fish

Proposal: For species of food fish for which no daily bag limit has been established, the daily limit would be 2 fish of any species.

Explanation: Under current rules if no daily limit has been established for a species of food fish, there is no limit on the daily take. The proposal would establish a daily limit of two such fish per day with the intent of providing limited harvest opportunity while also providing conservation. Most of the fish affected by this rule change are uncommon in Washington waters and include species such as bonito, white seabass and barracuda. If large numbers of any of these species were to occur in Washington waters in future years, and the resource would support higher rates of harvest, the department could quickly modify the rules through the emergency rule process to increase harvest rates.

#9. Lingcod Rules

Proposal: This proposal would align the lingcod seasons and slot limits for spearfishers with those of anglers in Marine areas 5-11 and 13.

Explanation: The Department received several to alter regulations for lingcod fishing in Puget Sound. These suggestions included changing the daily limit; changing size the limit and adjusting the length of the season. Current regulations differ by gear type: anglers have a 1.5 month season with minimum and maximum size limits while spearfishers have no size limit but only a three week season. The Department is proposing that current regulations for angling remain unchanged. The spearfishing season would be increased to match the angling season and minimum (26 inch) and maximum (40 inch) size limits would be in effect for this gear type. The end result would be identical regulations for angling and spearfishing for lingcod
Under the current rules, approximately 25% of the lingcod harvested are less than 26 inches in length. By eliminating this harvest of small fish, the abundance of larger fish should increase over the next few years

which will translate into increased numbers of spawning adult lingcod and increased numbers of lingcod available for harvest in the 26 to 40 inch window of opportunity. The harvest of large (over 40 inch) lingcod will be minimally affected as only 1% of the speared lingcod are over this length.

#10. Rockfish and Bottomfish Rules

Proposal: Due to conservation concerns for rockfish species throughout the state, the Department is proposing several changes to the recreational rules for rockfish.

1) Marine Area 4 (east of the Bonilla-Tatoosh line) to 13 – closed to the retention of bottomfish in waters deeper than 20 fathoms (120 ft);
2) Marine Areas 6- 13 – closed to the retention of rockfish;
3) Marine Area 4 (east of the Bonilla-Tatoosh line) – daily limit is 10 black and blue rockfish combined. No other species of rockfish may be retained;
4) Marine Area 5 –daily limit is the first black or blue rockfish caught, except west of Slip Point the daily limit is the first three black or blue rockfish caught. No other species of rockfish may be retained. Spearfishing for rockfish of any species is not allowed.

Explanation: The intent of these proposals is to provide increased protection from harvest for rockfish in Puget Sound. Populations of several species of rockfish have been in decline and the Federal Government has proposed that three species of rockfish be listed under the Endangered Species Act; two species (canary and yelloweye) as threatened and one species (bocaccio) as endangered. Additionally, the anatomy of rockfish causes high rates of mortality for fish which are brought to the surface from depth and released. These fish suffer internal damage and death due to expansion of their air bladder. To provide the needed protection, it is necessary to reduce the number of rockfish retained by anglers and to reduce the number of rockfish brought to the surface from depth and released. The current daily limit for most species of rockfish during open seasons in Puget Sound is one fish (with a larger daily limit in the west end of Area 5 and no retention of canary or yelloweye rockfish allowed anywhere in Puget Sound). However despite the low limit, approximately 13,000 rockfish are caught and retained annually by anglers in Puget Sound. The majority of these rockfish are caught by anglers fishing for bottomfish such as lingcod and sole. The Department is also proposing the prohibition of retention of all bottomfish caught in waters deeper than 120 feet. As with the other proposals it is designed to minimize the capture of rockfish from deep water. Salmon fishing would continue to be allowed in deep water but any bottomfish caught during deep water fishing would have to be released. Fishing for bottomfish such as lingcod, soles, flounders and greenling would not be allowed in deep water. However opportunities to fish for these species in shallow water (less than 120 feet) would continue. These proposals also represent a stepped approach to the management of rockfish in Puget Sound. This stepped approach allows higher rates of harvest of black and blue rockfish in the far western end of the Strait of Juan de Fuca, a lesser harvest in the area near Sekiu and no harvest in the remainder of the Sound. The stepped approach follows our knowledge of rockfish abundance and biology and allows harvest when appropriate.

#11. Hook Rules for Salmon in Marine Areas

Proposal: Require single-point barbless hooks when fishing for salmon from the Columbia River jetty and in Willapa Bay (MA 2-1) and the Westport Boat Basin from August 1 – January 31.
Explanation: This proposal would require single-point barbless hooks for all saltwater salmon fisheries, making saltwater salmon hook rules consistent and easy to follow, while allowing easier release of any salmon not retained

#12. Hoodsport Hatchery – ADA Fishing Pier

Proposal: This proposal allows persons who permanently use a wheelchair and/or have a designated harvester card to fish from the ADA-accessible site at the Hoodsport Salmon Hatchery, provided such persons follow all

applicable rules and regulations of the adjoining waters of Marine Area 12. Designated harvesters may fish from the ADA-accessible site with persons who permanently use a wheelchair and/or have a designated harvester card, if room allows. However, persons who permanently use a wheelchair have priority over others if the ADA-accessible site becomes overcrowded.
Explanation: The ADA accessible fishing pier was constructed in an area that is currently closed to all fishing. This proposal exempts the fishing pier from that closure and specifies licensing requirements for anglers to fish from the pier.

Shellfish Rules

#13. Dungeness Crab Season and Daily Limit

Proposal: This proposal would reduce the daily limit for Dungeness crab in all Puget Sound marine areas from 5 crab to 4. It would also change the days open each week from Wednesday through Saturday to Friday through Monday in Marine Areas 6, 7, 8-1, 8-2, 9, 10, 11, and 12.

Explanation: The intent of this rule change is to provide recreational crab opportunity for two consecutive weekend days while maintaining catch allocation objectives. We have received many requests from the public to allow crabbing on both Saturday and Sunday.

#14. Daily Limit for Rock Scallops

Proposal: This proposal would change the daily limit for rock scallops from 12 to 6.
Explanation: Rock scallops are a popular shellfish harvested by recreational divers. Rock scallops are a slow growing species with limited habitat in Washington waters. The department does not have the capacity to regularly monitor either the harvest or the abundance of this species. The proposed decrease to the daily bag limit is intended to decrease the risk of overexploitation while still maintaining an opportunity for recreational harvest.

#15. DNR-85 and South Dougall Point Beaches

Proposal: This proposal re-opens both of these beaches to the recreational harvest of clams and oysters year-round.
Explanation: These two public beaches have been closed due to pollution, but Washington Department of Health has notified our agency that the beaches are no longer polluted and can be re-opened year-round for recreational clam and oyster harvest.

#16. Oakland Bay Oyster Reserve

Proposal: Open all public tidelands in the Oakland Bay Oyster Reserve to recreational clam and oyster harvest year-round except for Dikes 7-17 (which are currently closed and will remain closed, with signage marking the dike boundaries).

Explanation: There is no biological or management reason to keep the other public tidelands within the Oakland Bay Oyster Reserve closed to public harvest, except in the case of Dikes 7-17, which have been closed to sport harvest since the early 1990s, and are currently managed by agreement as a "single-entity" tideland under Squaxin Tribe management. These dikes would remain closed under this rule change, and would be posted with signs.

#17. Potlatch East and Cushman (Saltwater) Park

Proposal: Delete Potlatch East and Cushman (Saltwater) Park from the beach list.
Explanation: Both these former public beaches are now in private ownership. WDFW rules are only applicable to publicly-owned tidelands.

#18. Scientific Name of Native Littleneck Clam

Proposal: In list of classified shellfish, change scientific name of native little neck clam to *Leukoma staminea* (was formerly *Protothaca staminea).*

Explanation: The scientific (Latin) name for the genus of this clam species has been officially changed.

#19. Clam and Oyster Beach Seasons

Proposals for season changes on clam and oyster beaches based on harvest and recruitment are not available at this time because current seasons are still under way and harvest numbers are not complete. These proposals will be available later this winter, and will be placed on the Department's web site at that time.

#20. Standardizing Clam and Oyster Seasons

Proposal: Make recreational oyster seasons the same as the clam seasons on nine public beaches (Pitt Island, Ala Spit, Cama Beach State Park, Camano Island State Park, Kayak Point County Park, Purdy Spit County Park, Dungeness Spit/National Wildlife Refuge, Spencer Spit State Park and Brown Point DNR 57-B). The first six will be closed to oyster harvest, Dungeness will be open May 15-Sept. 30, Spencer Spit will be open March 1 – July 31, and Brown Point will be open year-round.

Explanation: Pitt Island, Cama Beach State Park, Camano Island State Park, Kayak Point County Park and Purdy Spit County Park have all been closed to clamming for several years, but are open for oysters year-round. There is very little oyster resource present on these beaches, and this inconsistency with the clam season causes confusion among the public as well as enforcement problems. Spencer Spit, Ala Spit, and Dungeness Spit have limited (or closed) clam seasons most years, but year-long oyster seasons. Again, this is inconsistent with the clam season, causing confusion among the public and enforcement problems. Brown Point (DNR 57-B) oyster resources can be opened year-round for consistency with the existing year-round clam season.

#21. Silverdale County Park Name Change

Proposal: Change the name of "Silverdale County Park" to "Silverdale Waterfront Park." This beach is located in Dyes Inlet.

Explanation: The official name for this Kitsap County Park is "Silverdale Waterfront Park." The name change in the rules and Fishing pamphlet will make the names consistent with the county's signage, web pages and other publications.

#22. Crayfish Harvest

Proposal: This proposal would allow the harvest of non-native northern crayfish (*Orconectes virilis*) and Louisiana redclaw crayfish (*Procambarus clarkii*) as part of the daily limit of crayfish. All rules currently in place for crayfish (gear rules, season, minimum size, no females with eggs or young etc.) would also apply to these species. The daily limit would be 10 lbs in the shell of all crayfish species combined.

Explanation: Currently, only the native *Pacifastacus* species of crawfish are permitted in recreational harvests. Harvest of Northern Crayfish and Louisiana redclaw crayfish is not currently allowed. These two species have established themselves in lakes and streams in Washington State. Northern crayfish appear to be the predominant species in the Columbia River reservoirs of Lake Roosevelt and Lake Rufus Woods, and have spread to become the predominant species throughout the Columbia Basin Project waters. They appear to be the sole crawfish species in Moses Lake and Crab Creek, and have been found in at least 3 lakes in western Washington. Louisiana redclaw crayfish are known to be established in at least 10 lakes and ponds in western Washington (17% of sampled lakes per Larson and Olden 2008). Allowing harvest of the two species will help to remove these non-native species, while retaining current seasons and size limits provides protection for native species.

#23. Stream Strategy for Puget Sound and Straits

With various fish populations across the State being listed under the Endangered Species Act, (most recently Puget Sound steelhead), a more conservative approach to the regulation of fishing in rivers, streams, and beaver ponds is essential and requires the WDFW to provide as much protection as possible for all life stages of these populations, in particular for rearing juveniles. The difficulty is how to provide protection for these stocks of fish while also offering reasonable recreational opportunity. Currently the standard stream rule opens rivers, streams and beaver ponds to fishing for game fish from the 1st Saturday in June – October 31st, with an 8" minimum size, 2 fish / day limit. Consequently much of the juvenile rearing habitat for resident trout and Dolly Varden and anadromous salmon, steelhead, cutthroat, and Bull Trout is currently open for fishing. As a result, these juvenile salmonids are at risk of being incidentally caught and may not survive being handled and released, especially if bait is used.

A more conservative management strategy to protect these stocks under consideration by the WDFW is to close all rivers, streams, and beaver ponds to fishing except as listed in the Fishing in Washington Rules Pamphlet. Rivers, streams and beaver ponds listed in the pamphlet as open to fishing will be identified for areas where stocks are robust and can support fishing pressure and in areas where reasonable recreational opportunity exists. The primary goal is to protect stocks at certain times of the year and in areas where they are most susceptible to mortality that may be associated with recreational angling. At this time, we are proposing to implement this strategy only in streams that drain into Puget Sound and the Strait of Juan de Fuca. If this strategy is adopted and proves successful, the rest of the state would follow suit during the next regulation change cycle in two years.

The tables in Appendix 1 present all of the fishing opportunity that will be available in the Puget Sound and Strait of Juan de Fuca drainages. Areas open to fisheries are presented by river system unless the waters drain directly to salt water. (If these proposals are adopted there will also be an alphabetical list of open areas placed in the fishing pamphlet). All salmon seasons listed are *last year's* seasons and are subject to change. Since the basic rule in these areas would be "closed unless listed" there are "closed waters" areas that will no longer be highlighted. We are still working on how these would be displayed in the pamphlet. Some of these closed areas are still listed in the tables to clarify the intent of the proposals. The last column in each table is a letter listing, from A-G. These are the reasons for the proposed changes. Rules that remain unchanged will not have a letter in this column. Descriptions of the A-G listings are shown in the table below.

	STREAM STRATEGY		
	Steelhead Status	**Trout Rules**	**Fishing/Conservation**
A	Resident fish zone	8" minimum size, daily limit 2, bait allowed.	Fishing: resident fish opportunities usually above anadromous zone, hatchery steelhead may be available Conservation: allows most resident trout to spawn once before harvest
B	Resident fish zone/resident fish concerns	8" minimum size, daily limit 2 fish, selective gear rules.	Fishing: resident fish opportunities usually above anadromous zone, hatchery steelhead may be available Conservation: allows most resident trout to spawn once before harvest, reduces catch-and-release mortality associated with use of bait
C	Status good or anadromous fish juvenile presence low	14" minimum size, daily limit 2, bait allowed.	Fishing: resident trout, sea-run cutthroat, salmon, hatchery steelhead Conservation: 14" minimum size protects overwintering steelhead, allows resident trout and sea-run cutthroat to spawn once before retention.
D	Status good or anadromous fish juvenile presence low	14" minimum size, daily limit 2, selective gear rules.	Fishing: resident trout, sea-run cutthroat, salmon, hatchery steelhead Conservation: selective gear rules reduces the catch&release mortality associated with use of bait. 14" minimum size protects overwintering steelhead , allows resident trout and sea-run cutthroat to spawn once before retention.
E	bad	Selective gear rules and catch&release, except ,may retain 2 hatchery steelhead	Fishing: opportunity for harvest of hatchery steelhead, often includes catch&release opportunity for sea-run cutthroat and wild steelhead. Conservation: selective gear rules reduces the catch&release mortality associated with the use of bait. Protection provided for all trout life history stages.
F	bad	Catch&release, selective gear rules	Fishing: no hatchery steelhead present, catch&release opportunity for trout, which may include wild steelhead. Conservation: selective gear rules reduces the C&R mortality associated with the use of bait. Protection provided for all trout life history stages.
G	very bad	CLOSED WATERS	No fishing for any species. Protection provided for all life history stages.

#24. Freshwater Fish not Classified as Food Fish or Game Fish

Proposal: This proposal would close the harvest of freshwater fish not classified as food fish or game fish.

Explanation: This proposal provides protection of unclassified freshwater fish species from overharvest and also would eliminate the ability of an angler to fish in a body of water without a fishing license.

#25. Wild Steelhead Retention Seasons

Proposal: This proposal would change the beginning date for wild steelhead retention seasons on coastal streams from December 1 to February 16 – end dates of these fisheries would not be affected.

Explanation: Moving the starting date of the wild steelhead retention date forward to the middle of February is needed in order to protect the early portion of the run. Run timing is one of the important diversity traits of wild steelhead that helps maintain their total annual abundance and distribution. In the past, these early runs were large and known to migrate higher in the watershed during early high flows and occupy spawning areas not often accessed by later running fish.

#26. Tiger Muskie Rules

Proposal: This proposal would make it unlawful to use bait while fishing for tiger muskies.
Explanation: Because of the 50" minimum size limit, the tiger muskie fishery is primarily a catch-and-release fishery. Some anglers are concerned about the potential loss of released fish from hooking mortality if bait becomes a common method of fishing for tiger muskie. The use of bait while fishing for northern pike and muskellunge is popular in the Midwest states. The definition of bait includes the use of scent and/or flavor on any terminal lure.

Sturgeon

#27. Lower Columbia River Sturgeon Rules Above and Below Wauna

Proposal: This proposal allows for adoption of rules for the 2010 white sturgeon fishery in the Columbia River from Bonneville Dam downstream to the overhead powerline crossing of the Columbia River from Cathlamet, Washington to Wauna, Oregon approximately 40 miles upstream from the mouth (commonly referred to as the Wauna powerlines), and from the powerlines downstream to the mouth.
Opening and closing dates for the retention fishery and the specific days of the week that white sturgeon retention are allowed are contingent upon the annual fall-time resource inventory updates and negotiations with the state of Oregon and will be decided at a Joint State Hearing in December or January, and added to the 2010-2011 Sportfishing Rule Proposal package for recommendation to the Commission.
Explanation: Sturgeon in the lower Columbia River and tributaries downstream from Bonneville Dam are managed under the 3-year sturgeon management agreements between Washington and Oregon. Sturgeon population status, fishing seasons, and regulations are reviewed prior to each year of the 3-year agreement. Columbia River Joint State Hearings are held at the end of each year to set following-year seasons and regulations to keep sturgeon harvest within annual guidelines as defined in the Joint State Accord on Columbia River Sturgeon Fishery Management. These rules also maintain concurrent regulations between Washington and Oregon.

#28. Columbia River Sturgeon Rules - Bonneville to McNary Dam

Proposal: This proposal is designed to increase the period that retention of white sturgeon is allowed in the three Columbia River reservoirs between Bonneville and McNary dams.
Explanation: White sturgeon harvest in the three reservoirs between Bonneville and McNary dams is managed using annual pool-specific harvest guidelines based on resource inventories updated every three years. The current guidelines of 300 fish for The Dalles Pool and 165 fish for John Day Pool have resulted in short

retention seasons of 2.5 to 3.5 months the past two years. Anglers have expressed frustration with the early closures and would like fisheries to last into the warmer summer months if possible.

The existing season structure allows retention 7-days per week starting January 1 and lasts until each harvest guideline is reached. Possible alternatives include starting the retention fishery later in the year, limiting retention to fewer days each week, or a combination of both.

Region 3 and 5 staff, along with staff from ODFW, will convene a public meeting this fall to solicit input from local anglers on potential fishery options.

#29. Upper Columbia River and Lower Snake River Sturgeon Seasons

Proposal: 1) The Columbia River: from McNary Dam to Priest Rapids Dam is currently open to retention of sturgeon year-round. This proposal would limit sturgeon retention in this part of the river to February 1 - July 31; EXCEPT open to retention February 1 – April 30 from the trolley cableway 2.5 miles downstream from Priest Rapids Dam to Priest Rapids Dam. 2) The Snake River: from its mouth to Ice Harbor Dam is currently open to retention of sturgeon year-round. This proposal would limit sturgeon retention in this area of the Snake River to February 1 - July 31; EXCEPT open to retention February 1 – April 30 from the downstream end of Goose Island to Ice Harbor Dam (1.5 miles).

Explanation: White sturgeon harvest in all Columbia River reservoirs downstream of McNary Dam, and in the lower river below Bonneville Dam, is managed on a quota system to prevent over-harvest and maintain healthy populations. All upper Columbia R. reservoirs above Priest Rapids Dam are closed to the retention of sturgeon due to low legal-size adult abundance and/or poor juvenile recruitment from natural spawning. McNary Reservoir (i.e. Lake Wallula) and the lower Snake River reservoirs remain open year-round for retention and are not monitored in-season for harvest. Only fall "Young-of-the-Year" (YOY) juvenile surveys are presently conducted in Lake Wallula to assess natural reproduction/juvenile recruitment. These annual surveys indicate that young sturgeon recruit to the population during most years, but in relatively low numbers. Natural production was particularly strong during 1997-99 (high flow years) in some of the reservoirs, but reservoir conditions have not been suitable to produce large recruitments since that time. In 2007 and 2008, WDFW creel staff increased efforts to record incidental catch/harvest of sturgeon associated with the fall Chinook fishery. Consequently, we estimated that 46 percent of the total sturgeon harvest in Lake Wallula occurs during the Hanford Reach fall Chinook fishery from Aug. 16 – Oct. 22

Based on the limited information from the YOY surveys in Lake Wallula, the apparent decline in recruitment to legal size based on Catch Record Card-reported harvest, and the incidental catch and harvest of white sturgeon during the fall Chinook fishery, we are proposing the sturgeon harvest fishery in the Columbia R. between McNary Dam and Priest Rapids Dam be shortened from year-round to a 6-month season. Retention of legal sturgeon would be open from February 1 to July 31, but be restricted to "catch and release only" from August 1 to January 31. A more restrictive 3-month harvest season (Feb. 1 – Apr. 30) is proposed for a "sturgeon spawning sanctuary" area extending 2.5 miles downstream from Priest Rapids Dam. . All sturgeon fishing would be closed in the spawning sanctuary during the May 1 – July 31 spawning season, but would be re-open for "catch and release only" from August 1 to January 31. This addresses a conservation need for "oversize" broodstock sturgeon staging just downstream from the dam to spawn in the spring. These rare and valuable brood fish require increased protection from adverse impacts resulting from excess handling in the recreational fishery, including stress induced reproductive failure and mortality.

