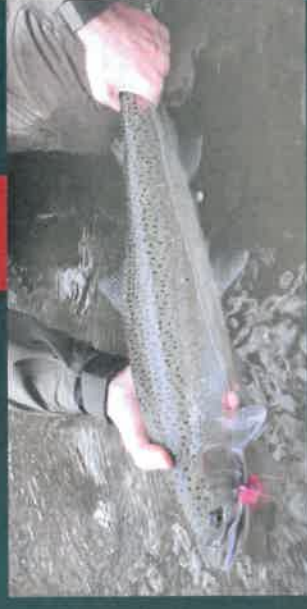


Northern Puget Sound Steelhead Hatchery Options

HATCHERY EVALUATION AND ASSESSMENT TEAM
WASHINGTON DEPARTMENT OF FISH AND WILDLIFE
JUNE 27TH 2018



Hatchery Options being