We also propose a similar reduction in the retention season in the Snake R. from the mouth to Ice Harbor Dam be shortened from year-round to a 6-month season. Retention of legal sturgeon would be open from February 1 to July 31, but be restricted to "catch and release only" from August 1 to January 31. A more restrictive 3-month harvest season (Feb. 1 – Apr. 30) is proposed for a "sturgeon spawning sanctuary" area extending from Ice Harbor Dam downstream 1.5 miles to the downstream end of Goose Island. All sturgeon fishing would be closed in the spawning sanctuary during the May 1 – July 31 spawning season, but would be re-open for "catch

and release only" from August 1 to January 31. This addresses a conservation need for "oversize" broodstock sturgeon staging in the spring to spawn in the Ice Harbor Dam tailwater area.
These reductions in the "retention season" would reduce the overall harvest roughly 50%, while still allowing the fishery to be open during some of the months that generate the highest effort (May-September). Prohibiting sturgeon retention during the fall Chinook fishery would reduce legal size harvest. It may also help reduce illegal retention of sub-legal or over-size fish during the fall Chinook fishery by making enforcement easier when angler effort for salmon is very high

#30. Shad as Sturgeon Bait

Proposal: This proposal would make it unlawful to use shad as bait while fishing for sturgeon.
Explanation: The intent of this proposal is to provide additional protection for adult broodstock white sturgeon. The key to sustaining a healthy lower Columbia River white sturgeon population is to protect and maintain an adequate broodstock population to ensure continued productivity for long-term sustainability of the entire population. Harvest management is focused on maintaining and protecting the broodstock population through a number of regulatory measures, including harvestable size limits and fishing sanctuaries. Adult white sturgeon congregate in the Columbia River downstream from most of the dams, especially from late spring through the summer. Many of these fish are broodstock sized adults that move to these areas to spawn. The timing of these concentrations coincides with the American shad run. Sturgeon feed on shad and anglers have learned to use whole shad as bait in targeting over legal-size fish to catch and release. Large adult sturgeon inhale whole shade and often end up getting hooked so far down the throat that the hook cannot be removed. Staff conducting weekly surveys for dead sturgeon found that up to 40% of oversize sturgeon carcasses contained hooks in the gut.
Previously enacted conservation measures, including the 2006 expansion of the May-July no-sturgeon-fishing spawning sanctuary downstream from Bonneville Dam 6 miles to Navigation Marker 85, have contributed to an apparent decline in mortality, as borne out by a reduction in the number of carcasses observed during surveys since 2006. However, over 25% of carcasses continue to contain hooks.
Incidental handle of broodstock sized sturgeon does occur in fisheries targeting legal-sized fish through-out the year. However, the use of whole shad is a method that is specifically targeting broodstock sized fish during a biological sensitive time period and is not associated with fishing aimed at the harvestable component of the population. This method of exclusively targeting large broodstock sized sturgeon is especially popular with guides that widely advertise over-sized target fishing trips in late spring and early summer.
The lower Columbia white sturgeon population has likely experienced reduced productivity in recent years due to significant loss of sturgeon (including large adults) to predation by Steller and California sea lions. The magnitude of this additional impact to the broodstock population is unknown. However, it would be prudent to err on the side of caution in managing for sustainability of a viable broodstock population. A prohibition on shad as bait would reduce impacts to broodstock by eliminating a fishing method that is exclusively focused on handling over-sized sturgeon. Sport fishery opportunity can be maintained as focused on legal-sized fish with over-sized as incidental handle as opposed to an advertised exploitable resource.

Freshwater Gear Rules

#31. Columbia River Salmon and Steelhead– Single-Point Barbless Hooks

Proposal: This proposal would retain the anti-snagging rule but would also require anglers to use single-pointed barbless hooks (regardless of gear type) when fishing for salmon and steelhead in the Columbia River from the mouth (Buoy 10) to McNary Dam.
Explanation: Neither the current anti-snagging rule, in effect for anglers fishing for salmon or steelhead in the Columbia River from Bonneville Dam to McNary Dam, nor the proposed revision of the anti-snagging rule require the use of barbless hooks, and both rules also allow the use of multiple-point hooks in some instances.

This proposal would require single point barbless hooks whenever fishing for salmon or steelhead in the Columbia River, from the mouth to McNary Dam, allowing easier release of any fish not retained.

#32. Lead-Tackle on Lakes Where Loons Breed

Proposal: This proposal would make it unlawful to use lead weights weighing less than one half ounce or lead jigs measuring less than 1 ½" in the following freshwater lakes: Ferry Lake, Swan Lake, and Long Lake (Ferry County), Pierre Lake (Stevens County), Big Meadow Lake, Yocum Lake and South Skookum Lake (Pend Oreille County), Lost Lake, Blue Lake and Bonaparte Lake (Okanogan County), Calligan Lake, Hancock Lake (King County), and Lake Hozomeen (Whatcom County).
Explanation: Common loons are currently state listed as a sensitive species with significant questions as to the species' population status. Washington has both breeding populations and wintering populations of common loons. Ingestion of small lead fishing gear has been identified as one of the major causes of loon mortality in WA. Lead toxicosis from fishing tackle was responsible for mortalities in 39% of common loon carcasses recovered in Washington from 1996-2008 (Poleschook & Gumm 2008). Over the past few years, an increasing number of manufacturers have begun offering for sale lead-free sinkers and jigs. This is an incremental step in reducing the availability of lead to loons and the proposal is restricted to lakes in Washington where we have documented common loon breeding.

Region 1

#33. Mill Creek (Walla Walla Co)

Proposal: Closed waters from 400 ft below Gose Street Bridge to Bennington Dam.
Explanation: The portion from Roosevelt St upstream to Bennington Dam is a flood control channel with a series of weirs. Fish become stranded in the pool below each of the weirs and the lower portion of this reach dewaters. Water temperatures become marginal or critical for ESA listed salmonids. Fish are very vulnerable because of the isolation within pools below weirs. WDFW is working with the USACE and others to improve habitat conditions but to help protect ESA listed fish and improve their survival in poor habitat conditions the fishery should be terminated.

#34. Sherman Creek (Ferry Co)

Proposal: Change from December 1 – August 31 season to standard stream season (1st Saturday in June through October 31)
Explanation: Originally, protection was sought for returning kokanee broodstock collection. The kokanee hatchery program was not successful, partly because the water was too cold. With the discontinuation of this program, the stream should revert to the statewide stream season.

#35. Dayton Pond (Columbia Co)

Proposal: Allow anglers with reduced fee licenses or Designated Harvester Cards to fish the Dayton Juvenile Pond along with juveniles.

Explanation: Some individuals from the public have made this request because it provides easy fishing access within town.

#36. Lake Roosevelt Kokanee Limit

Proposal: Change the kokanee daily limit from 2 fish to 6, no more than 2 with intact adipose fins.
Explanation: Hatchery fish are available for harvest. This will allow anglers to harvest a larger number of these fish, while still limiting the harvest of wild fish to a maximum of 2.

Region 2

#37. Bonaparte Creek (Okanogan Co)

Proposal: add a CLOSED WATERS section to Bonaparte Creek from the mouth to the falls one mile upstream. Retain standard stream season and daily limits.
Explanation: *Juvenile and adult steelhead rear and spawn within the proposed closure area and represent the highest density of steelhead usage within the Okanogan River basin.*

#38. Columbia Basin Hatchery Creek (Grant Co)

Proposal: Remove the 8" minimum size for trout in the section open only to juveniles and anglers with a reduced fee license or designated harvester card. Retain daily limit of 3 trout.
Explanation: No minimum size is warranted or advised on this put-and-take fishery from the hatchery outflow to the confluence with Rocky Coulee Wasteway. No significant natural production occurs. Most fish are caught with bait, so the mortality on released fish is high.

#39. Icicle River (Chelan Co)

Proposal: This proposal would close the season on the Icicle River above the Leavenworth National Fish Hatchery rack on September 15 rather than October 31.
Explanation: This proposal will provide added protection (in addition to the selective gear rule which is already in place) to the ESA-listed bull trout that have been observed spawning in the Icicle River.

#40. Methow River

Proposal: From County Road 1535 (lower Burma Rd) to Weeman Bridge – add maximum hook size #10 (1/4" gap point to shank) to the catch-and-release fisheries for all game fish. (No change to winter whitefish fishery).
Explanation: Anglers have been targeting steelhead during the trout fishery, which under permit 1554, had to be closed in 2008 early due to approaching steelhead take limits. The small hook size is intended to cut down on this activity and allow the fishery to remain open.

#41. Buzzard Lake (Okanogan Co)

Proposal: Last Saturday in April – Oct 31 season. Trout daily limit 1. All species: selective gear rules
Explanation: The proposed rules are intended to produce a quality trout fishery.

#42. Lake Chelan Lake Trout Rules

Proposal: Open the northern portion of the lake year round to the harvest of lake trout.
Explanation: The proposed regulation change is primarily designed to assist with controlling numbers of lake trout and to be consistent with lake trout regulations in the southern portion of the lake. It will also be consistent with the proposed year-round season for landlocked salmon. Anglers fishing for salmon will frequently catch lake trout.

#43. Lake Chelan Salmon Rules

Proposal: Open both the northern and southern portions of the lake to salmon fishing (under landlocked salmon rules) year-round with a daily limit of one salmon and a minimum size of 15".
Explanation: Efforts to provide a salmon fishery based on triploid summer Chinook stocking have been successful. Triploid salmon stocked specifically for recreational fishing fish now exist in numbers sufficient to open a year-round fishery. This rule is currently in effect by emergency regulation.

#44. Cougar Lake (Okanogan Co) Pasayten Wilderness Area

Proposal: add selective gear rules to Cougar Lake.

Explanation: Selective gear rules will help protect larger bull trout that contribute to the downstream population within the Lost River drainage by reducing hook and release mortality. This also makes the rules concurrent with current Black Lake (Pasayten Wilderness Area) to protect bull trout spawning in Lake Creek.

#45. Cougar Lake (Okanogan Co) near Winthrop

Proposal: Add a catch-and release season with selective gear rules April 1- August 31, before the current retention fishery.
Explanation: This would provide additional opportunity, while at the same time providing the current fall/winter catch and keep trout season in Cougar Lake. A regulation similar to Davis, Campbell, Rat, and Green lakes would make for some consistency as well as providing another catch-and-release area. Harvest is usually not enough to impact the spring and summer trout fisheries, since we supplement with additional hatchery trout. Winter harvest is fairly low most years.

#46. Desert Lakes (Grant Co) Rules

Proposal: Change the rules for Harris, Sedge, Tern, and Dune lakes (Grant Co) from statewide rules to selective gear rules for all species and a daily limit of one trout.
Explanation: Rehabilitation is planned for fall 2009, and thereafter the waters will return to trout fisheries (this rule, if adopted, would not take effect until May 1, 2010). Selective gear rules would be consistent w/ nearby Beda Lake. The demand for quality waters is high and these walk-in fisheries would be prime candidates as they currently have no other angler-type following.

#47. Enchantment Park Pond (Chelan Co)

Proposal: Change the name of Enchantment Park Pond to Blackbird Island Pond and change-fishing season from year-round, to July 1 – September 30. Retain "juvenile only" designation.
Explanation: The original Enchantment Park Pond, now named Blackbird Island Pond, has been reconstructed for use as both a hatchery steelhead acclimation pond and juvenile angler pond. From mid March until June 31 the pond will be used for steelhead acclimation. After all steelhead have left the pond, WDFW will stock trout to provide angling opportunity for juvenile anglers (less than 15 years of age). During the month of October any remaining trout will be removed and the ponds will be readied for the next batch of steelhead in the spring.

#48. Fish Lake (Chelan Co)

Proposal: Add a daily limit of 25 perch (currently no daily limit for perch).
Explanation: Historically, anglers enjoyed excellent perch fishing throughout the year at Fish Lake. In recent years anglers have expressed concerns about declining harvest opportunities for perch. The WDFW Warm Water Team surveyed the lake in 2001. The results of this study suggested that perch numbers may have declined due to a combination of factors: 1) competition for forage between young of the year perch and the abundantly stocked hatchery trout fingerlings; 2) predation of young perch by hatchery stocked catchable size trout; 3) disease; and 4) over-harvest. The proposed rule change is recommended to control over-harvest.

#49. Rufus Woods Lake

Proposal: On the waters of Rufus Woods Lake or within Designated Fishing Areas, which are located and marked as such on the Colville Reservation shoreline, either a Tribal permit or State License is required. A State License is still required when fishing from the Douglas County shoreline. Year-round season. Trout (includes kokanee) – daily limit 2. Other game fish – statewide rules. Any trout caught using bait must be included as part of daily limit. Only uninjured fish caught using artificial lures or flies with single barbless hooks may be released. Closed to fishing for sturgeon.
Explanation: These rules are necessary to conform to Colville Tribal regulations for boundary waters, and will allow for better enforcement of rules, reduced hook and release mortality, and enhanced cooperation between Colville Tribal and WDFW personnel.

#50. Sprague Lake

Proposal: CLOSED WATERS - Year-round: those waters of Cow Creek, the marsh at the SW end of the lake from the lakeside edge of the reeds to Danekas Rd, the small bay at the SE end of the lake, and those waters within 50' of Harper Island. All waters SW of the SW tip of Harper Island are open to fishing from boats with non-combustible motors only. Sept. 1-April 31: those waters SW of the SW tip of Harper Island closed to fishing. (Figure 1) Note: Closed waters and boat motor restrictions will be indicated by sign and displayed at the public boat launches.

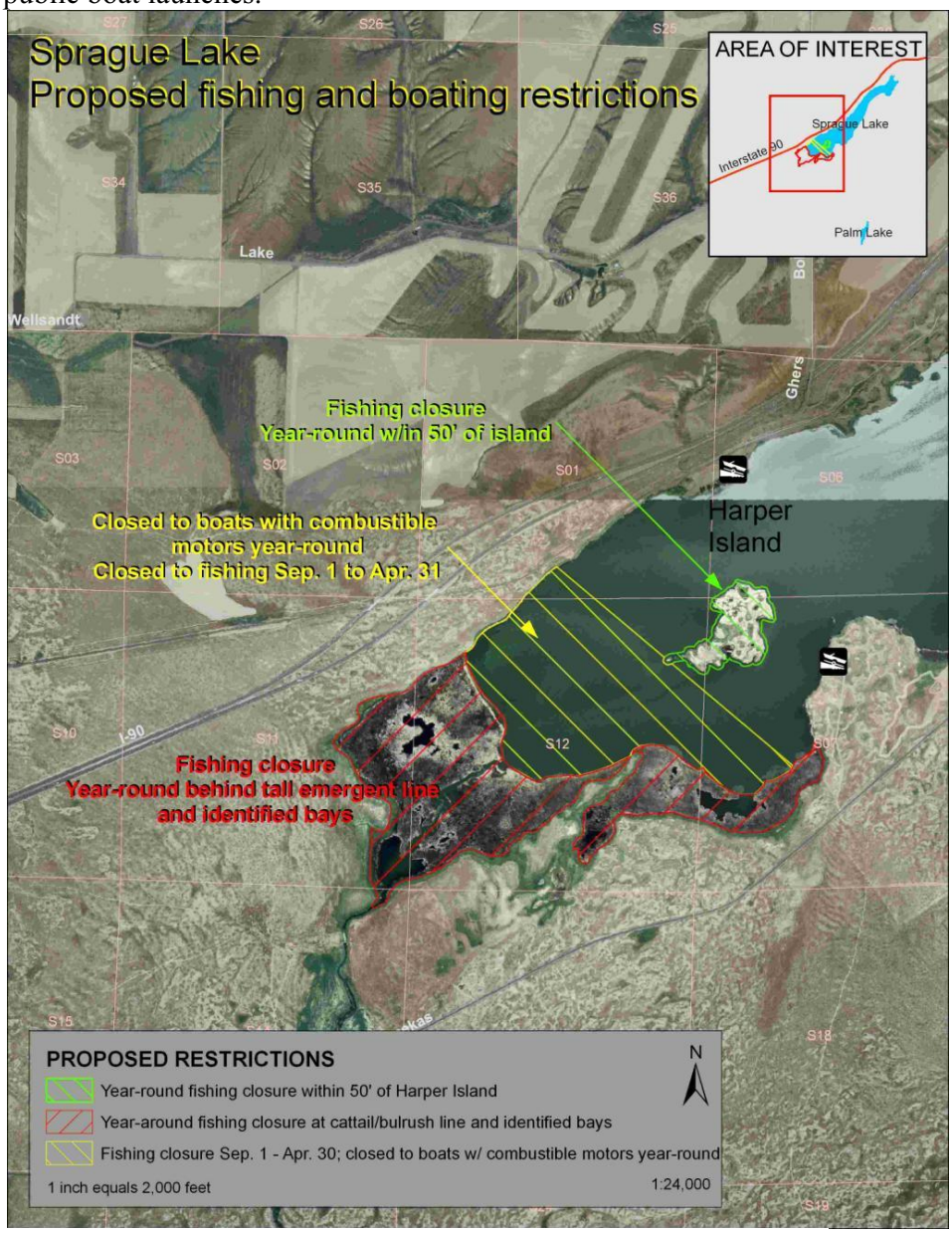

Figure 16 – Proposed Restrictions

Explanation: The proposed rule change is needed to reduce negative impacts associated with recreational disturbance to breeding waterbirds (particularly grebes and terns) and staging migratory waterfowl (particularly small Canada geese). The Western grebe is a state candidate for listing and populations have been plummeting in recent years. Declines of Western Grebes have been documented on their wintering grounds, particularly in the Puget Sound region where the Puget Sound Ambient Monitoring Project (PSAMP) and Washington Sea Grant Program have reported 71–95% declines in abundance indices since the 1990s (Coastal Observation and Seabird Survey Team 2009). Sprague Lake is an important breeding area for this species.

Region 3

#51. Middle Fork Ahtanum Creek (Yakima Co)

Proposal: This proposal would add a CLOSED WATERS section - in the Middle Fork Ahtanum Creek from the A2000 Rd. Bridge at Tree Phones Campground downstream to the A2000 spur road bridge in NE Section 34 (about 3.5 miles).
Explanation: The closed area will protect spawning and rearing bull trout. This rule will establish a long-term conservation zone for protection of this federally listed (ESA) "threatened" species. Resident-type bull trout are struggling to survive in the Ahtanum Cr. basin and need full protection from any indirect (non-targeted) fishing mortality in the primary spawning and rearing area.

#52. Bachelor Creek(Yakima Co)

Proposal: This creek currently has a year-round season and a 5-trout daily limit with no minimum size. This proposal would return Bachelor Creek to the normal stream season (1st Saturday in June – October 31) and normal stream rules for trout (two fish daily limit, minimum size 8").
Explanation: The liberal trout rules, which are geared to lakes, ponds and reservoirs where hatchery fish are stocked, were put in place when WDFW stocked Bachelor Creek. Since stocking stopped, these rules are no longer appropriate for a waterbody that relies on wild trout natural production to support a fishery. The standard season for creeks (1st Sat. in June – Oct. 31) for all species, and the 2 trout daily limit, 8" min. size, are appropriate.

#53. Benton County Rivers, Streams, and Beaver Ponds

Proposal: Benton County rivers, streams, and beaver ponds are currently open year-round. This proposal would return these waters to the statewide standard season of the first Saturday in June – October 31.
Explanation: These creeks (Snipes, Spring, Corral and Amon Cr.) support wild resident trout, some steelhead spawning and rearing, and have wild juvenile fall Chinook and coho salmon rearing in the lower reaches. ESA-listed steelhead parr and smolts deserve protection from late fall/early spring fishing mortality provided by delaying the opening of the season until after the smolts have migrated to the Yakima River. The resident trout fishery in these creeks is supported solely by natural production and wild females need an opportunity to spawn once before being subjected to harvest.

#54. Wide Hollow Creek (Yakima Co)

Proposal: This creek currently has a 5-trout daily limit with no minimum size. This proposal would return Bachelor Creek to the normal stream rules for trout (two fish daily limit, minimum size 8"). It would also designate Wide Hollow Creek as a "juvenile only" water.

Explanation: WDFW no longer stocks hatchery trout into Wide Hollow Cr. (last stocked in 2005---primarily to benefit juvenile anglers).The liberal trout species rules, which are geared to lakes, ponds and reservoirs where hatchery fish are still stocked, are no longer appropriate for a waterbody that relies on wild trout natural production to support a fishery.

Wide Hollow Cr. is a small, urban stream that flows from West Valley through the City of Yakima and City of Union Gap before entering the Yakima River. It flows through two public parks and the backyards of many private residences, affording youth anglers an opportunity to learn to fish without having to travel out-of-town. In many ways it is similar to Mercer Cr. and Wilson Cr. within the Ellensburg city limits, which have long been designated for "juvenile anglers only". Wide Hollow Cr. is a prime candidate for this same designation.

#55. Powerline Lake (Franklin Co)

Proposal: Change trout daily limit from 5 fish to 2.
Explanation: Powerline Lake (50 acres) has recently replaced Railroad Pond as WDFW's Franklin County "quality trout lake" after public access to Railroad Pond was lost. WDFW began stocking triploid rainbow trout

in Powerline Lake in 2007. The triploid rainbows appear to survive well and have provided a good fishery throughout the year. Because the number of triploids that can be stocked annually is limited, the statewide standard 5 trout daily limit is excessive and can lead to rapid depletion of the population. No other trout (i.e. standard hatchery "catchables") are stocked during the year. Trout fry are not stocked because Powerline Lake is managed as a "mixed stock" lake, which also supports warmwater fisheries for largemouth bass, black crappie and yellow perch. To spread out distribution of the triploid trout harvest among anglers and to provide for fall fishing opportunity and/or carryovers into the following year, we propose to reduce the daily trout limit to two fish.

#56. Wenas Lake

Proposal: return to the standard trout daily limit of 5. (current rule sets a limit of 2 brown trout within the 5 trout daily limit).
Explanation: WDFW no longer stocks hatchery trout (rainbow or brown trout) into Wenas Lake. The special rule limiting the take of brown trout is not longer needed.

Region 4

NOTE: The majority of the proposals for changes to stream fisheries in Region 4 are found in the stream strategy spreadsheets.

Wild Steelhead Protection

The following proposals for earlier closing dates on the Nooksack River and forks, Pilchuck Creek, Pilchuck River, Raging River, Skykomish River, Snohomish River, Snoqualmie River, and Stillaguamish River are all intended to provide more protection for wild steelhead present in these rivers. Most hatchery steelhead will have cleared these areas by the middle of February, so anglers are fishing for wild fish (catch-and-release) until the end of the month under current rules. These proposals are included in the spreadsheets for the proposed new stream strategy, and are also in line with the Statewide Steelhead Management Plan's Recreational Fishery Management Guidelines.

#57. Nooksack River, NF,SF,MF (Whatcom Co)

Proposal: This proposal would close the fisheries in the Nooksack River, including the North Fork, Middle Fork and South Fork on February 15 rather than the current February 28.

#58. Pilchuck Creek (Snohomish Co)

Proposal: This proposal would close fisheries in Pilchuck Creek from the mouth to the Highway. 9 Bridge on February 15 rather than the current February 28.

#59. Pilchuck River (Snohomish Co)

Proposal: This proposal would close fisheries in the Pilchuck River from the mouth to 500' downstream of the Snohomish city diversion dam February 15 rather than the current February 28.

#60. Raging River

Proposal: This proposal would close fisheries on the Raging River on February 15 rather than the current February 28.

#61. Skykomish River

Proposal: This proposal would close fisheries on the Skykomish River from the mouth to the mouth of the Wallace River on February 15 rather than the current February 28.

#62. Snohomish River

Proposal: This proposal would close fisheries on the Snohomish River on February 15 rather than the current February 28.

#63. Snoqualmie River

Proposal: This proposal would close fisheries on the Snoqualmie River from the mouth to the boat launch at Plumb on February 15 rather than the current February 28.

#64. Stillaguamish River

Proposal: This proposal would close fisheries on the Stillaguamish River from Marine Drive to the Forks on February 15 rather than the current February 28.

#65. Skagit River

Proposal: This proposal would make three changes in the Skagit River fishing rules: 1) from the mouth to Highway 536, the selective gear rules would be put into place February 15 rather than the current March 1; 2) the retention fishery in all sections of the river from Highway 536 to the Cascade River currently close March 15. This proposal would close these fisheries on February 15. The catch-and-release fisheries from the Dalles Bridge to the Cascade would then begin February 16 instead of the current March 16; 3) From Highway 536 to the Dalles Bridge, a fishery would be added (February 16 – March 31, selective gear rules and catch and release except up to 2 hatchery steelhead may be retained. Lawful to fish from a floating device equipped with a motor, but not while under power.)
Explanation: the February 15 closure of the retention fisheries and earlier application of selective gear rules provide protection for wild stocks (see proposals above). The additional catch-and-release fishery (except up to two hatchery steelhead may be retained) can be offered because of the other measures put in place to protect wild fish.

#66. Green/Duwamish River Wild Steelhead

Proposal: This proposal would close the retention of wild steelhead on the Green/Duwamish River.
Explanation: An exception to the statewide wild retention regulation was initially made for the Green because there were substantial numbers of unmarked non-native summer-run steelhead in the Green River. In recent years, catches of unmarked summer-run steelhead have declined substantially.

#67. Beaver Lake (King Co)

Proposal: Change trout daily limit to 5 fish, no more than 2 over 15".
Explanation: This proposal is intended to spread out the catch of jumbo trout that are planted in Beaver Lake each November, making the fishery last longer into the winter.

#68. Blackman's Lake (Snohomish Co)

Proposal: This proposal would change the daily limit for trout in Blackman's Lake from 5 to 3.
Explanation: The Snohomish Sportsman's club spends thousands of dollars annually stocking Blackman's with triploid trout. A reduction in the bag limit would ensure that the sport fishing community would get the maximum benefit from these fish. Many of the triploids planted weigh several pounds, and provide a satisfactory fishing experience at 3 fish. Blackman's offers three public fishing docks which are utilized by juvenile fishermen and anglers with disabilities. The reduced daily limit would offer anglers a better chance at catching triploids by spreading out the catch.

#69. Monte Cristo Lake (Snohomish Co)

Proposal: This proposal would set the season for Monte Cristo Lake as the first Saturday in June –Aug 31st, and catch-and-release for all species, except up to two hatchery steelhead may be retained.

Explanation: This body of water is essentially a wide pool in the South Fork of the Sauk River. Current rules allow trout harvest in this pool through October, inconsistent with the intent of other regulations on the South Fork Sauk. Regulations were changed on the South Fork Sauk River above Elliot Creek in 1995 to protect Bull Trout, and changed again in 2007 to catch and release, selective gear rules, but this "lake" was not included in the change. This change will make the regulations consistent in the South Fork Sauk River above Elliot Creek.

#70. Rattlesnake Lake (King Co)

Proposal: This proposal would change the season on Rattlesnake Lake from the last Saturday in April to October 31 to open year round. The selective gear rules restriction would apply, and the fishery would become catch-and-release for all species.
Explanation: We received several public proposals to make Rattlesnake Lake a catch-and-release fishery, and open to fishing year-round. Some proposals were for a fly-fishing-only lake. We are proposing to retain the selective gear rules restriction, but change to catch-and-release and open year-round.

Region 5

#71. Green River (Cowlitz Co)

Proposal: This proposal opens the area above Miners Creek to a catch-and-release fishery with selective gear rules.
Explanation: This proposal would create a fishery within the Mt. St. Helens National Volcanic Monument, while providing recreational opportunity in a key recreation area adjacent to Green River Horse Camp and the Green River Trail.

#72. Wind River and Drano Lake Anti-Snagging Rule

Proposal: This proposal would remove the anti-snagging rule from the Wind River from mouth (boundary line/markers) to the Burlington-Northern Railroad Bridge and Drano Lake from the Hwy. 14 Bridge to markers on points of land downstream and across from the Little White Salmon National Fish Hatchery during the spring Chinook fishery (March 16 through June 30.)
Explanation: The Fish and Wildlife Commission recently adopted the replacement of the non-buoyant lure restriction with the anti-snagging rule. Under permanent regulations, both Wind River and Drano Lake had the non-buoyant lure restrictions, which would have become the anti-snagging rule.
During the recent North of Falcon process, the department proposed a test to remove the upcoming anti-snagging rule during the spring Chinook fishery in some areas. Floating lures are commonly trolled in these locations and the new anti-snagging rule would have required anglers to replace them with single pointed hooks.
Based upon public response at the North of Falcon process, the department moved forward with the test. Snagging did not become a problem this spring; therefore the department is proposing to permanently remove the anti-snagging rule during the spring Chinook fishery in these areas.
The anti-snagging rule will still be in place on May 1 on the Wind River from the Burlington-Northern Railroad Bridge upstream. Spring Chinook are susceptible to snagging in the river itself, and during the fall salmon fisheries at Wind River and Drano Lake.

#73. Drano Lake Bank Fishery

Proposal: The area around the outlet of Drano Lake (west of a line projected from the eastern most pillar of the Highway 14 Bridge to a posted marker on the north shore) will be limited to bank fishing only from April 16 through June 30. (Figure 2).

Figure 2 - Proposed Bank Fishing Area

Explanation: Over the last several seasons, the department has received numerous concerns about bank and boat interactions near the outlet of Drano Lake during spring Chinook fisheries. Bank fishing is limited in the lake and the outlet is a popular and productive area for both bank and boat anglers. In spring 2008, the department opened the adjacent mainstem Columbia to bank fishing only to provide additional opportunity and reduce conflicts just inside the lake. That effort had only minimal success because of limited access and prevalent windy conditions. During the recent North of Falcon process, the department proposed a test to reduce the bank and boat conflicts by limiting the immediate area near the outlet of Drano Lake to bank fishing only during the spring Chinook fishery. This was done by emergency rule. A similar bank fishing area at the mouth of the White Salmon River has been successful in reducing bank and boat conflicts. Based upon public response during this test, the department decided to propose making this rule permanent.
NOTE: The remainder of Drano Lake will remain open to fishing from boats and the bank. The bank-only area will be in place only during the spring Chinook fishery. The adjacent mainstem Columbia from Bonneville Dam to the Tower Island power lines (located about 6 miles below The Dalles Dam) remains open to fishing for hatchery salmon, hatchery steelhead, and shad from the bank through April.

#74. Merrill Lake (Cowlitz Co)

Proposal: This proposal would add a catch-and-release rule to the fly-fishing-only rules in Merrill Lake.
Explanation: Merrill Lake is a fly-fishing-only lake. It has been stocked with triploid trout, and most fishermen currently practice catch-and-release at this lake. Catch-and-release may also help to curtail some of the poaching going on.

#75. Spirit Lake (Cowlitz Co)

Proposal: Open by limited-entry drawing, Saturdays only June 15 - October 31. Catch-and-release and selective gear rules. Fishing from a floating device or from a designated bank area only.

Explanation: This fishery is contingent on the U.S. Forest Service allowing public access. The Department has requested that U.S Forest Service allows access for this limited fishery that would provide anglers with a special fishing opportunity on a population of large trout, and is hopeful that an agreement can be reached.

#76. Swift Reservoir (Skamania Co)

Proposal: This proposal would extend the end date of the fishery in Swift Reservoir from October 31 to November 30.
Explanation: In the past, the department planted the reservoir annually with 800,000 fingerling rainbow trout. We closed the water after October to reduce handling of these small fish. Several years ago we changed the program to 60,000 catchable sized rainbow trout, planted in the spring before the opener. We have found that these fish have created an additional excellent fall fishery. They have attained additional growth and are providing a high catch rate.
In 2008 the opener of the reservoir was delayed until Memorial Day weekend due to a heavy snowpack and a very low water level. Because of the late opener the season was extended by emergency regulation through November. Anglers found this additional month of fall fishing to be excellent

#77. Yale Reservoir (Cowlitz Co)

Proposal: This proposal would add landlocked salmon rules to Yale Reservoir.
Explanation: Landlocked Chinook are present in Yale Reservoir. This will allow anglers to harvest them as part of their daily limit of five trout (kokanee limit remains separate).

Region 6

NOTE: The majority of the proposals for changes to stream fisheries in Region 6 are found in the stream strategy spreadsheets.

#78. Hoko River Wild Steelhead (Clallam Co)

Proposal: This proposal would remove the special rule allowing anglers to harvest wild steelhead from the Hoko River.
Explanation: Though escapements to the Hoko River are not yet consistently under the goal of 400, the last two years have been illustrating a trend of declining abundance. Removing wild retention in the Hoko will not result in large savings - sport catch of wild steelhead has also dropped off in recent years, averaging less than 12 fish over the past 4 years. However, this is again an indication of a reduced return of wild steelhead to a small river system, indicating the need for a more cautious management approach.
The small plants of early timed hatchery steelhead into nearby streams in the Strait (Pysht, Clallam, and Lyre) are being terminated by WDFW. The reduced opportunity on hatchery stocks in the area may focus greater fishing pressure on the Hoko wild stock in the future.

#79. Minter Creek Night Closure (Mason Co)

Proposal: This proposal would add a night closure to Minter Creek during the salmon fishery taking place from the mouth to the fishing boundary markers about 50' downstream of the hatchery rack from November 1 through December 31.
Explanation: This proposal was requested by our enforcement officers who state that: "Poaching at this little creek is very prolific."

#80. Pysht River Wild Steelhead (Clallam Co)

Proposal: This proposal would remove the special rule allowing anglers to harvest wild steelhead from the Pysht River.
Explanation: In the 21 years prior to 2005, escapement of steelhead to the Pysht in the index areas monitored never failed to meet or exceed the escapement goal of 200. Escapements to these index areas since 2005 (the

last four years of data), have all been under the escapement goal. Removing wild retention in the Pysht will not result in large savings - sport catch of wild steelhead has dropped off in recent years, averaging only 4 fish over the past 4 years. However, this is again an indication of a reduced return of an already small stock, and the need for a more cautious management approach.
The small plant of early timed hatchery steelhead into the Pysht River (10,000 smolts) is being terminated by WDFW as a cost saving measure, along with the steelhead plants into the Clallam and Lyre rivers. The reduced opportunity on hatchery stocks in the area may focus greater fishing pressure on the wild stocks in the near future, at a time when they are struggling.

#81. Gray Wolf River (Clallam Co)

Proposal: This proposal would make the fishery on the Gray Wolf River from the bridge one mile above Dungeness Forks Campground to the Olympic National Park boundary catch-and-release with selective gear rules.
Explanation: This change was put in place this summer by emergency rule for protection of summer steelhead stocks recently listed as "threatened" under ESA. This proposal would make the change a permanent rule. It is also included in the spreadsheets for the proposed new stream strategy

Protection for Coastal Steelhead Stocks

The following changes to the Bogachiel, South Fork Calawah, Hoh, and Sol Duc rivers are intended to provide an additional measure of protection to steelhead stocks in these streams. Although coastal stocks were not listed under ESA as those in Puget Sound were, we propose to take a more conservative approach to the management of these stocks as well.

#82. Bogachiel River (Clallam Co)

Proposal: This proposal would add selective gear rules on the Bogachiel River from the Highway 101 Bridge to the Olympic National Park boundary from the 1st Saturday in June through November 30.

#83. South Fork Calawah River (Clallam Co)

Proposal: This proposal would add selective gear rules on the South Fork Calawah River from the 1st Saturday in June through November 30.

#84. Hoh River (Clallam Co)

Proposal: This proposal would make the fishery on the Hoh River from the Highway 101 Bridge to the Olympic National Park boundary selective gear rules and catch-and-release except up to two hatchery steelhead may be retained.

#85. Sol Duc River (Clallam Co)

Proposal: This proposal would make the fishery on the Sol Duc River from the Highway 101 Bridge downstream of Snider Creek to the Olympic National Park boundary catch-and-release with selective gear rules except up to two hatchery steelhead may be retained.

#86. Alder Lake Kokanee (Thurston Co)

Proposal: Change the trout daily limit on Alder Lake to: kokanee not included in daily limit. Kokanee daily limit 10. The daily limit for other species of trout would remain at 5.

Explanation: As part of a mitigation program, kokanee are stocked into Alder Lake. The bonus limit seeks to increase interest and participation.

#87. Capitol Lake (Thurston Co)

Proposal: This proposal opens Capitol Lake year-round. The rules would include catch and release for trout with selective gear rules for all species except that anglers may use bait and barbless hooks while fishing for salmon Sept. 1st -Oct 15th.

Explanation: Capital Lake was historically stocked with catchable trout annually but the practice was discontinued in the 1990's. Waters upstream from the lake are managed as a quality catch-and-release fishery. The current rules for the lake are inconsistent with management objectives in the Deschutes River. Catch and release mortality (associated with bait and barbed hooks) of sub legal fish may be limiting the recruitment of larger fish to the quality fishery. The addition of selective gear rules should lessen this mortality considerably.

#88. Munn and Susan Lakes (Thurston Co)

Proposal: This proposal would open Munn and Susan lakes to a year-round catch-and-release fishery with selective gear rules.

Explanation: There is currently no year-round selective fishing opportunity on lowland lakes in South Puget Sound (Pierce or Thurston Co.). Creel surveys conducted this year indicated that substantially more anglers participated in the catch-and-release fishery than during the harvest season. Additionally, several of the local fly fishing clubs verbally agreed to purchase fish to be stocked into the lake at various times during the year.

#89. South Sound Lakes (Pierce, Mason, Kitsap Jefferson, and Thurston Co)

Proposal: This proposal would change the trout limit in American, Clear, Carney, Crescent, Kapowsin, Ohop, Rapjohn, Silver, Spanaway, Steilacoom and Tanwax lakes in Pierce County; Aldrich, Benson, Clara, Devereaux, Hatchery, Haven, Howell, Isabella, Island, Kokanee, Lost, Maggie, Nahwatzel, Panhandle, Phillips, Robbins, Spencer, Tee, Tiger, Trails End, Twin, Wood, and Wooten lakes in Mason County; Buck, Horseshoe, Island, Kitsap, Mission, Panther, Wildcat, and Wye lakes in Kitsap County; Leland, Ludlow, Sandy Shore, Silent, and Tarboo lakes in Jefferson County; and **.:** Summit, Clear, Ward, Long, Pattison, Hicks, Deep, McIntosh, Black, St. Clair, and Lawrence lakes in Thurston County to: daily limit 5, no more than 2 over 14" may be retained, except no minimum size for kokanee.

Explanation: In response to angler requests for larger fish, WDFW's Eells Springs Hatchery will begin producing additional jumbo (>14") rainbow trout in 2010. In order for the overall cost and hatchery space required to remain the same, fewer catchable (8-10") rainbow trout will be produced. The intent of the proposal is to provide a quality fishing experience, spread out the harvest of the jumbo (>14") rainbow trout across more anglers, and possibly result in less high-grading (and potential release mortality). The minimum size is not necessary for kokanee because they are planted as fry and enter the fishery as a group that are all much the same size.

#90. Stump Lake (Mason Co)

Proposal: This proposal would make the trout daily limit in Stump Lake 5, with no more than two fish over 15".

Explanation: The reduced daily limit for 2 fish over 15" from a total daily limit of 5 fish is intended to extend the time these fish are available for harvest.

#91. Lake Symington (Kitsap Co)

Proposal: This proposal will add a season from the 1st Saturday in June through Oct 31 to Lake Symington, with selective gear rules for all species, and catch-and-release for trout.

Explanation: Lake Symington and Big Beef Creek above Lake Symington provide spawning and rearing habitat for ESA-listed wild steelhead. The lake is not currently stocked with any hatchery-reared trout. In addition, Big Beef Creek is one of four study streams in the Hood Canal Intensively Monitored Watersheds

(IMW) project. The IMW project, conducted by WDFW, is a long-term study that compares salmonid survival before and after restoration. Survey and trapping data are collected annually on Big Beef Creek. Harvest of wild salmonids will affect study outcomes and data quality.

#92. Tarboo Lake (Jefferson Co)

Proposal: This proposal would give Tarboo Lake the standard "Opening Day" season of the last Saturday in April through October 31 and remove the landlocked salmon rules.
Explanation: The salmon season was originally implemented because we intended to release surplus coho adults from Quilcene National Fish Hatchery into the lake to provide a fishery. However, due to potential health risks to fish in Tarboo Creek, these releases will not take place. The proposal would return the season to Last Saturday in April – Oct. 31, consistent with other Opening Day lowland lakes in the area.

Housekeeping

#93. Housekeeping Change to Selective Gear Rules Definition

Proposal: This proposal would remove the restriction of fishing from a floating device equipped with an internal combustion engine from the definition of selective gear rules. All other provisions would remain unchanged. The internal combustion restriction would be added separately to areas where it is currently in force.
Explanation: The selective gear rules definition was developed to include a suite of restrictions that were put in place where to provide a "quality fishing" experience in our fisheries for game fish. However, selective gear rules are now also being used to reduce impacts on non-target species. The restriction on the use of bait, requirement for knotless nets, and requirement for single-point barbless hooks, are all tools that we use to increase the survival of released fish. If this proposal is adopted, areas that currently have the selective gear rule will keep the restriction on fishing from a floating device equipped with an internal combustion engine.

#94. References to "Disability License"

Proposal: Remove WAC and pamphlet references to "Disability License" and replace them with "reduced fee license or designated harvester card."
Explanation: There is no such thing as a "Disability License." The intent of these rules is to allow anglers who have a reduced fee license or those who have a designated harvester card to be able to fish in the designated areas, and allow these anglers to fish with a hand-operated gate on a dip net while fishing for forage fish.

#95. Marine Area 8-2 Description

Proposal: Update the reference to the light referenced in the boundary description to refer to light #4 in Camano Island.

Explanation: This is not a change to the boundary; just an update to make sure the correct light is referenced. The correct description of the boundary should read: Area 8-2 (Port Susan and Port Gardner): East of a line from the East Point Light on Whidbey Island to the Saratoga Pass Light #4 on Camano Island (Fl red 4 sec.) and north of a line from the south tip of Possession Point 110 degrees true to a shipwreck on the opposite shore.

#96. Housekeeping Change to Oyster Rules

Proposal: This proposal will remove conflicting language from the rules and make it clear that oysters must be shucked before they are removed from the intertidal zone and the shells replaced on the tidelands at the approximate tide level from which they were taken.

Explanation: Prior to 1998, our sport fishing rules required that all oysters harvested on public tidelands by sport harvesters be shucked. In May 1, 1998, this was changed, and we began requiring harvesters to shuck in Hood Canal (south of Tala Point) and the Pacific coast, but not to shuck in Puget Sound. Suffice it to say this change was very confusing for harvesters and Enforcement, and on May 1, 2002, the F&W Commission (at Fish Program's recommendation) returned to the old "shuck oysters everywhere" rule. This change was effected on May 1, 2002. The rule defining daily limits for shellfish now correctly reads: (5) Oysters: 18 oysters, shucked and the shells left on the beach. However, the old language requiring shucking only in certain areas of the state was also contained in another rule, and due to an oversight the language in that second rule was not deleted in 2002. This proposal will fix this oversight, and retain the rule that requires shucking oysters before their removal from all public tidelands.

#97. Snoqualmie River Housekeeping Proposal

Proposal: Currently, there is a catch-and-release season from November 1 – May 31 in the Snoqualmie River from the Falls upstream, including the North and South Forks. This proposal would change the end date of that fishery to the Friday before the first Saturday in June, to match up with the beginning of the retention fishery on the first Saturday in June.
Explanation: This is a housekeeping change to match the end of the catch-and-release season with the beginning of the retention season.

Eastside Salmon Proposals

Rules for salmon fisheries are adopted through the North of Falcon (PFMC) process. Including these salmon regulation proposals in the major regulation public comment/review process will extend/expand public input for consideration in the North of Falcon process. So we welcome your comments on these proposals and appreciate your review, and will pass all comments on to the North of Falcon process, where these and other rules will be evaluated and considered for adoption early next year.

#98. Yakima River Fall Salmon Rules

Proposal: This proposal would close the fishery for salmon in the Yakima River (from Hwy. 223 Bridge at Granger to 400 feet below Sunnyside Dam) from September 1 through October 22.
Explanation: This section is managed jointly by WDFW and the Yakama Nation and will be managed annually with fisheries opened based on abundance of returning fall salmon.

#99. Snake River Fall Salmon Rules

Proposal: This proposal would remove the night closure in the Snake River during April 24-June 15, from Texas Rapids boat launch upstream to the Corps of Engineers boat launch approximately 1 mile upstream of Little Goose Dam for all species **except** salmon.
Explanation: The night closure for all species associated with the salmon fishery conflicts with catfish and other angling that normally occurs at night. Fishing for catfish at night is a very common practice in the Snake River, and elsewhere. Salmon fishing could include a night closure, but only for salmon fishing, not for other species.

#100. Columbia River Salmon "Angler's Choice"

Proposal: This proposal would change the daily limit in the salmon fishery in the Columbia River from Priest Rapids Dam to Rocky Reach Dam AND from Rocky Reach Dam to Wells Dam July 1 – Oct 15. All other rules for these fisheries would remain unchanged. The daily limit would be 1 wild or 3 hatchery (marked) adult salmon plus 3 wild or hatchery jacks. So the limit becomes the angler's choice for adult salmon - A). **one wild** (adipose fin present) adult: **OR** B) **three hatchery** (adipose fin clipped) adults may be retained. With either

choice, up to three jacks (hatchery or wild) may be retained. Coho and sockeye must be released. Anglers may not continue to fish for salmon after the adult portion of the daily limit has been retained.
Explanation: While there are adequate wild summer Chinook for a fishery, there is arguably an over-escapement of hatchery fish. This regulation is intended to encourage anglers to target the hatchery Chinook.

#101. Upper Columbia River Salmon "Angler's Choice"

Proposal: This proposal would change the daily limit in the salmon fishery in the Columbia River from Wells Dam to the Hwy 17 bridge at Bridgeport -July 1 – Aug 31, and from Hwy 173 bridge at Brewster to Hwy 17 bridge at Bridgeport September 1 – October 15. All other rules for these fisheries would remain unchanged. The daily limit would be 1 wild or 3 hatchery (marked) adult salmon plus 3 wild or hatchery jacks. So the limit becomes the angler's choice for adult salmon - A). **one wild** (adipose fin present) adult: **OR** B) **three hatchery** (adipose fin clipped) adults may be retained. With either choice, up to three jacks (hatchery or wild) may be retained. Coho and sockeye must be released. Anglers may not continue to fish for salmon after the adult portion of the daily limit has been retained.
Explanation: While there are adequate wild summer Chinook for a fishery, there is arguably an over-escapement of hatchery fish. This regulation is intended to encourage anglers to target the hatchery Chinook.

#102. Okanogan River Summer Chinook "Angler's Choice"

Proposal: This proposal would add a salmon fishery in the Okanogan River upstream from the Hwy 97 Bridge upstream of the mouth July 1 – Sept 15, with a minimum size of 12". The daily limit would be 1 wild or 3 hatchery (marked) adult salmon plus 3 wild or hatchery jacks. So the limit becomes the angler's choice for adult salmon - A). **one wild** (adipose fin present) adult: **OR** B) **three hatchery** (adipose fin clipped) adults may be retained. With either choice, up to three jacks (hatchery or wild) may be retained. Coho and sockeye must be released. Anglers may not continue to fish for salmon after the adult portion of the daily limit has been retained. A night closure and the anti-snagging rule would be in effect for all species.
Explanation: This proposal will encourage the release of wild fish, while still allowing some harvest of summer Chinook that move into the tributaries early, but due to warmer summer water temperatures, die before spawning. Permit 1554 with NOAA Fisheries allows for tributary harvest of summer Chinook above Wells Dam.

#103. Similkameen River Summer Chinook "Angler's Choice"

Proposal: This proposal would add a salmon fishery from the mouth to Enloe Dam July 1 – Sept 15, with a minimum size of 12". The daily limit would be 1 wild or 3 hatchery (marked) adult salmon plus 3 wild or hatchery jacks. So the limit becomes the angler's choice for adult salmon - A). **one wild** (adipose fin present) adult: **OR** B) **three hatchery** (adipose fin clipped) adults may be retained. With either choice, up to three jacks (hatchery or wild) may be retained. Coho and sockeye must be released. Anglers may not continue to fish for salmon after the adult portion of the daily limit has been retained. A night closure and the anti-snagging rule would be in effect for all species.

Explanation: This proposal will encourage the release of wild fish, while still allowing some harvest of summer Chinook that move into the tributaries early, but due to warmer summer water temperatures, die before spawning. Permit 1554 with NOAA Fisheries allows for tributary harvest of summer Chinook above Wells Dam.

Appendix 1 –
Stream Strategy Tables

See attached Spreadsheets

Appendix 2 –
Proposals Not Supported or Modified by Staff

See Attached Table

Appendix E-3A. Proposed Stream Strategy spreadsheets for Puget Sound

Table 57. Fraser River Tributaries - all rivers, streams, and beaver ponds not listed below are closed waters.

Water	Species	Season	Additional Rules	Stream Strategy
SUMAS RIVER (Whatcom Co.) including all tributaries except Johnson Creek	All Game Fish	First Sat. in June-Oct. 31	Statewide min. size/daily limit.	A
JOHNSON CREEK (Whatcom Co.) from NP Railroad tracks to Lawson St. footbridge in Sumas	Juvenile anglers only (under 15 years old).			A
	All Game Fish	First Sat. in June-Oct. 31	Statewide min. size/daily limit.	
SILESIA CREEK (Whatcom Co.)	All Game Fish	First Sat. in June-Oct. 31	Statewide min. size/daily limit.	A
CHILIWACK RIVER (Whatcom Co.) including all tributaries and their tributaries	All Game Fish	First Sat. in June-Oct. 31	Statewide min. size/daily limit.	A

Table 58. Whatcom County Independents - all rivers, streams, and beaver ponds not listed below are closed waters.

Waterbody	Species	Season	Additional Rules	Stream Strategy
DAKOTA CREEK (Whatcom Co.) from mouth to Giles Rd. Bridge *The mouth is defined as a line from outermost headland on south bank to the house at 1285 Runge Ave., Blaine, WA (¼ mile downstream of Blaine Rd. Bridge).*	All Game Fish	First Sat. in June-Oct. 31	Statewide min. size/daily limit. Selective gear rules	B
	SALMON	Oct. 1-Dec. 31	Min. size 12". Daily limit 2.	
CALIFORNIA CREEK (Whatcom Co.)	All Game Fish	First Sat. in June-Oct. 31	Statewide min. size/daily limit. Selective gear rules	B
TERRELL CREEK (Whatcom Co.)	All Game Fish	First Sat. in June-Oct. 31	Statewide min. size/daily limit. Selective gear rules	B
SQUALICUM CREEK (Whatcom Co.)	All Game Fish	First Sat. in June-Oct. 31	Statewide min. size/daily limit. Selective gear rules	B
WHATCOM CREEK (Whatcom Co.) from mouth to yellow markers below foot bridge below Dupont St. in Bellingham *The mouth is defined by a line from the flashing light at the southwest end of the Port of Bellingham North Terminal to the southernmost point of the dike surrounding the Georgia Pacific treatment pond.*	ALL SPECIES - Aug. 1-Dec. 31: night closure and anti-snagging rule.			C
	TROUT	First Sat. in June-Feb. 28	Min. size 14". Daily limit 2.	
	Other Game Fish	First Sat. in June-Feb. 28	Statewide min. size/daily limit.	
	SALMON	Aug. 1-Dec. 31	Min. size 12". Daily limit 6. Up to 2 adults may be retained.	
	Anglers fishing lawfully, within 50 yards of the Bellingham Technical College Hatchery Collection Tube, and on the hatchery side of the creek, that hook and land CHUM, may remove them from the water and immediately place them unharmed into the Hatchery Collection Tube.			
WHATCOM CREEK (Whatcom Co.) from foot bridge below Dupont St. in Bellingham to Woburn St Bridge	ALL SPECIES - Aug. 1-Dec. 31: night closure and anti-snagging rule.			C
	TROUT	First Sat. in June-Feb. 28	Min. size 14". Daily limit 2.	
	Other Game Fish	First Sat. in June-Feb. 28	Statewide min. size/daily limit.	
WHATCOM CREEK (Whatcom Co.) from stone bridge at Whatcom Falls Park to Lake Whatcom	Juvenile anglers only (under 15 years old). ALL SPECIES - Aug. 1-Oct. 31: night closure and anti-snagging rule.			
	TROUT	Last Sat. in Apr.-Oct. 31	No min. size. Daily limit 2.	
	Other Game Fish	Last Sat. in Apr.-Oct. 31	Statewide min. size/daily limit.	

Table 59. Nooksack River Watershed - all rivers, streams, and beaver ponds not listed below are closed waters.

Waterbody	Species	Season	Additional Rules	Stream Strategy
NOOKSACK RIVER (Whatcom Co.) from Lummi Indian reservation boundary to yellow marker at the FFA high school barn in Deming	ALL SPECIES - First Sat. in June-Nov. 30: night closure and anti-snagging rule.			C
	TROUT	First Sat. in June-Feb. 15	Min. size 14". Daily limit 2.	
	Other Game Fish	First Sat. in June-Feb. 15	Statewide min. size/daily limit.	
	SALMON	Sept. 1-Dec. 31	Min. size 12". Daily limit 2. Release PINK, wild CHINOOK, and wild COHO.	
SILVER, TEN MILE, BERTRAND, ANDERSON, SMITH CREEKS (Whatcom Co)	All Game Fish	First Sat. in June-Oct. 31	Statewide min. size/daily limit. Selective Gear rules	B
FISHTRAP CREEK (Whatcom Co.) from Koh Rd. to Bender Rd.	Juvenile anglers only (under 15 years old).			
	All Game Fish	June 1-Oct. 31	Statewide min. size/daily limit.	
NOOKSACK RIVER (Whatcom Co.) from yellow marker at the FFA high school barn in Deming to confluence of North and South Forks	TROUT	Oct. 1-Feb. 15	Min. size 14". Daily limit 2.	C
	Other Game Fish	Oct. 1-Feb. 15	Statewide min. size/daily limit.	
	SALMON	Oct. 16-Dec. 31	Min. size 12". Daily limit 2. Release PINK, CHINOOK, and wild COHO.	
NOOKSACK RIVER, NORTH FORK (Whatcom Co.) from mouth to Maple Creek	ALL SPECIES - First Sat. in June-Nov. 30: night closure and anti-snagging rule. Nov. 1-Feb. 28: motors prohibited.			C
	TROUT	First Sat. in June-Feb. 15	Min. size 14". Daily limit 2.	
	Other Game Fish	First Sat. in June-Feb. 15	Statewide min. size/daily limit.	
	SALMON	Oct. 1-Oct. 31	Min. size 12". Daily limit 2. Release PINK, CHINOOK, and wild COHO.	
RACEHORSE CREEK, KENDALL CREEK above hatchery grounds, MAPLE CREEK (Whatcom Co.)	All Game Fish	First Sat. in June-Oct. 31	Statewide min. size/daily limit. Selective Gear rules	B
NOOKSACK RIVER, NORTH FORK (Whatcom Co) from Maple Creek to Nooksack Falls	ALL SPECIES - Nov. 1-Feb. 15: motors prohibited.			B
	TROUT	First Sat. in June-Feb. 15	Min. size 14". Daily limit 2. Selective gear rules	
	Other Game Fish	First Sat. in June-Feb. 15	Statewide min. size/daily limit. Selective gear rules.	
CANYON CREEK (Whatcom Co.) from Canyon Creek Rd Br. upstream	All Game Fish	First Sat. in June-Oct. 31	Statewide min. size/daily limit. Selective Gear rules	B
NOOKSACK RIVER, NORTH FORK (Whatcom Co.) upstream of Nooksack Falls, including all tributaries and their tributaries	All Game Fish	First Sat. in June-Oct. 31	Statewide min. size/daily limit.	A
NOOKSACK RIVER, MIDDLE FORK (Whatcom Co.) Mouth to City of Bellingham diversion Dam	ALL SPECIES - Nov. 1-Feb. 15: motors prohibited.			D
	TROUT	First Sat. in June-Feb. 15	Min. size 14". Daily limit 2. Selective gear rules	
	Other Game Fish	First Sat. in June-Feb. 15	Statewide min. size/daily limit. Selective gear rules.	

Waterbody	Species	Season	Additional Rules	Stream Strategy
NOOKSACK RIVER, MIDDLE FORK (Whatcom Co.) from diversion dam upstream, including all tributaries and their tributaries	All Game Fish	First Sat. in June-Oct. 31	Statewide min. size/daily limit.	A
NOOKSACK RIVER, SOUTH FORK (Skagit/Whatcom Co.) from mouth to Saxon Rd. Bridge	ALL SPECIES - First Sat. in June-Nov. 30: night closure. First Sat. in June-Feb. 15: Selective gear rules,			E
	All Game Fish	First Sat. in June-Feb. 15	Catch-and-release except up to 2 hatchery STEELHEAD may be retained.	
	SALMON	Oct. 16-Dec. 31	Min. size 12". Daily limit 2. Release PINK, CHINOOK, and wild COHO.	
HUTCHINSON CREEK (Whatcom Co.)	TROUT	First Sat. in June-Oct. 31	Min size 14". Selective gear rules.	D
	Other Game Fish	First Sat. in June-Oct. 31	Statewide min. size/daily limit. Selective gear rules	
NOOKSACK RIVER, SOUTH FORK (Skagit/Whatcom Co.) from Saxon Rd. to Skookum Creek	First Sat. in June-Nov. 30: night closure.			E
	All Game Fish	First Sat. in June-Feb. 15	Catch-and-release except up to 2 hatchery STEELHEAD may be retained. Selective gear rules.	
	SALMON	Oct. 16-Dec. 31	Min. size 12". Daily limit 2. Release PINK, CHINOOK, and wild COHO.	

Table 60. Samish River Watershed - all rivers, streams, and beaver ponds not listed below are closed waters.

Waterbody	Species	Season	Additional Rules	Stream Strategy
SAMISH RIVER (Skagit/Whatcom Co.) from mouth (Samish Island/ Bayview-Edison Rd. Bridge) to Thomas Rd. Bridge	ALL SPECIES - Aug. 1-Dec. 31: night closure, anti-snagging rule, and stationary gear restriction.			C
	TROUT	First Sat. in June-Dec 31	Min. size 14". Daily limit 2.	
	Other Game Fish	First Sat. in June-Dec 31	Statewide min. size/daily limit.	
	SALMON	July 1-Dec. 31	Min. size 12". Daily limit 2. Release wild COHO.	
	All Species	Jan 1- March 31	Catch-and-release except up to 2 hatchery STEELHEAD may be retained. Selective Gear Rules	E
SAMISH RIVER (Skagit/Whatcom Co.) from Thomas Rd. Bridge to I-5 Bridge	ALL SPECIES	Aug. 1-Dec. 31	Night closure, anti-snagging rule, and stationary gear restriction.	C
	TROUT	First Sat. in June-Dec 31	Min. size 14". Daily limit 2.	
	Other Game Fish	First Sat. in June-Dec 31	Statewide min. size/daily limit.	
	SALMON	Oct. 1-Dec. 31	Min. size 12". Daily limit 2. Release wild COHO.	
	All Species	Jan 1- March 31	Catch-and-release except up to 2 hatchery STEELHEAD may be retained. Selective Gear Rules	E
SAMISH RIVER (Skagit/Whatcom Co.) from I-5 Bridge to Hickson Bridge	CLOSED WATERS	from Old Hwy. 99 Bridge to WDFW salmon rack		E
	ALL SPECIES	Aug. 1-Dec. 31	Night closure and anti-snagging rule.	
	All Species	First Sat. in June-Mar. 31	Catch-and-release except up to 2 hatchery STEELHEAD may be retained. Selective Gear Rules	
FRIDAY, SILVER, & THOMAS CREEKS (Skagit/Whatcom Co.)	All Species	First Sat. in June-Oct. 31	Statewide min. size/daily limit. Selective Gear rules	B
SAMISH RIVER (Skagit/Whatcom Co.) from Hickson Bridge upstream	All Species	First Sat. in June-Oct. 31	Statewide min. size/daily limit. Selective Gear rules	B

Table 61. Skagit River Watershed - all rivers, streams, and beaver ponds not listed below are closed waters.

Waterbody	Species	Season	Additional Rules	Stream Strategy
SKAGIT RIVER (Skagit/Whatcom Co.) from mouth to Hwy 536 at Mt. Vernon (Memorial Hwy Bridge). *The mouth is defined by a line projected from terminus of the jetty with McGlinn Island to the white monument on east end of Ika Island, then to the white monument on east end of Craft Island, then to the white monument near corner of the levee on the west side of Dry Slough, and then to the white monument on the east side of Tom Moore Slough.*	ALL SPECIES	February 15 - May 31	Selective gear rules	
		July 9 - August 9	Night closure	
	Dolly Varden/bull trout	Year-round	Min. size 20". May be retained as part of TROUT daily limit.	
	All Other TROUT	Year-round	Min. size 14". Daily limit 2.	
	Other Game Fish	Year-round	Statewide min. size/daily limit.	
	SALMON	July 9-Aug. 9	Open noon Thursdays through Sundays ONLY. Min. size 12". Daily limit 2 CHINOOK only. Only 1 adult may be retained.	
	SALMON	Aug. 16-Dec. 31	Min. size 12". Daily limit 2, plus 2 additional PINK. Release CHINOOK and CHUM.	
FISHER SLOUGH/HILL DITCH (Skagit Co.) from Mouth to I-5 Bridge -830	TROUT	First Sat. in June-Oct. 31	Min. size 14". Daily limit 2.	
	Other Game Fish	First Sat. in June-Oct. 31	Statewide min. size/daily limit.	
SKAGIT RIVER (Skagit Co.) from Hwy. 536 at Mt. Vernon (Memorial Hwy. Bridge) to mouth of Gilligan Creek	ALL SPECIES	July 1-Nov. 30	Night closure	E
		Aug 16-Nov 30	Anti-snagging rule.	
	Dolly Varden/bull trout	June 1-Feb. 15	Min. size 20". May be retained as part of TROUT daily limit.	
	All Other TROUT	June 1-Feb. 15	Min. size 14". Daily limit 2.	
	Other Game Fish	June 1-Feb. 15	Statewide min. size/daily limit.	
	All Game Fish	Feb 16- March 15	Catch-and-release except up to 2 hatchery STEELHEAD may be retained. Selective gear rules. Unlawful to fish from a floating device while under power.	
	SALMON	July 9-Aug. 9	Open noon Thursdays through Sundays ONLY. Min. size 12". Daily limit 2 CHINOOK only. Only 1 adult may be retained.	
	SALMON	Aug. 16-Dec. 31	Min. size 12". Daily limit 2, plus 2 additional PINK. Release CHINOOK and CHUM.	
NOOKACHAMPS CREEK (Skagit Co.) all tributaries and their tributaries.	All Game Fish	First Sat. in June-Oct. 31	Statewide min. size/daily limit. Selective gear rules.	B
HANSEN CREEK (Skagit Co.) all tributaries and their tributaries	All Game Fish	First Sat. in June-Oct. 31	Statewide min. size/daily limit. Selective gear rules.	B
JONES CREEK (Skagit Co.)	All Game Fish	First Sat. in June-Oct. 31	Statewide min. size/daily limit. Selective gear rules.	B

Waterbody	Species	Season	Additional Rules	Stream Strategy
SKAGIT RIVER (Skagit Co.) from mouth of Gilligan Creek to the Dalles Bridge at Concrete	ALL SPECIES - July 1-Nov. 30: night closure and anti-snagging rule.			E
	Dolly Varden/bull trout	June 1-Feb. 15	Min. size 20". May be retained as part of TROUT daily limit.	
	All Other TROUT	June 1-Feb. 15	Min. size 14". Daily limit 2.	
	Other Game Fish	June 1-Feb. 15	Statewide min. size/daily limit.	
	All Game Fish	Feb 16- March 15	Catch-and-release except up to 2 hatchery STEELHEAD may be retained. Selective gear rules. Unlawful to fish from a floating device while under power.	
	SALMON	Aug. 16-Dec. 31	Min. size 12". Daily limit 2, plus 2 additional PINK. Release CHINOOK and CHUM.	
SKAGIT RIVER (Skagit Co.) from the Dalles Bridge at Concrete to Hwy. 530 Bridge at Rockport	CLOSED WATERS - June 1-Aug. 31: closed between a line projected across the thread of the river 200' above the east bank of the Baker River and a line projected across the thread of the river 200' below the west bank of the Baker River.			
	ALL SPECIES	July 1-Nov. 30	Night closure and anti-snagging rule.	
	Dolly Varden/bull trout	June 1-Feb. 15	Min. size 20". May be retained as part of TROUT daily limit.	
	All Other TROUT	June 1-Feb. 15	Min. size 14". Daily limit 2.	E
	Other Game Fish	June 1-Feb. 15	Statewide min. size/daily limit.	
	All Game Fish	Feb 16- April 30	Catch-and-release except up to 2 hatchery STEELHEAD may be retained. Selective gear rules. Unlawful to fish from a floating device while under power.	B
	SALMON	Sept. 16-Dec. 31	Min. size 12". Daily limit 2, plus 2 additional PINK. Release CHINOOK and CHUM.	
JACKMAN CREEK (Skagit Co.)	All Game Fish	First Sat. in June-Oct. 31	Statewide min. size/daily limit. Selective gear rules.	B
SKAGIT RIVER (Skagit Co.) from the Hwy. 530 Bridge at Rockport to Cascade River	ALL SPECIES	June 1-Nov. 30	Night closure and anti-snagging rule.	
	Dolly Varden/bull trout	June 1-Feb. 15	Min. size 20". May be retained as part of TROUT daily limit.	
	All Other TROUT	June 1-Feb. 15	Min. size 14". Daily limit 2.	C
	Other Game Fish	June 1-Feb. 15	Statewide min. size/daily limit.	E
	All Game Fish	Feb 16- April 30	Catch-and-release except up to 2 hatchery STEELHEAD may be retained. Selective gear rules. Unlawful to fish from a floating device while under power.	

Waterbody	Species	Season	Additional Rules	Stream Strategy
SKAGIT RIVER (Skagit Co.) from the Hwy. 530 Bridge at Rockport to Cascade River	SALMON	June 1-July 15	Min. size 12". Daily limit 4 hatchery CHINOOK only. Up to 2 adults may be retained.	
	SALMON	Sept. 16-Dec. 31	Min. size 12". Daily limit 2, plus 2 additional PINK. Release CHINOOK and CHUM.	
ILLABOT, ROCKY, BACUS, & OLSON CREEKS (Skagit Co.)	All Game Fish	First Sat. in June-Oct. 31	Statewide min. size/daily limit. Selective gear rules.	B
SKAGIT RIVER (Skagit/Whatcom Co.) from Cascade River to Gorge powerhouse at Newhalem	ALL SPECIES - Selective gear rules.			
	All Game Fish	June 1-Mar. 15	Catch-and-release except up to 2 hatchery STEELHEAD may be retained.	E
DIOBSUD, BACON, ALMA, THORNTON, GOODELL, NEWHALEM, & LADDER CREEKS (Skagit/Whatcom Co.)	All Game Fish	First Sat. in June-Oct. 31	Catch-and-release except up to 2 hatchery STEELHEAD may be retained. Selective gear rules.	E
SKAGIT RIVER (Whatcom Co.) Gorge Dam upstream to Ross Dam, and all tributaries except Stetattle Creek	All Game Fish	First Sat. in June-Oct. 31	Statewide min. size/daily limit.	A
SKAGIT RIVER (Whatcom Co.) All tributaries, except Stetattle Creek	All Game Fish	First Sat. in June-Oct. 31	Statewide min. size/daily limit.	A
STETATTLE CREEK (Whatcom Co.) above mouth of Bucket Creek (about 1 ½ mile upstream)	All Game Fish	First Sat. in June-Oct. 31	Statewide min. size/daily limit.	A
ROSS LAKE tributary streams (Whatcom Co.) from one mile upstream of Ross Lake to headwaters (except Ruby Creek and Big Beaver Creek)	TROUT	July 1-Oct. 31	Statewide min. size/daily limit.	A
	Other Game Fish	July 1-Oct. 31	Statewide min. size/daily limit.	A
BIG BEAVER CREEK (Ross Lk tributary) (Whatcom Co.) from 1/4 mile upstream of Ross Lake to headwaters	All Game Fish	July 1 - Oct 31	Catch-and-release and selective gear rules.	F
RUBY CREEK (Ross Lk tributary) (Whatcom Co.)	Closed Waters			
BAKER RIVER (Skagit Co.) from mouth to Hwy. 20 Bridge at Concrete -824	Dolly Varden/Bull Trout	Sept. 1-Oct. 31	Min. size 20". May be retained as part of TROUT daily limit.	
	All Other TROUT	Sept. 1-Oct. 31	Min. size 14". Daily limit 2.	C
	Other Game Fish	Sept. 1-Oct. 31	Statewide min. size/daily limit.	
BAKER RIVER (Skagit/Whatcom Co.) from fish barrier dam to headwaters and all tributaries and their tributaries except Channel Creek	All species	First Sat. in June-Oct. 31	Statewide min. size/daily limit.	A
CHANNEL CREEK (Skagit/Whatcom Co.)	All species	First Sat. in June-Sept. 15	Statewide min. size/daily limit.	A

Waterbody	Species	Season	Additional Rules	Stream Strategy
SAUK RIVER (Skagit/Snohomish Co.) from mouth to Darrington Bridge (828)	ALL Species - selective gear rules.			
	All Game Fish	First Sat. in June-Apr. 30	Catch-and-release except up to 2 hatchery STEELHEAD may be retained.	E
HILT, WHITE, & DAN'S CREEK (Skagit/Snohomish Co.)	All Game Fish	First Sat. in June-Oct. 31	Catch-and-release except up to 2 hatchery STEELHEAD may be retained. Selective Gear Rules	E
SAUK RIVER (Snohomish Co.) from Darrington Bridge to Whitechuck River (828)	ALL Species - selective gear rules.			
	All Game Fish	First Sat. in June-Feb. 28	Catch-and-release except up to 2 hatchery STEELHEAD may be retained.	E
CLEAR CREEK (Snohomish Co.) above Asbestos Creek Falls	All Game Fish	First Sat. in June-Oct. 31	Statewide min. size/daily limit.	A
SAUK RIVER (Snohomish Co.) from Whitechuck River upstream including NORTH FORK and SOUTH FORK to Elliott Creek (828)	ALL Species - selective gear rules.			B
	All Game Fish	First Sat. in June-Oct. 31	Catch-and-release except up to 2 hatchery STEELHEAD may be retained.	E
FALLS, SLOAN, CADET, & ELLIOT CREEKS (Snohomish Co.)	All Game Fish	First Sat. in June-Oct. 31	Statewide minimum size/daily limit. Selective Gear rules	B
SAUK RIVER, SOUTH FORK (Snohomish Co.) above Elliott Creek -828	ALL Species - selective gear rules.			
	All Game Fish	First Sat. in June-Aug. 31	Catch-and-release except up to 2 hatchery STEELHEAD may be retained.	E
SUIATTLE RIVER (Skagit/Snohomish Co.)	Dolly Varden/bull trout	First Sat. in June-Oct. 31	Min. size 20". May be retained as part the TROUT daily limit. Selective Gear rules	
	All Other TROUT	First Sat. in June-Oct. 31	Min. size 8". Daily limit 2. Selective gear rules.	B
	Other Game Fish	First Sat. in June-Oct. 31	Statewide min. size/daily limit. Selective gear rules	
BIG CREEK (above TeePee falls), GRADE, TENAS, ALL, STRAIGHT, BUCK (above upper boundary of Buck Creek Campground), LIME, DOWNEY, SULPHUR, MILK, & CANYON CREEKS (Skagit/Snohomish Co.)	All Game Fish	First Sat. in June-Oct. 31	Statewide min. size/daily limit. Selective gear rules	B
WHITECHUCK RIVER (Snohomish Co.)	All Species - Selective Gear Rules			
	Dolly Varden/bull trout	First Sat. in June-Oct. 31	Min. size 20". May be retained as part of TROUT daily limit.	
	All Other TROUT	First Sat. in June-Oct. 31	Min. size 8". Daily limit 2.	B
	Other Game Fish	First Sat. in June-Oct. 31	Statewide min. size/daily limit.	
PUGH, OWL, & CAMP CREEK (Snohomish Co.)	All Game Fish	First Sat. in June-Oct. 31	Statewide min. size/daily limit. Selective Gear rules	B

Waterbody	Species	Season	Additional Rules	Stream Strategy
CASCADE RIVER (Skagit Co.) from mouth to Rockport-Cascade Rd. Bridge	ALL SPECIES	June 1-July 15 and Sept. 16-Nov. 30	Anti-snagging rule and night closure.	
	Dolly Varden/bull trout	June 1-July 15	Min. size 20". May be retained as part of TROUT daily limit.	
	All Other TROUT	June 1-July 15	Min. size 14". Daily limit 2.	C
	Other Game Fish	June 1-July 15	Statewide min. size/daily limit.	
	Dolly Varden/bull trout	Sept. 16-Feb. 28	Min. size 20". May be retained as part of TROUT daily limit.	
	All Other TROUT	Sept. 16-Feb. 28	Min. size 14". Daily limit 2.	C
	Other Game Fish	Sept. 16-Feb. 28	Statewide min. size/daily limit.	
	SALMON	June 1-July 15	Min. size 12". Daily limit 4 hatchery CHINOOK only. Up to 2 may be adults.	
	SALMON	Sept. 16-Nov. 30	Min. size 12". Daily limit 4 COHO only.	
JORDAN CREEK (Skagit Co.)	All Game Fish	First Sat. in June-Oct. 31	Statewide min. size/daily limit. Selective Gear rules	B
CASCADE RIVER (Skagit Co.) from Rockport-Cascade Rd. Bridge upstream (826) including forks	All Game Fish	First Sat. in June-Feb. 28	Catch-and-release except up to 2 hatchery STEELHEAD may be retained. Selective gear rules.	E
BOULDER, MARBLE, FOUND, & KINDY CREEKS (Skagit Co.)	All Game Fish	First Sat. in June-Oct. 31	Catch-and-release except up to 2 hatchery STEELHEAD may be retained. Selective Gear Rules	E

Table 62. Stillaguamish River Watershed - all rivers, streams, and beaver ponds not listed below are closed waters.

Waterbody	Species	Season	Additional Rules	Stream Strategy
STILLAGUAMISH RIVER (Snohomish Co.) and all sloughs downstream of Marine Drive (south of Stanwood)	ALL SPECIES - Aug. 1-Nov. 30: night closure and anti-snagging rule.			C
	TROUT	Year-round	Min. size 14". Daily limit 2.	
	Other Game Fish	Year-round	Statewide min. size/daily limit.	
	SALMON	Sept. 1-Dec. 31	Min. size 12". Daily limit 2, plus 2 additional PINK. Release CHINOOK.	
STILLAGUAMISH RIVER (Snohomish Co.) from Marine Drive upstream to forks	ALL SPECIES - Aug. 1-Nov. 30: night closure. June 1-Nov. 30: selective gear rules, except motors allowed.			C
	All Game Fish	First Sat. in June-Nov. 30	Catch-and-release except up to 2 hatchery STEELHEAD may be retained.	
	TROUT	Dec. 1-Feb. 15	Min. size 14". Daily limit 2.	
	Other Game Fish	Dec. 1-Feb. 15	Statewide min. size/daily limit.	
	SALMON	Sept. 1-Dec. 31	Min. size 12". Daily limit 2, plus 2 additional PINK. Release CHINOOK.	
PILCHUCK CREEK (Snohomish Co.) (Stillaguamish system) from mouth to Hwy. 9 Bridge	ALL SPECIES - First Sat. in June-Nov. 30: selective gear rules.			
	TROUT	First Sat. in June-Feb. 15	Min. size 14". Daily limit 2.	C
	Other Game Fish	First Sat. in June-Feb. 15	Statewide min. size/daily limit.	
PILCHUCK CREEK (Snohomish Co.) from Hwy. 9 Bridge to Pilchuck Falls	All species	First Sat. in June-Oct. 31	Min. size 14". Daily limit 2. Selective Gear Rules	D
PILCHUCK CREEK (Snohomish Co.) from Pilchuck Falls upstream including all tributaries and their tributaries, including tributaries to Lake Cavanaugh.	All species	First Sat. in June-Oct. 31	Statewide min. size/daily limit.	A
STILLAGUAMISH RIVER, NORTH FORK (Snohomish Co.) from mouth to Swede Heaven Bridge	ALL SPECIES - Aug. 1-Nov. 30: night closure and anti-snagging rule. Fishing from any floating device prohibited upstream of the Hwy. 530 Bridge at mile post 28.8 (Cicero Bridge). Motors prohibited downstream from the Hwy. 530 Bridge.			
	All Game Fish	First Sat. in June-Nov. 30	Catch-and-release except up to 2 hatchery STEELHEAD may be retained. Fly fishing only.	
	TROUT	Dec. 1-Feb. 15	Min. size 14". Daily limit 2.	C
	Other Game Fish	Dec. 1-Feb. 15	Statewide min. size/daily limit.	
BOULDER RIVER (Snohomish Co.) from mouth to Boulder Falls	All Game Fish	First Sat. in June-Oct. 31	Catch-and-release and selective gear rules, except up to 2 hatchery STEELHEAD may be retained.	E
BOULDER RIVER (Snohomish Co.) from Boulder Falls upstream	All species	First Sat. in June-Oct. 31	Statewide min. size/daily limit.	A

Waterbody	Species	Season	Additional Rules	Stream Strategy
STILLAGUAMISH RIVER, NORTH FORK (Snohomish Co.) from Swede Heaven Bridge to N.Fork falls (approx. one mile upstream of Cascade Creek)	All Game Fish	First Sat. in June-Oct. 31	Selective gear rules and catch-and-release except up to 2 hatchery STEELHEAD may be retained.	E
SQUIRE CREEK (Snohomish Co.)	All Game Fish	First Sat. in June-Oct. 31	Selective gear rules and catch-and-release except up to 2 hatchery STEELHEAD may be retained.	E
STILLAGUAMISH RIVER, NORTH FORK (Skagit/Snohomish Co.) Upstream of Falls	All Game Fish	First Sat. in June-Oct. 31	Statewide min. size/daily limit.	A
STILLAGUAMISH RIVER, SOUTH FORK (Snohomish Co.) from mouth to 400' below Granite Falls fishway outlet.874	ALL SPECIES - Aug. 1-Nov. 30: night closure and anti-snagging rule.			
	TROUT	First Sat. in June-Feb. 15	Min. size 14". Daily limit 2.	C
	Other Game Fish	First Sat. in June-Feb. 15	Statewide min. size/daily limit.	
CANYON CREEK (Snohomish Co.) (South Fork Stillaguamish) (866)	TROUT	First Sat. in June-Feb. 15	Catch-and-release except up to 2 hatchery STEELHEAD may be retained.	
STILLAGUAMISH RIVER, SOUTH FORK from Mt. Loop Hwy. Bridge (above Granite Falls) upstream (874)	ALL SPECIES - Aug. 1-Nov. 30: night closure and anti-snagging rule.			
	All Game Fish	First Sat. in June-Nov. 30	Statewide min. size/daily limit.	A

Table 63. Snohomish River Watershed - all rivers, streams, and beaver ponds not listed below are closed waters.

Waterbody	Species	Season	Additional Rules	Stream Strategy
SNOHOMISH RIVER (Snohomish Co.) from mouth (Burlington-Northern railroad bridges) (including all channels, sloughs, and interconnected waterways) upstream to confluence of the Skykomish and Snoqualmie rivers (all channels) (850)	ALL SPECIES - August 1- November 30: night closure and anti-snagging rule			C
	Dolly Varden/Bull Trout	First Sat in June - Feb 15.	Min size 20". May be retained as part of the TROUT daily limit.	
	All Other TROUT	First Sat in June - Feb 15.	Min. size 14". Daily limit 2.	
	Other Game Fish	First Sat in June - Feb 15.	Statewide min. size/daily limit	
	SALMON	Aug 16 - Dec 31	Min. size 12". Daily limit 2, pl;us 2 additional PINK. Release CHINOOK.	
	STURGEON	year-round	Min. size 38" fork length. Max. size 54" fork length. Daily limit 1. Mar. 1-May. 31: Release all STURGEON upstream of Hwy. 2 Bridge.	
PILCHUCK RIVER (Snohomish Co.) from mouth to 500' downstream of the Snohomish city diversion dam (840)	ALL SPECIES - fishing from any floating device prohibited.			C
	TROUT	Dec 1 - Feb 15.	Min. size 14". Daily limit 2.	
	Other Game Fish	Dec 1 - Feb 15.	Statewide min. size/daily limit.	
SKYKOMISH RIVER (Snohomish Co.) from mouth to Lewis St. Bridge in Monroe (844)	ALL SPECIES - Aug. 1-Nov. 30: night closure and anti-snagging rule. Nov. 1-Feb. 15: fishing from any floating device prohibited from boat ramp below Lewis St. Bridge at Monroe to 2,500' downstream.			C
	Dolly Varden/Bull Trout	June 1 - Feb 15.	Min size 20". May be retained as part of the TROUT daily limit.	
	All Other TROUT	June 1 - Feb 15.	Min. size 14". Daily limit 2.	
	Other Game Fish	June 1 - Feb 15.	Statewide min. size/daily limit.	
	SALMON	Aug 16 - Dec 31	Min. size 12". Daily limit 2, plus 2 additional PINK. Release CHINOOK.	
SKYKOMISH RIVER (Snohomish Co.) from Lewis Street Bridge in Monroe to Wallace River (844)	ALL SPECIES - June 1 - November 31 - night closure and anti-snagging rule			C
	Dolly Varden/Bull Trout	June 1 - Feb 15.	Min size 20". May be retained as part of the TROUT daily limit.	
	All Other TROUT	June 1 - Feb 15.	Min. size 14". Daily limit 2.	
	Other Game Fish	June 1 - Feb 15.	Statewide min. size/daily limit.	
	SALMON	June 1 - July 31	Min. size 12". Daily limit 2 hatchery CHINOOK only.	
	SALMON	Sept 1 - Dec 31	Min. size 12". Daily limit 2, pl;us 2 additional PINK. Release CHINOOK.	
SULTAN RIVER (Snohomish Co.) from mouth to 400' downstream of diversion dam (river mile 9.7) (854)	Dolly Varden/Bull Trout	1st Sat. in June - Feb 15.	Min size 20". May be retained as part of the TROUT daily limit.	C
	All Other TROUT	1st Sat. in June - Feb 15.	Min. size 14". Daily limit 2.	
	Other Game Fish	1st Sat. in June - Feb 15.	Statewide min. size/daily limit.	

Waterbody	Species	Season	Additional Rules	Stream Strategy
SULTAN RIVER (Snohomish Co.) from diversion dam to 400 ft below Culmback Dam	TROUT	First Sat. in June-Oct. 31	Statewide min. size/daily limit.	
	Other Game Fish	First Sat. in June-Oct. 31	Statewide min. size/daily limit.	
WALLACE RIVER (Snohomish Co.) from mouth (farthest downstream railroad bridge) to 363rd Ave. SE/Reece Rd. (Dike Road) (860)	ALL SPECIES - Nov. 1-Feb. 28: fishing from any floating device prohibited.			C
	Dolly Varden/Bull Trout	First Sat in June - Feb 28	Min size 20". May be retained as part of the TROUT daily limit.	
	All Other TROUT	First Sat in June - Feb 28	Min. size 14". Daily limit 2.	
	Other Game Fish	First Sat in June - Feb 28	Statewide min. size/daily limit.	
	SALMON	Sept 1 - Nov 30	Min. size 12". Daily limit 2 COHO only.	
WALLACE RIVER (Snohomish Co.) from 363rd Ave. SE/Reece Rd. (Dike Road) to 200' upstream of water intake of salmon hatchery. (860)	ALL SPECIES - Nov. 1-Feb. 28: fishing from any floating device prohibited.			C
	Dolly Varden/Bull Trout	Sept 1- Feb 28	Min size 20". May be retained as part of the TROUT daily limit.	
	All Other TROUT	Sept 1- Feb 28	Min. size 14". Daily limit 2.	
	Other Game Fish	Sept 1- Feb 28	Statewide min. size/daily limit.	
	SALMON	Sept 1 - Nov 30	Min. size 12". Daily limit 2 COHO only.	
WALLACE RIVER (Snohomish Co.) from 200' upstream of water intake of salmon hatchery to Wallace Falls (860)	ALL SPECIES - Nov. 1-Feb. 28: fishing from any floating device prohibited.			C
	Dolly Varden/bull trout	Nov. 1-Feb. 28	Min. size 20". May be retained as part of TROUT daily limit.	
	All Other TROUT	Nov. 1-Feb. 28	Min. size 14". Daily limit 2.	
	Other Game Fish	Nov. 1-Feb. 28	Statewide min. size/daily limit.	
WALLACE RIVER (Snohomish Co.) from Wallace Falls upstream	All Game Fish	First Sat. in June-Oct. 31	Statewide min. size/daily limit.	A
SKYKOMISH RIVER (Snohomish Co) from Wallace River to 1,000' downstream of Reiter Ponds outlet (844)	ALL SPECIES - June 1-Nov. 30: night closure and anti-snagging rule.			C
	Dolly Varden/bull trout	June 1-Feb. 15	Min. size 20". May be retained as part of TROUT daily limit.	
	All Other TROUT	June 1-Feb. 15	Min. size 14". Daily limit 2.	
	Other Game Fish	June 1-Feb. 15	Statewide min. size/daily limit.	
	SALMON	Sept. 1-Dec. 31	Min. size 12". Daily limit 2, plus 2 additional PINK. Release CHINOOK.	
SKYKOMISH RIVER (Snohomish Co) from 1,000' downstream of Reiter Ponds outlet to 1,500' upstream of Reiter Ponds outlet (844)	ALL SPECIES	Aug. 1-Nov. 30: night closure and anti-snagging rule.		C
		Aug. 1-Feb. 28: fishing from any floating device prohibited in the area 1,500' upstream to 1,000' downstream of the outlet at the Reiter Ponds.		
	Dolly Varden/bull trout	Aug. 1-Feb. 28	Min. size 20". May be retained as part of TROUT daily limit.	

Waterbody	Species	Season	Additional Rules	Stream Strategy
SKYKOMISH RIVER (Snohomish Co) from 1,000' downstream of Reiter Ponds outlet to 1,500' upstream of Reiter Ponds outlet (844)	All Other TROUT	Aug. 1-Feb. 28	Min. size 14". Daily limit 2.	C
	Other Game Fish	Aug. 1-Feb. 28	Statewide min. size/daily limit.	
	SALMON	Sept 1- Dec. 31	Min. size 12". Daily limit 2, plus 2 additional PINK. Release CHINOOK.	
SKYKOMISH RIVER (Snohomish Co) from 1,500' upstream of Reiter Ponds outlet to confluence of North and south Fork (844)	ALL SPECIES - June 1-Nov. 30: night closure and anti-snagging rule.			C
	Dolly Varden/bull trout	June 1-Feb. 15	Min. size 20". May be retained as part of TROUT daily limit.	
	All Other TROUT	June 1-Feb. 15	Min. size 14". Daily limit 2.	
	Other Game Fish	June 1-Feb. 15	Statewide min. size/daily limit.	
	SALMON	Sept 1- Dec. 31	Min. size 12". Daily limit 2, plus 2 additional PINK. Release CHINOOK.	
SKYKOMISH RIVER, NORTH FORK (Snohomish Co.) from mouth to 1,000' downstream of Bear Creek Falls (846)	ALL SPECIES - Aug. 1-Nov. 30: night closure.			E
	All Game Fish	First Sat in June - Feb 15	Selective gear rules and catch-and-release except up to 2 hatchery steelhead may be retained.	
SKYKOMISH RIVER, NORTH FORK (Snohomish Co.) from Deer Falls (about 1/4 mile upstream of Goblin Creek) upstream (846)	All Game Fish	First Sat in June - Oct 31	Statewide min. size/daily limit.	A
SKYKOMISH RIVER, SOUTH FORK (King/Snohomish Co.) from mouth to 600' downstream of the Sunset Falls Fishway (848)	ALL SPECIES - Aug. 1-Nov. 30: night closure and anti-snagging rule.			C
	TROUT	First Sat in June - Feb 15	Min. size 14". Daily limit 2.	
	Other Game Fish	First Sat in June - Feb 15	Statewide min. size/daily limit	
SKYKOMISH RIVER, SOUTH FORK (King/Snohomish Co.) from Sunset Falls upstream (848)	TROUT	First Sat in June - Nov 30	Min. size 14". Daily limit 2. Selective gear rules.	D
	Other Game Fish	First Sat in June - Nov 30	Statewide min. size/daily limit. Selective gear rules.	
	WHITEFISH	Dec 1 - Feb 28	No min. size. Daily limit 15 WHITEFISH only.	
SKYKOMISH RIVER, SOUTH FORK (King/Snohomish Co.) All tributaries upstream of Sunset Falls, including their tributaries	TROUT	First Sat in June - Nov 30	Min. size 14". Daily limit 2. Selective gear rules.	D
	Other Game Fish	First Sat in June - Nov 30	Statewide min. size/daily limit. Selective gear rules.	
TYE RIVER (King Co.) continuation of SOUTH FORK SKYKOMISH RIVER beginning from Foss River upstream to Alpine Falls	TROUT	First Sat in June - Oct 31	Min. size 14". Daily limit 2. Selective gear rules.	D
	Other Game Fish	First Sat in June - Oct 31	Statewide min. size/daily limit. Selective gear rules.	
	WHITEFISH	Nov 1 - Feb 28	No min. size. Daily limit 15 WHITEFISH only.	

Waterbody	Species	Season	Additional Rules	Stream Strategy
TYE RIVER (King Co.) from Alpine Falls upstream	All Game Fish	First Sat in June - Oct 31	Statewide min. size/daily limit	A
TYE RIVER (King Co.) All tributaries upstream of Foss River, including their tributaries	All Game Fish	First Sat in June - Oct 31	Statewide min. size/daily limit	A
SNOQUALMIE RIVER (King Co.) from mouth to boat ramp at Plumb access	ALL SPECIES	Sept. 1-Nov. 30	Night closure	C
		First Sat in June -Nov. 30	Selective gear rules, except motors allowed.	
	TROUT	First Sat in June - Feb 15.	Min. size 14". Daily limit 2.	
	Other Game Fish	First Sat in June - Feb 15.	Statewide min. size/daily limit	
	SALMON	Sept 1- Dec. 31	Min. size 12". Daily limit 2, plus 2 additional PINK. Release CHINOOK and PINK.	
SNOQUALMIE RIVER (King Co.) from boat ramp at Plumb access to Snoqualmie Falls (852)	ALL SPECIES	Sept. 1-Nov. 30	Night closure	C
		First Sat in June-Nov. 30	Selective gear rules, except motors allowed.	
		Nov. 1-Feb. 28	Fishing from any floating device prohibited from boat ramp at Plumb access to mouth of Tokul Creek (about ¼ mile).	
	TROUT	First Sat in June - Feb 28.	Min. size 14". Daily limit 2.	
	Other Game Fish	First Sat in June - Feb 28.	Statewide min. size/daily limit	
	SALMON	Sept 1- Dec. 31	Min. size 12". Daily limit 2, plus 2 additional PINK. Release CHINOOK and PINK.	
TOLT RIVER (King Co.) from mouth to USGS trolley cable near confluence of North and South forks (858)	All SPECIES - First Sat. in June- Nov. 30: selective gear rules.			C
	TROUT	First Sat in June - Feb 15.	Min. size 14". Daily limit 2.	
	Other Game Fish	First Sat in June - Feb 15.	Statewide min. size/daily limit	
TOLT RIVER, NORTH FORK (King Co.) from falls in Section 26 upstream	All Game Fish	First Sat in June - Oct 31	Catch-and-release and selective gear rules.	F
TOLT RIVER, SOUTH FORK (King Co.) from dam upstream (858)	TROUT	First Sat in June - Oct 31	Min. size 10". Daily limit 2. Selective gear rules.	
	Other Game Fish	First Sat in June - Oct 31	Statewide min. size/daily limit. Selective gear rules.	
RAGING RIVER (King Co.) from mouth to Hwy. 18 Bridge (3 miles upstream from Preston) (842)	TROUT	First Sat in June - Feb 15.	Min. size 14". Daily limit 2.	C
	Other Game Fish	First Sat in June - Feb 15.	Statewide min. size/daily limit	
RAGING RIVER (King Co.) from Hwy. 18 Bridge (3 miles upstream from Preston) upstream	All Game Fish	First Sat in June - Oct 31	Statewide min. size/daily limit	A

Waterbody	Species	Season	Additional Rules	Stream Strategy
TOKUL CREEK (King Co.) from mouth to Fish Hatchery Rd. Bridge (856)	ALL SPECIES - anti-snagging rule. Closed daily from 5:00 p.m.-7:00 a.m.			C
	TROUT	Dec 1. - Feb 28	Min. size 14". Daily limit 2.	
	Other Game Fish	Dec 1. - Feb 28	Statewide min. size/daily limit	
TOKUL CREEK (King Co.) from Fish Hatchery R. Bridge to posted cable boundary marker (approximately 400' downstream of the hatchery intake) (856)	ALL SPECIES - anti-snagging rule. Closed daily from 5:00 p.m.-7:00 a.m.			C
	TROUT	Jan. 15 - Feb 28	Min. size 14". Daily limit 2.	
	Other Game Fish	Jan. 15 - Feb 28	Statewide min. size/daily limit	
SNOQUALMIE RIVER (King Co) from Snoqualmie Falls upstream including North and South forks (852)	TROUT	First Sat in June - Oct 31	Min. size 10". Daily limit 2. Selective gear rules.	
	Other Game Fish	First Sat in June - Oct 31	Statewide min. size/daily limit. Selective gear rules.	
	All Game Fish	Nov 1 - Friday before the first Saturday in June	Catch-and-release and selective gear rules.	
BOXLEY CREEK (King Co.) (SF Snoqualmie River) from falls (located approximately river mile 0.9) upstream	All Game Fish	First Sat in June - Oct 31	Statewide min. size/daily limit	A
COAL CREEK (King Co.) (near Snoqualmie) from mouth to Hwy I-90	Juvenile anglers only (under 15 years old)			
	TROUT	Last Sat in April - Oct 31	No min size. Daily limit 2.	
	Other Game Fish	Last Sat in April - Oct 31	Statewide min. size/daily limit	
COAL CREEK (King Co.) (near Snoqualmie) from Hwy I-90 upstream	All Game Fish	First Sat in June - Oct 31	Statewide min. size/daily limit	A
KIMBALL CREEK (King Co.) (near Snoqualmie)	Juvenile anglers only (under 15 years old)			
	TROUT	Last Sat in April - Oct 31	No min size. Daily limit 2.	
	Other Game Fish	Last Sat in April - Oct 31	Statewide min. size/daily limit	
SNOQUALMIE RIVER (King Co) All tributaries and their tributaries upstream of Snoqualmie Falls including North and South Forks, except Tate and Sunday creeks	All Game Fish	First Sat in June - Oct 31	Statewide min. size/daily limit	A
MIDDLE FORK SNOQUALMIE RIVER (King Co) from mouth upstream including all tributaries except Pratt and Taylor rivers (852)	All Game Fish	year-round	Catch-and-release and selective gear rules.	F
PRATT RIVER (King Co.) (tributary to Middle Fork Snoqualmie)	All Game Fish	First Sat in June - Oct 31	Catch-and-release and selective gear rules.	F
TAYLOR RIVER (King Co.) (tributary to Middle Fork Snoqualmie)	All Game Fish	First Sat in June - Oct 31	Catch-and-release and selective gear rules.	F

Table 64. Lake Washington Tributaries - all rivers, streams, and beaver ponds not listed below are closed waters.

Waterbody	Species	Season	Additional Rules	Stream Strategy
BIG BEAR CREEK (Snohomish/King Co.) (tributary of Sammamish River)	Juvenile anglers only (under 15 years old).			
	All Game Fish	First Sat. in June-Aug. 31	Statewide min. size/daily limit.	
CEDAR RIVER (King Co.) from mouth to Landsburg Road Bridge (RM 21.5)	ALL SPECIES - selective gear rules, fishing from a floating device with an internal combustion engine is prohibited, and night closure.			
	All Game Fish	First Sat. in June-Aug. 31	Statewide min. size/daily limit. Release TROUT.	
COAL CREEK (King Co.) (Lake Washington tributary)	Juvenile anglers only (under 15 years old).			
	All Game Fish	First Sat. in June-Aug. 31	Statewide min. size/daily limit.	
KELSEY CREEK (King Co.) (tributary of Lake Washington) including Mercer Slough	Juvenile anglers only (under 15 years old).			
	All Game Fish	First Sat. in June-Aug. 31	Statewide min. size/daily limit.	
LITTLE BEAR CREEK (Snohomish/King Co.) (tributary of Sammamish River)	Juvenile anglers only (under 15 years old).			
	All Game Fish	First Sat. in June-Aug. 31	Statewide min. size/daily limit.	
MAY CREEK (King Co.) (tributary of Lake Washington)	Juvenile anglers only (under 15 years old).			
	All Game Fish	First Sat. in June-Aug. 31	Statewide min. size/daily limit.	
NORTH CREEK (Snohomish/King Co.) (tributary of Sammamish River)	Juvenile anglers only (under 15 years old).			
	All Game Fish	First Sat. in June-Aug. 31	Statewide min. size/daily limit.	
~~PIPERS CREEK (King Co.) (Carkeek Creek)~~	~~CLOSED WATERS - from mouth upstream, and all tributaries.~~			
~~ROCK CREEK (King Co.) Cedar River tributary below Landsburg Dam~~	~~CLOSED WATERS~~			
SAMMAMISH RIVER (King Co.) (slough)	All species: Selective gear rules. Fishing from a floating device equipped with an internal combustion engine is prohibited.			
	All Game Fish	Jan. 1-Aug. 31	Statewide min. size/daily limit- release TROUT.	
SWAMP CREEK (Snohomish/King Co.) (tributary to Sammamish River)	Juvenile anglers only (under 15 years old).			
	All Game Fish	First Sat. in June-Aug. 31	Statewide min. size/daily limit.	
THORNTON CREEK (King Co.) (tributary to Lake Washington)	Juvenile anglers only (under 15 years old).			
	All Game Fish	First Sat. in June-Aug. 31	Statewide min. size/daily limit.	

Table 65. Green/Duwamish River Watershed - all rivers, streams, and beaver ponds not listed below are closed waters.

Waterbody	Species	Season	Additional Rules	Stream Strategy
DUWAMISH RIVER (King Co.)	See Green River (King County)			
GREEN (DUWAMISH) RIVER (King Co.) downstream of 1st Ave. South Bridge	See Marine Area 10 Rules			
GREEN RIVER (King Co.) from 1st Ave. South Bridge to Old Hwy. 99/Tukwila Intl. Blvd.	ALL SPECIES	Aug. 22-Aug. 31	Night closure, only 1 single-point hook may be used, hook must measure ½ inch or less from point to shank, and bait prohibited.	
		Sept. 1-Nov. 30	night closure and anti-snagging rule.	
		Nov. 1-Feb. 15	fishing from any floating device prohibited.	
	~~Wild STEELHEAD retention allowed July 1-July 31 and Aug. 22-Nov. 30. See Wild STEELHEAD RETENTION RULES, page 31.~~			
	TROUT	First Sat. in June-July 31	Min. size 14". Daily limit 2.	
	Other Game Fish	First Sat. in June-July 31	Statewide min. size/daily limit.	
	TROUT	Aug. 22-Feb. 15	Min. size 14". Daily limit 2.	
	Other Game Fish	Aug. 22-Feb. 15	Statewide min. size/daily limit.	
	SALMON	Aug. 22-Dec. 31	Min. size 12". Daily limit 6. Up to 3 adult COHO and CHUM (combined) may be retained. Release CHINOOK.	
GREEN RIVER (King Co.) from Old Hwy. 99/Tukwila Intl. Blvd. to I-405	ALL SPECIES	Sept. 1-Nov. 30	night closure and anti-snagging rule	
		Nov. 1-Feb. 15	fishing from any floating device prohibited.	
	~~Wild STEELHEAD retention allowed July 1-July 31 and Sept. 1-Nov. 30. See Wild STEELHEAD RETENTION RULES, page 31.~~			
	TROUT	First Sat. in June-July 31	Min. size 14". Daily limit 2.	
	Other Game Fish	First Sat. in June-July 31	Statewide min. size/daily limit.	
	TROUT	Sept. 1-Feb. 15	Min. size 14". Daily limit 2.	
	Other Game Fish	Sept. 1-Feb. 15	Statewide min. size/daily limit.	
	SALMON	Sept. 1-Dec. 31	Min. size 12". Daily limit 6. Up to 3 adult COHO and CHUM (combined) may be retained. Only 1 CHINOOK may be retained.	
GREEN RIVER (King Co.) from I-405 to S. 277th Bridge in Auburn	ALL SPECIES	Sept. 1-Sept. 30	Night closure, only 1 single-point hook may be used, hook must measure ½ inch or less from point to shank, and bait prohibited.	
		Oct. 1-Nov. 30	Night closure and anti-snagging rule.	
		Nov. 1-Feb. 15	Fishing from any floating device prohibited.	

Waterbody	Species	Season	Additional Rules	Stream Strategy
GREEN RIVER (King Co.) from I-405 to S. 277th Bridge in Auburn	~~Wild STEELHEAD retention allowed July 1-July 31 and Sept. 1-Nov. 30. See Wild STEELHEAD RETENTION RULES, page 31.~~			
	TROUT	First Sat. in June-July 31	Min. size 14". Daily limit 2.	
	Other Game Fish	First Sat. in June-July 31	Statewide min. size/daily limit.	
	TROUT	Sept. 1-Feb. 15	Min. size 14". Daily limit 2.	
	Other Game Fish	Sept. 1-Feb. 15	Statewide min. size/daily limit.	
	SALMON	Sept. 1-Dec. 31	Min. size 12". Daily limit 6. Up to 3 adult COHO and CHUM (combined) may be retained. Release CHINOOK.	
GREEN RIVER (King Co.) from the S. 277th Bridge to Auburn-Black Diamond Rd. Bridge	ALL SPECIES	Sept. 16-Oct. 15	Night closure, only 1 single-point hook may be used, hook must measure ½ inch or less from point to shank, and bait prohibited.	
		Oct. 16-Nov. 30	Night closure and anti-snagging rule.	
		Nov. 1-Feb. 28	Fishing from any floating device prohibited.	
	~~Wild STEELHEAD retention allowed July 1-Aug. 15 and Sept. 16-Nov. 30. See Wild STEELHEAD RETENTION RULES, page 31.~~			
	TROUT	First Sat. in June-Aug. 15	Min. size 14". Daily limit 2.	
	Other Game Fish	First Sat. in June-Aug. 15	Statewide min. size/daily limit.	
	TROUT	Sept. 16-Feb. 28	Min. size 14". Daily limit 2.	
	Other Game Fish	Sept. 16-Feb. 28	Statewide min. size/daily limit.	
	SALMON	Sept. 16-Dec. 31	Min. size 12". Daily limit 6. Up to 3 adult COHO and CHUM (combined) may be retained. Release CHINOOK.	
GREEN RIVER (King Co.) from the Auburn-Black Diamond Rd. Bridge to the water pipeline walk bridge (1/2 mile downstream of Tacoma Headworks Dam)	CLOSED WATERS - within 150' of the Palmer Ponds outlet rack and within 150' of the mouth of Keta (Crisp) Creek.			
	ALL SPECIES - Aug. 1-Nov. 30: night closure and anti-snagging rule.			
	~~Wild STEELHEAD retention allowed July 1-Nov. 30. See Wild STEELHEAD RETENTION RULES, page 31.~~			
	TROUT	First Sat. in June-Feb. 28	Min. size 14". Daily limit 2.	
	Other Game Fish	First Sat. in June-Feb. 28	Statewide min. size/daily limit.	
	SALMON	Nov. 1-Dec. 31	Min. size 12". Daily limit 6. Up to 3 adult COHO and CHUM (combined) may be retained. Release CHINOOK.	

Waterbody	Species	Season	Additional Rules	Stream Strategy
GREEN RIVER (King Co.) from the water pipeline walk bridge (1/2 mile downstream of Tacoma Headworks Dam) to Friday Creek	CLOSED WATERS			
GREEN RIVER (King Co.) from Friday Creek upstream including all tributaries and their tributaries.	All species	First Sat. in June-Oct. 31	Statewide min. size/daily limit.	
SOOS CREEK (King Co.) mouth to hatchery rack	TROUT	First Sat. in June-Aug. 31	Min. size 14". Daily limit 2.	
	Other Game Fish	First Sat. in June-Aug. 31	Statewide min. size/daily limit.	

Table 66. Puyallup River Watershed - all rivers, streams and beaver ponds not listed below are closed waters.

Watershed	Species	Season	Additional Rules	Stream Strategy
PUYALLUP RIVER (Pierce Co) from 11th St. Bridge to City of Puyallup Outfall structure across the river from the junction of Freeman Rd. and N. Levee Rd.	ALL SPECIES Aug 16 - Nov 30: night closure, anti-snagging rule, and barbless hooks required			
	TROUT	Open concurrently with salmon fishery, closed Feb. 28	Min. size 14". Daily limit 2.	
	Other Game Fish	Open concurrently with salmon fishery, closed Feb. 28	Statewide min. size/daily limit	
	SALMON	Aug 16 - Aug 22	Min. size 12". Daily limit 6. Up to 4 adults may be retained, of which only 2 may be any conbination of Chinook, COHO, and CHUM. Release wild adult CHINOOK.	C
	SALMON	Aug 24 - Dec 31	Min. size 12". Daily limit 6. Up to 4 adults may be retained, of which only 2 may be any conbination of Chinook, COHO, and CHUM. Release wild adult CHINOOK.	
PUYALLUP RIVER (Pierce Co) from City of Puyallup Outfall structure across the river from the junction of Freeman Rd. and N. Levee Rd. to Carbon River.	ALL SPECIES Aug 16 - Nov 30: night closure, anti-snagging rule, and barbless hooks required			
	TROUT	Open concurrently with salmon fishery, closed Feb. 28	Min. size 14". Daily limit 2.	
	Other Game Fish	Open concurrently with salmon fishery, closed Feb. 28	Statewide min. size/daily limit	C
	SALMON	Aug 16 - Dec 31	Min. size 12". Daily limit 6. Up to 4 adults may be retained, of which only 2 may be any conbination of Chinook, COHO, and CHUM. Release wild CHINOOK.	
WHITE (STUCK) RIVER (Pierce Co) from mouth to R St. Bridge in Auburn	ALL SPECIES Oct 1 - Nov 30: night time closure and anti-snagging rule.			
	All Game Fish	Oct 1-Oct 31	Catch and release, Fly Fishing only.	
	TROUT	Nov 1-Feb 28	Min. size 14". Daily limit 2.SGR	
	Other Game Fish	Nov 1-Feb 28	Statewide min. size/daily limit. Selective Gear Rules	
WHITE (STUCK) RIVER (Pierce Co) from R St. Bridge to Hwy. 410 Bridge at Buckley	ALL SPECIES Oct 1 - Oct 31: night time closure and anti-snagging rule.			
	TROUT	Oct 1-Oct 31	Min. size 14". Daily limit 2. Selective Gear Rules	C
	Other Game Fish	Oct 1-Oct 31	Statewide min. size/daily limit. Selective Gear Rules	
WHITE (STUCK) RIVER (Pierce Co) from Weyerhaeuser 6000 Rd. Bridge (Bridge Camp) upstream	ALL SPECIES Oct 1 - Oct 31: night time closure and anti-snagging rule.			
	All Game Fish	July 1-Oct 31	Catch and Release, Selective Gear Rules	F
	Whitefish	Nov 1-Jan 31	No min. size. Daily limit 15 WHITEFISH only, Whitefish gear rules.	

Watershed	Species	Season	Additional Rules	Stream Strategy
BOISE CREEK (King Co) from Highway 410 crossing upstream	All Game Fish	1st Sat in June-Oct 31	Statewide min. size/daily limit.	A
RED CREEK (King Co)	All Game Fish	1st Sat in June-Oct 31	Statewide min. size/daily limit.	A
SCATTER CREEK (King Co) from Highway 410 crossing upstream	All Game Fish	1st Sat in June-Oct 31	Statewide min. size/daily limit.	A
LYLE CREEK (Clearwater River tributary) (Pierce Co)	All Game Fish	1st Sat in June-Oct 31	Statewide min. size/daily limit.	A
GREENWATER RIVER (King/Pierce Co) from mouth to Greenwater lakes	Whitefish	Nov 1-Jan 31	No min. size. Daily limit 15 WHITEFISH only, Whitefish gear rules.	
GREENWATER RIVER (King/Pierce Co) from Greenwater lakes upstream	All Game Fish	1st Sat in June-Oct 31	Statewide min. size/daily limit.	A
PYRAMID CREEK (King Co) from Forest Service Rd. 7000 upstream	All Game Fish	1st Sat in June-Oct 31	Statewide min. size/daily limit.	A
PUYALLUP RIVER (Pierce Co) from Carbon River upstream	All Game Fish	Sept 1-Feb 28	Catch and release except up to 2 hatchery STEELHEAD may be retained. Selective Gear Rules	
FISKE and FOX CREEKS (Pierce Co) from Fisk Rd. E upstream	All Game Fish	1st Sat in June-Oct 31	Statewide min. size/daily limit.	A
KINGS CREEK (Pierce Co) from mouth upstream	All Game Fish	1st Sat in June-Oct 31	Statewide min. size/daily limit.	A
CARBON RIVER(Pierce Co) from mouth to Voights Creek	ALL SPECIES Sept 1 - Nov 30: night closure, anti-snagging rule, and barbless hooks required.			E
	TROUT	Sept 1-Nov 30	Min. size 14". Daily limit 2.	
	Other Game Fish	Sept 1-Nov 30	Statewide min. size/daily limit	
	All Game Fish	Dec 1-Feb 28	Catch and release except up to 2 hatchery STEELHEAD may be retained. Selective Gear Rules	
	SALMON	Sept 1-Nov. 30	Min. size 12". Daily limit 6. Up to 4 adults may be retained. Up to 2 may be adult hatchery Chinook. Release wild adult CHINOOK and CHUM.	
CARBON RIVER (Pierce Co) from Voights Creek to Hwy 162 Bridge	All Game Fish	Nov 1-Feb 28	Catch and release except up to 2 hatchery STEELHEAD may be retained. Selective Gear Rules	E
VOIGHTS CREEK (Pierce Co) from falls under power line upstream	All Game Fish	1st Sat in June-Oct 31	Statewide min. size/daily limit.	A
SOUTH PRAIRIE CREEK (Pierce Co) from City of Buckley diversion dam upstream	All Game Fish	1st Sat in June-Oct 31	Statewide min. size/daily limit.	A
WILKESON CREEK (Pierce Co) from confluence with Gale Creek upstream.	All Game Fish	1st Sat in June-Oct 31	Statewide min. size/daily limit.	A

Watershed	Species	Season	Additional Rules	Stream Strategy
GALE CREEK (Pierce Co) from confluence with Wilkeson Creek upstream	All Game Fish	1st Sat in June-Oct 31	Statewide min. size/daily limit.	A
BEAVER AND NEW POND CREEKS (Pierce Co)	All Game Fish	1st Sat in June-Oct 31	Statewide min. size/daily limit.	A
EVANS CREEK (Pierce Co) (Carbon River tributary) from Carbon River-Fairfax Rd. upstream	All Game Fish	1st Sat in June-Oct 31	Statewide min. size/daily limit.	A
CAYADA CREEK (Pierce Co) (Carbon River tributary)	All Game Fish	1st Sat in June-Oct 31	Statewide min. size/daily limit.	A

Table 67. Nisqually River Watershed - all rivers, streams and beaver ponds not listed below are closed waters.

Waterbody	Species	Season	Additional Rules	Stream Strategy
NISQUALLY RIVER (Pierce Co.) from mouth to the military tank crossing bridge (located one mile upstream of mouth of Muck Creek)	TROUT	July 1-Nov. 30	Min. size 14". Daily limit 2.	C
	Other Game Fish	July 1-Nov. 30	Statewide min. size/daily limit.	
	SALMON	July 1-Jan. 31	Min. size 12". Daily limit 6. Up to 3 adults may be retained, of which only 2 may be any combination of PINK, COHO and CHUM. Release wild adult CHINOOK.	
NISQUALLY RIVER (Pierce Co.) from the military tank crossing bridge (located one mile upstream of mouth of Muck Creek) to 400' below LaGrande Powerhouse	ALL SPECIES - Aug. 1-Oct. 31: night closure and anti-snagging rule.			
	All Game Fish	July 1-Oct. 31	Catch-and-release except up to 2 hatchery STEELHEAD may be retained. Selective gear rules.	E
TANWAX CREEK (Thurston Co.)	All Game Fish	First Sat. in June-Oct. 31	Catch-and-release. Selective gear rules.	F
OHOP CREEK (Pierce Co.)	All Game Fish	July 1-Oct. 31	Catch-and-release except up to 2 hatchery STEELHEAD may be retained. Selective gear rules.	E
NISQUALLY RIVER (Pierce Co.) From Alder Reservoir upstream	Trout	July 1-Oct. 31	Min. size 8". Daily limit 2, selective gear rules.	B
	Other Game Fish	July 1-Oct. 31	Statewide min. size/daily limit. Selective gear rules.	
MINERAL CREEK (Lewis Co.)	Trout	First Sat. in June-Oct. 31	Min. size 12". Daily limit 2. Selective gear rules.	
	Other Game Fish	First Sat. in June-Oct. 31	Statewide min. size/daily limit. Selective gear rules	
LITTLE NISQUALLY RIVER (Lewis Co.)	TROUT	First Sat. in June-Oct. 31	Min. size 10". Daily limit 2, selective gear rules.	
	Other Game Fish	First Sat. in June-Oct. 31	Statewide min. size/daily limit. Selective gear rules	
MCALLISTER CREEK (Thurston Co.)	TROUT	First Sat. in June-Oct. 31	Min. size 14". Daily limit 2. Selective gear rules.	C
	Other Game Fish	First Sat. in June-Oct. 31	Statewide min. size/daily limit. Selective gear rules.	
EATON CREEK (Thurston Co). Lake St. Clair Tributary.	All Game Fish	First Sat. in June-Oct. 31	Statewide min. size/daily limit. Selective gear rules.	B

Table 68. East Kitsap Independent Streams - all rivers, streams and beaver ponds not listed below are closed waters.

Waterbody	Species	Season	Additional Rules	Stream Strategy
CHAMBERS CREEK (Pierce Co.) from mouth (Burlington Northern RR Bridge) to markers 400' below the Boise-Cascade Dam (near West Tacoma Mill)	Marine Area 13 rules apply downstream of the Burlington Northern RR Bridge. ALL SPECIES - night closure and anti-snagging rule			C
	TROUT	July 1-Nov 15	Min. size 14". Daily limit 2.	
	Other Game Fish	July 1-Nov 15	Statewide min. size/daily limit	
	SALMON	July 1-Nov 15	Min. size 12". Daily limit 6. Up to 2 adults may be retained. Release wild COHO.	
CHAMBERS CREEK (Pierce Co.) from Boise-Cascade Dam to Steilacoom Lake	ALL SPECIES - night closure and anti-snagging rule.			D
	TROUT	July 1-Oct 31	Min. size 14". Daily limit 2. Selective gear rules	
	Other Game Fish	July 1-Oct 31	Statewide min. size/daily limit. Selective gear rules	
CLOVER CREEK (Pierce Co.) from Steilacoom Lake upstream and all tributaries	All Game Fish	July 1-Oct 31	Statewide min.size/daily limit.	A
MINTER CREEK (Kitsap/Pierce Co.) from mouth to hatchery rack	Salmon	Nov 1-Dec 31	Min size 12". Daily limit 4 CHUM only. Open only from mouth to fishing boundary markers located approximately 50' downstream of hatchery rack. Night closure.	
NORTH KITSAP STREAMS (Illahee, Steele, Little Scandia, Big Scandia, Dogfish, Groves, and Eglon creeks, and all streams on Bainbridge Island) (Kitsap Co.)	TROUT	1st Sat in June-Oct 31	Min. size 14". Daily limit 2. Selective gear rules	D
	Other Game Fish	1st Sat in June-Oct 31	Statewide min. size/daily limit. Selective Gear Rules	
DYES INLET FRESHWATER STREAMS (Baker, Clear, and Kitsap creeks) (Kitsap Co.)	TROUT	1st Sat in June-Oct 31	Min. size 14". Daily limit 2. Selective gear rules	D
	Other Game Fish	1st Sat in June-Oct 31	Statewide min. size/daily limit. Selective Gear Rules	
EAST KITSAP FRESHWATER STREAMS (Olalla, Crescent, Blackjack, and Salmonberry creeks) (Kitsap Co.)	TROUT	1st Sat in June-Oct 31	Min. size 14". Daily limit 2. Selective gear rules	D
	Other Game Fish	1st Sat in June-Oct 31	Statewide min. size/daily limit. Selective Gear Rules	
BURLEY CREEK (Kitsap Co.)	TROUT	1st Sat in June-Oct 31	Min. size 14". Daily limit 2. Selective gear rules	D
	Other Game Fish	1st Sat in June-Oct 31	Statewide min. size/daily limit. Selective Gear Rules	

Table 69. Deep South Sound Streams - all rivers, streams and beaver ponds not listed below are closed waters.

Waterbody	Species	Season	Additional Rules	Stream Strategy
WOODLAND CREEK (Thurston Co)	Trout	First Sat. in June-Oct. 31	Min. size 14". Daily limit 2. Selective gear rules.	D
	Other Game Fish	First Sat. in June-Oct. 31	Statewide min. size/daily limit. Selective Gear Rules	
WOODARD CREEK (Thurston Co)	Trout	First Sat. in June-Oct. 31	Min. size 14". Daily limit 2. Selective gear rules.	D
	Other Game Fish	First Sat. in June-Oct. 31	Statewide min. size/daily limit. Selective Gear Rules	
PERCIVAL CREEK (Thurston Co.)	Trout	First Sat. in June-Oct. 31	Min. size 14". Daily limit 2. Selective gear rules.	D
	Other Game Fish	First Sat. in June-Oct. 31	Statewide min. size/daily limit. Selective Gear Rules	
BLACK LAKE DITCH (Thurston Co.) From the confluence with Percival Creek upsteam to Black Lake.	Trout	First Sat. in June-Oct. 31	Min. size 14". Daily limit 2. Selective gear rules.	D
	Other Game Fish	First Sat. in June-Oct. 31	Statewide min. size/daily limit. Selective Gear Rules	
DESCHUTES RIVER (Thurston Co.) From the Old Hwy. 99 Bridge on Capitol Blvd. in Tumwater upstream to the Henderson Blvd. Bridge near Pioneer Park (728)	TROUT	First Sat. in June-Oct. 15	Catch and release. Selective gear rules. Bait allowed Sept 1-Oct. 15th.	F
	Other Game Fish	First Sat. in June-Oct. 15	Statewide min. size/daily limit. Selective Gear Rules. Bait Allowed Sept 1-Oct 15th.	
	SALMON	July 1-Oct. 15	Min. size 12". Daily limit 6. Up to 2 adults may be retained. Release COHO. Selective gear rules except bait allowed Sept 1-Oct 15th.	
DESCHUTES RIVER (Thurston Co.) from the Henderson Blvd. Bridge near Pioneer Park upstream	TROUT	Year-round	Catch-and-release. Selective gear rules.	F
	Other Game Fish	Year-round	Statewide min. size/daily limit. Selective Gear Rules.	
	SALMON	July 1-Oct. 15	Min. size 12". Daily limit 6. Up to 2 adults may be retained. Release wild coho. Selective gear rules.	
MCLANE CREEK (Thurston Co.)	August 2 - October 31 - night closure.			D
	Trout	First Sat. in June-Oct. 31	Min. size 14". Daily limit 2. Selective gear rules.	
	Other Game Fish	First Sat. in June-Oct. 31	Statewide min. size/daily limit. Selective Gear Rules	
PERRY CREEK (Thruston Co.) from mouth to falls	Trout	First Sat. in June-Oct. 31	Min. size 14". Daily limit 2. Selective gear rules.	D
	Other Game Fish	First Sat. in June-Oct. 31	Statewide min. size/daily limit. Selective Gear Rules	
SCHNEIDER CREEK (Thurston Co.)	Trout	First Sat. in June-Oct. 31	Min. size 14". Daily limit 2. Selective gear rules.	D
	Other Game Fish	First Sat. in June-Oct. 31	Statewide min. size/daily limit. Selective Gear Rules	
KENNEDY CREEK (Thurston Co.) from mouth (500 yards east of the northbound Hwy. 101 Bridge) to northbound Hwy. Bridge	ALL SPECIES - Oct 1 - Dec 31: night closure and anti-snagging rule.			D
	Trout	First Sat. in June-Oct. 31	Min. size 14". Daily limit 2. Selective gear rules.	
	Other Game Fish	First Sat. in June-Oct. 31	Statewide min. size/daily limit. Selective Gear Rules	
	SALMON	Oct. 1-Nov. 30	Min. size 12". Daily limit 6. Up to 2 adults may be retained. Release wild coho. Selective gear rules.	

Waterbody	Species	Season	Additional Rules	Stream Strategy
KENNEDY CREEK (Thurston Co.) from mouth, upsteam to the Kennedy Creek Falls (RM 2.3).	ALL SPECIES - Oct 1 - Dec 31: night closure.			D
	Trout	First Sat. in June-Oct. 31	Min. size 14". Daily limit 2. Selective gear rules.	
	Other Game Fish	First Sat. in June-Oct. 31	Statewide min. size/daily limit. Selective Gear Rules	
KENNEDY CREEK (Thurston Co.) from fall upstream	Trout	First Sat. in June-Oct. 31	Min. size 8". Daily limit 2. Selective gear rules.	B
	Other Game Fish	First Sat. in June-Oct. 31	Statewide min. size/daily limit.	
SKOOKUM CREEK (Mason Co.)	Trout	First Sat. in June-Oct. 31	Catch and release. Selective gear rules.	F
	Other Game Fish	First Sat. in June-Oct. 31	Statewide min. size/daily limit. Selective Gear Rules	
MILL CREEK (Mason Co.)	Trout	First Sat. in June-Oct. 31	Min. size 14". Daily limit 2. Selective gear rules.	D
	Other Game Fish	First Sat. in June-Oct. 31	Statewide min. size/daily limit. Selective Gear Rules	
SHELTON CREEK (Mason Co.)	Trout	First Sat. in June-Oct. 31	Catch and release. Selective gear rules.	F
	Other Game Fish	First Sat. in June-Oct. 31	Statewide min. size/daily limit. Selective Gear Rules	
GOLDSBOROUGH CREEK (Mason Co.)	Trout	First Sat. in June-Oct. 31	Catch and release. Selective gear rules.	F
	Other Game Fish	First Sat. in June-Oct. 31	Statewide min. size/daily limit. Selective Gear Rules	
JOHNS CREEK (Mason Co.)	Trout	First Sat. in June-Oct. 31	Catch and release. Selective gear rules.	F
	Other Game Fish	First Sat. in June-Oct. 31	Statewide min. size/daily limit. Selective Gear Rules	
CRANBERRY CREEK (Mason Co.)	Trout	First Sat. in June-Oct. 31	Catch and release. Selective gear rules.	F
	Other Game Fish	First Sat. in June-Oct. 31	Statewide min. size/daily limit. Selective Gear Rules	
DEER CREEK (Mason Co.)	Trout	First Sat. in June-Oct. 31	Catch and release. Selective gear rules.	F
	Other Game Fish	First Sat. in June-Oct. 31	Statewide min. size/daily limit. Selective Gear Rules	
MALANEY CREEK (Mason Co.)	Trout	First Sat. in June-Oct. 31	Catch and release. Selective gear rules.	F
	Other Game Fish	First Sat. in June-Oct. 31	Statewide min. size/daily limit. Selective Gear Rules	
UNCLE JOHN CREEK (Mason Co.)	Trout	First Sat. in June-Oct. 31	Catch and release. Selective gear rules.	F
	Other Game Fish	First Sat. in June-Oct. 31	Statewide min. size/daily limit. Selective Gear Rules	
CAMPBELL CREEK (Mason Co.)	Trout	First Sat. in June-Oct. 31	Catch and release. Selective gear rules.	F
	Other Game Fish	First Sat. in June-Oct. 31	Statewide min. size/daily limit. Selective Gear Rules	
SHERWOOD (Mason Co.)	Trout	First Sat. in June-Oct. 31	Catch and release. Selective gear rules.	F
	Other Game Fish	First Sat. in June-Oct. 31	Statewide min. size/daily limit. Selective Gear Rules	
COULTER CREEK (Kitsap/Mason Co.)	Trout	First Sat. in June-Oct. 31	Catch and release. Selective gear rules.	F
	Other Game Fish	First Sat. in June-Oct. 31	Statewide min. size/daily limit. Selective Gear Rules	
ROCKY CREEK (Pierce/Kitsap Co.)	Trout	First Sat. in June-Oct. 31	Catch and release. Selective gear rules.	F
	Other Game Fish	First Sat. in June-Oct. 31	Statewide min. size/daily limit. Selective Gear Rules	

Table 70. Hood Canal Watershed - all rivers, streams, and beaver ponds not listed below are closed waters.

Waterbody	Species	Season	Additional Rules	Stream Strategy
ANDERSON CREEK (Kitsap Co.)	All Game Fish	First Sat. in June-Oct. 31	Catch-and-release. Selective gear rules.	F
BEAVER PONDS In Kitsap Co and ponds in Mason Co. on Tahuya Peninsula west of Hwy 3	TROUT	Last Sat. in Apr-Oct. 31	No. min. size. Daily limit 2.	- -
	Other Game Fish	Last Sat. in Apr-Oct. 31	Statewide min. size/daily limit.	
BEAVER PONDS In Kitsap Co and Mason Co. east of Hwy 3	TROUT	First Sat. in June-Oct. 31	No. min. size. Daily limit 2.	- -
	Other Game Fish	First Sat. in June-Oct. 31	Statewide min. size/daily limit.	
BIG BEEF CREEK (Kitsap Co.) from Seabeck Hwy. Bridge to Lake Symington	CLOSED WATERS - Aug. 1-Aug. 31: within 100' of the Seabeck Hwy. NW Big Beef Creek Bridge.			
	All Game Fish	First Sat. in June-Aug. 31	Catch-and-release. Selective gear rules.	F
BIG BEEF CREEK (Kitsap Co.) from Lake Symington upstream	TROUT	First Sat. in June-Oct. 31	Catch-and-release. Selective gear rules.	F
	All other game fish	First Sat. in June-Oct. 31	Statewide minimum size/daily limit. Selective gear rules.	- -
BIG MISSION CREEK (Mason Co.)	All Game Fish	First Sat. in June-Oct. 31	Catch-and-release. Selective gear rules.	F
DEWATTO RIVER (Mason Co.) from mouth to Dewatto-Holly Rd. Bridge	ALL SPECIES - Sept. 16-Oct. 31: night closure.			
	All Game Fish	First Sat. in June-Oct. 31	Catch-and-release. Selective gear rules.	F
	SALMON	Sept. 16-Oct. 31	Min. size 12". Daily limit 2 COHO only. Selective gear rules.	- -
DEWATTO RIVER (Mason Co.) from Dewatto-Holly Rd. Bridge upstream	All Game Fish	First Sat. in June-Oct. 31	Catch-and-release. Selective gear rules.	F
DONOVAN CREEK (Jefferson Co.)	All Game Fish	First Sat. in June-Oct. 31	Catch-and-release. Selective gear rules.	F
DOSEWALLIPS RIVER (Jefferson Co.) from mouth to Hwy. 101 Bridge	All Game Fish	First Sat. in June-Aug. 31	Catch-and-release. Selective gear rules.	F
	SALMON	Nov. 1-Dec. 15	Min. size 12". Daily limit 2 CHUM only.	- -
DOSEWALLIPS RIVER (Jefferson Co.) from Hwy. 101 Bridge to the Olympic National Park boundary about ¾ mile downstream of falls	All Game Fish	First Sat. in June-Aug. 31	Catch-and-release. Selective gear rules.	F
ROCKY BROOK CREEK (Jefferson Co.) from mouth 1000' upstream to falls	CLOSED WATERS			
ROCKY BROOK CREEK (Jefferson Co.) from falls upstream	All Game Fish	First Sat. in June-Oct. 31	Minimum size 8", daily limit 2.	A
DUCKABUSH RIVER (Jefferson Co.) from mouth to Mason Co. PUD #1 overhead electrical distribution line	All Game Fish	First Sat. in June-Aug. 31	Catch-and-release. Selective gear rules.	F
	SALMON	Nov. 1-Dec. 15	Min. size 12". Daily limit 2 CHUM only.	- -

Waterbody	Species	Season	Additional Rules	Stream Strategy
DUCKABUSH RIVER (Jefferson Co.) from Mason Co. PUD #1 overhead electrical distribution line to the Olympic National Park boundary	All Game Fish	First Sat. in June-Aug. 31	Catch-and-release. Selective gear rules.	F
FULTON CREEK (Mason Co.) from mouth to falls	All Game Fish	First Sat. in June-Oct. 31	Catch-and-release. Selective gear rules.	F
FULTON CREEK (Mason Co.) upstream of falls at river mile 0.8	All Game Fish	First Sat. in June-Oct. 31	Minimum size 8", daily limit 2.	A
GAMBLE CREEK (Kitsap Co.)	All Game Fish	First Sat. in June-Oct. 31	Catch-and-release. Selective gear rules.	F
HAMMA HAMMA RIVER (Mason Co.) from mouth to 400' below falls	All Game Fish	First Sat. in June-Aug. 31	Catch-and-release. Selective gear rules.	F
HAMMA HAMMA RIVER (Mason Co.) from falls upstream	All Game Fish	First Sat. in June-Oct. 31	Minimum size 8", daily limit 2.	A
JEFFERSON, LENA AND WASHINGTON CREEKS (Mason Co.)	All Game Fish	First Sat. in June-Oct. 31	Minimum size 8", daily limit 2.	A
JORSTED CREEK (Mason Co.)	All Game Fish	First Sat. in June-Oct. 31	Catch-and-release. Selective gear rules.	F
LILLIWAUP RIVER (Mason Co.) from mouth to 200' below falls	All Game Fish	First Sat. in June-Aug. 31	Catch-and-release. Selective gear rules.	F
LILLIWAUP RIVER (Mason Co.) from falls upstream	All Game Fish	First Sat. in June-Oct. 31	Minimum size 8", daily limit 2.	A
LITTLE MISSION CREEK (Mason Co.) from falls upstream	All Game Fish	First Sat. in June - Oct. 31	Catch-and-release. Selective gear rules.	F
LITTLE QUILCENE RIVER (Jefferson Co.) from mouth to the Little Quilcene River Bridge on Penny Creek Rd.	CLOSED WATERS - Sept. 1-Oct. 31: mouth to Hwy. 101 Bridge.			
	All Game Fish	First Sat. in June-Oct. 31	Catch-and-release. Selective gear rules.	F
LITTLE QUILCENE RIVER (Jefferson Co.) from Little Quilcene River Bridge on Penny Creek Rd. upstream	All Game Fish	First Sat. in June-Oct. 31	Minimum size 8", daily limit 2.	A
LELAND, RIPLEY, AND HOWE CREEKS (Jefferson Co.)	All Game Fish	First Sat. in June-Oct. 31	Catch-and-release. Selective gear rules.	F
LUDLOW CREEK (Jefferson Co.)	All Game Fish	First Sat. in June-Oct. 31	Catch-and-release. Selective gear rules.	F
QUILCENE RIVER (Jefferson Co.) from mouth to Rodgers St.	All Game Fish	First Sat. in June-Aug. 15	Catch-and-release. Selective gear rules.	F

Waterbody	Species	Season	Additional Rules	Stream Strategy
QUILCENE RIVER (Jefferson Co.) from Rodgers St. to electric weir at Quilcene National Fish Hatchery	WDFW access easement is from Hwy. 101 Bridge downstream approximately 1 mile on north side of river only. CLOSED WATERS - from Hwy. 101 Bridge to electric weir at Quilcene National Fish Hatchery. ALL SPECIES - First Sat. in June-Aug. 15: selective gear rules. Aug. 16-Oct. 31: night closure and only 1 single-point barbless hook may be used.			
	All Game Fish	First Sat. in June-Oct. 31	Catch-and-release.	F
	SALMON	Aug. 16-Oct. 31	Min. size 12". Daily limit 4 COHO only. Only fish hooked inside the mouth may be retained.	- -
QUILCENE RIVER (Jefferson Co.) from electric weir at Quilcene National Fish Hatchery to upper boundary of Falls View Campground	All Game Fish	First Sat. in June-Oct. 31	Catch-and-release. Selective gear rules.	F
QUILCENE RIVER (Jefferson Co.) from upper boundary of Falls View Campground upstream	All Game Fish	First Sat. in June-Oct. 31	Minimum size 8", daily limit 2.	A
PENNY CREEK (Jefferson Co.)	All Game Fish	First Sat. in June-Oct. 31	Minimum size 8", daily limit 2.	A
RENDSLAND Creek (Mason Co.)	All Game Fish	First Sat. in June-Oct. 31	Catch-and-release. Selective gear rules.	F
SHINE CREEK (Jefferson Co.)	All Game Fish	First Sat. in June-Oct. 31	Catch-and-release. Selective gear rules.	F
SKOKOMISH RIVER (Mason Co.) from mouth to Hwy. 101 Bridge	ALL SPECIES - Aug. 1-Nov. 30: night closure, anti-snagging rule, and barbless hooks required. Aug. 1-Dec. 15: terminal gear (hooks, weights, lures, or baits) and line must not be within 25' of tribal gillnets.			
	All Game Fish	First Sat. in June-July 31	Catch-and-release.	F
	All Game Fish	Oct. 1-Dec. 15	Catch-and-release.	F
	SALMON	Aug. 1-Sept. 30	Min. size 12". Daily limit 1. Release CHUM	- -
	SALMON	Oct. 1-Dec. 15	Min. size 12". Daily limit 6. Up to 4 adults may be retained. Release CHINOOK. Oct. 1-Oct. 15: release CHUM	- -
SKOKOMISH RIVER (Mason Co.) from Hwy. 101 Bridge to forks	All Game Fish	First Sat. in June-Oct. 31	Catch-and-release. Selective gear rules.	F
PURDY CREEK (Mason Co.)	All Game Fish	First Sat. in June-July 31	Catch-and-release. Selective gear rules.	F
SKOKOMISH RIVER, NORTH FORK (Mason Co.) from mouth to lower dam	All Game Fish	First Sat. in June-Oct. 31	Catch-and-release. Selective gear rules.	F
SKOKOMISH RIVER, NORTH FORK (Mason Co.) North Fork above Lake Cushman to Olympic National Park boundary	All Game Fish	First Sat. in June-Aug. 31	Catch-and-release. Selective gear rules.	F

Waterbody	Species	Season	Additional Rules	Stream Strategy
SKOKOMISH RIVER, SOUTH FORK (Mason Co.) from mouth to LeBar Creek	All Game Fish	First Sat. in June-Oct. 31	Catch and release. Selective gear rules.	F
SKOKOMISH RIVER, SOUTH FORK (Mason Co.) from LeBar Creek to Rule Creek.	CLOSED WATERS			
SKOKOMISH RIVER, SOUTH FORK (Mason Co.) from Rule Creek upstream	Trout	First Sat. in June-Oct. 31	Minimum size 12", daily limit 2.	C
	Other Game Fish	First Sat. in June-Oct. 31	Statewide min. size/limit. Selective gear rules.	- -
LEBAR CREEK (Mason Co.) upstream of falls at river mile 1	All Game Fish	First Sat. in June-Oct. 31	Minimum size 8", daily limit 2.	A
CEDAR AND PINE CREEKS (Mason Co.)	All Game Fish	First Sat. in June-Oct. 31	Minimum size 8", daily limit 2.	A
CHURCH CREEK (MASON CO.) upstream of bridge on USFS road #2361	All Game Fish	First Sat. in June-Oct. 31	Minimum size 8", daily limit 2.	A
STIMSON CREEK (Mason Co.)	All Game Fish	First Sat. in June-Oct. 31	Catch-and-release. Selective gear rules.	F
TAHUYA RIVER (Mason Co.) from mouth to marker approximately 1 mile above North Shore Rd. Bridge	ALL SPECIES - First Sat. in June-Oct. 31: selective gear rules. Sept. 16-Oct. 31: night closure.			F
	All Game Fish	First Sat. in June-Oct. 31	Catch-and-release.	
	SALMON	Sept. 16-Oct. 31	Min. size 12". Daily limit 2 COHO only.	
TAHUYA RIVER (Mason Co.) from marker approximately 1 mile above North Shore Rd. Bridge to Belfair-Tahuya Rd. Bridge	All Game Fish	First Sat. in June-Oct. 31	Catch-and-release. Selective gear rules.	F
TAHUYA RIVER (Mason Co.) from Belfair-Tahuya Rd. Bridge upstream	All Game Fish	First Sat. in June-Oct. 31	Catch-and-release. Selective gear rules.	F
TARBOO CREEK (Jefferson Co.)	All Game Fish	First Sat. in June-Oct. 31	Catch-and-release. Selective gear rules.	F
THORNDYKE CREEK (Jefferson Co.)	All Game Fish	First Sat. in June-Oct. 31	Catch-and-release. Selective gear rules.	F
UNION RIVER (Mason Co.) from mouth to North Shore Rd. Bridge	All Game Fish	First Sat. in June-Aug. 15	Catch-and-release.	- -
	STURGEON	First Sat. in June-Aug. 15	Min. size 38" fork length. Max. size 54" fork length. Daily limit 1.	
UNION RIVER (Mason Co.) from North Shore Rd. Bridge to the lower bridge on the Old Belfair Hwy.	All Game Fish	First Sat. in June-Aug. 15	Catch-and-release. Selective gear rules.	F
UNION RIVER (Mason Co.) from lower bridge on the Old Belfair Hwy. upstream	CLOSED WATERS - from watershed boundary upstream (including all tributaries).			
	All Game Fish	First Sat. in June-Oct. 31	Catch-and-release. Selective gear rules.	F

Table 71. Strait Of Juan De Fuca - all rivers, streams and beaver ponds not listed below are closed waters.

Waterbody	Species	Season	Additional Rules	Stream Strategy
CHIMACUM CREEK (Jefferson Co.) from mouth to Ness's Corner Rd.	All Game Fish	First Sat. in June-Aug. 31	Catch-and-release. Selective gear rules.	F
CHIMACUM CREEK (Jefferson Co.) from Ness's Corner Rd. upstream, including all forks	All Game Fish	First Sat. in June-Oct. 31	Catch-and-release. Selective gear rules.	F
JIMMYCOMELATELY CREEK (Clallam Co.) from mouth to confluence with East Fork	All Game Fish	First Sat. in June-Aug. 31	Catch-and-release. Selective gear rules.	F
JIMMYCOMELATELY CREEK (Clallam Co.) from confluence with East Fork upstream, including East Fork	All Game Fish	First Sat. in June-Oct. 31	Statewide min. size/daily limit.	A
DUNGENESS RIVER (Clallam Co.) (738) from mouth to hatchery intake pipe at river mile 11.3	TROUT	Oct. 16-Feb. 28	Min. size 14". Daily limit 2.	C
	Other Game Fish	Oct. 16-Feb. 28	Statewide min. size/daily limit.	
	SALMON	Oct. 16-Dec. 31	Min. size 12". Daily limit 4 COHO only.	
DUNGENESS RIVER (Clallam Co.) from the hatchery intake pipe at river mile 11.3 to the forks at Dungeness Forks Campground	TROUT	Oct. 16-Feb. 28	Min. size 14". Daily limit 2.	C
	Other Game Fish	Oct. 16-Feb. 28	Statewide min. size/daily limit.	
DUNGENESS RIVER (Clallam Co.) from the forks at Dungeness Campground to Gold Creek	CLOSED WATERS			
DUNGENESS RIVER (Clallam Co.) from Gold Creek upstream	All Game Fish	First Sat. in June-Oct. 31	Statewide min. size/daily limit.	A
GRAY WOLF RIVER (Clallam Co.) from mouth at Dungeness Forks Campground upstream to bridge at river mile 1.	CLOSED WATERS			
GRAY WOLF RIVER (Clallam Co.) from bridge at river mile 1 upstream	All Game Fish	First Sat. in June-Oct. 31	Catch and Release. Selective gear rules.	F
MCDONALD CREEK (Clallam Co.)	All Game Fish	First Sat. in June-Oct. 31	Catch and Release. Selective gear rules.	F
SIEBERT CREEK (Clallam Co.)	All Game Fish	First Sat. in June-Oct. 31	Catch and Release. Selective gear rules.	F
MORSE CREEK (Clallam Co.) -782 from mouth to Port Angeles Dam	TROUT	Dec. 1-Feb. 28	Min. size 14". Daily limit 2.	C
	Other Game Fish	Dec. 1-Feb. 28	Statewide min. size/daily limit.	
MORSE CREEK (Clallam Co.) from Port Angeles Dam upstream	All Game Fish	First Sat. in June-Oct. 31	Statewide min. size/daily limit.	A
PEABODY CREEK (Clallam Co.)	Juvenile anglers only (under 15 years old).			
	All Game Fish	First Sat. in June-Oct. 31	Statewide min.size/daily limit	

Waterbody	Species	Season	Additional Rules	Stream Strategy
VALLEY CREEK (Clallam Co.)	Juvenile anglers only (under 15 years old).			
	All Game Fish	First Sat. in June-Oct. 31	Statewide min.size/daily limit	
ELWHA RIVER (Clallam Co.) -742 from mouth to Aldwell Lake Dam	CLOSED WATERS - from 200' downstream of the south spillway on Aldwell Lake Dam to Aldwell Dam. ALL SPECIES - fishing from any floating device prohibited.			C
	TROUT	Oct. 1-Feb. 28	Min. size 14". Daily limit 2.	
ELWHA RIVER (Clallam Co.) -742 from mouth to Aldwell Lake Dam	Other Game Fish	Oct. 1-Feb. 28	Statewide min. size/daily limit.	
	SALMON	Oct. 1-Nov. 15	Min. size 12". Daily limit 6 COHO only. Up to 4 adults may be retained.	
ELWHA RIVER (Clallam Co.) from Lake Aldwell upstream including all tributaries except Indian Creek up to the Olympic National Park boundary	TROUT	First Sat. in June-Oct. 31	Min. size 12". Daily limit 2. Selective Gear Rules.	D
	Other Game Fish	First Sat. in June-Oct. 31	Statewide min. size/daily limit. Selective Gear Rules.	
INDIAN CREEK (Clallam Co.) from mouth to first Hwy. 101 crossing) (trib. to Elwha River)	TROUT	First Sat. in June-Oct. 31	Min. size 12". Daily limit 2. Selective gear rules.	D
	Other Game Fish	First Sat. in June-Oct. 31	Statewide min. size/daily limit. Selective gear rules.	
SALT CREEK (Clallam Co.) -814 from mouth to bridge on Highway 112	All Game Fish	First Sat. in June-Oct. 31	Catch-and-release. Selective gear rules.	F
	All Game Fish	Nov. 1 to Feb. 28	Catch-and-release except up to 2 hatchery STEELHEAD may be retained. Selective Gear Rules.	E
LYRE RIVER (Clallam Co.) (768) from mouth to falls near river mile 3	TROUT	First Sat. in June-Feb. 28	Min. size 14". Daily limit 2.	C
	Other Game Fish	First Sat. in June-Feb. 28	Statewide min. size/daily limit.	
LYRE RIVER (Clallam Co.) from falls near river mile 3 upstream	All Game Fish	First Sat. in June-Oct. 31	Catch-and-release. Selective gear rules.	F
EAST TWIN RIVER (Clallam Co.) -740	All Game Fish	First Sat. in June-Oct. 31	Catch-and-release. Selective gear rules.	F
WEST TWIN RIVER (Clallam Co.) -882	All Game Fish	First Sat. in June-Oct. 31	Catch-and-release. Selective gear rules.	F
DEEP CREEK (Clallam Co.) -726	All Game Fish	Dec. 1-Feb. 28	Catch-and-release except up to 2 hatchery STEELHEAD may be retained. Selective Gear Rules.	E
PYSHT RIVER (Clallam Co.) 810	~~Wild STEELHEAD retention allowed Dec. 1-Feb. 28. See Wild STEELHEAD RETENTION RULES, page 31.~~			
	All Game Fish	First Sat. in June-Oct. 31	Catch-and-release. Selective gear rules.	F
	TROUT	Nov. 1 to Feb. 28	Min. size 14". Daily limit 2.	C
	Other Game Fish	Nov. 1 to Feb. 28	Statewide min. size/daily limit.	
CLALLAM RIVER (Clallam Co.) -718	All Game Fish	First Sat. in June-Oct. 31	Catch-and-release. Selective gear rules.	F
	TROUT	Nov. 1 to Feb. 28	Min. size 14". Daily limit 2.	C
	Other Game Fish	Nov. 1 to Feb. 28	Statewide min. size/daily limit.	

Waterbody	Species	Season	Additional Rules	Stream Strategy
HOKO RIVER (Clallam Co.) -752 from mouth to cement bridge on Lake Ozette Hwy. (upper Hoko Bridge)	ALL SPECIES	Sept. 1-Oct. 31	fly fishing only.	C
	~~Wild STEELHEAD retention allowed Dec. 1-Mar. 15. See Wild STEELHEAD RETENTION RULES, page 31.~~			
	TROUT	First Sat. in June-Mar. 15	Min. size 14". Daily limit 2.	
	Other Game Fish	First Sat. in June-Mar. 15	Statewide min. size/daily limit.	
HOKO RIVER (Clallam Co.) from upper Hoko Bridge to Ellis Creek Bridge (river mile 18.5)	All Game Fish	First Sat. in June-Mar. 31	Catch-and-release except up to 2 hatchery STEELHEAD may be retained. Fly fishing only.	E
LITTLE HOKO RIVER (Clallam Co.)	All Game Fish	First Sat. in June-Oct. 31	Catch-and-release. Selective gear rules.	F
SEKIU RIVER (Clallam Co.)(818) from mouth to forks	All Game Fish	First Sat. in June-Oct. 31	Catch-and-release. Selective gear rules.	F
	TROUT	Nov. 1 to Feb. 28	Min. size 14". Daily limit 2.	C
	Other Game Fish	Nov. 1 to Feb. 28	Statewide min. size/daily limit.	
SEKIU RIVER (Clallam Co.) from forks upstream	All Game Fish	First Sat. in June-Oct. 31	Catch and Release. Selective Gear Rules.	F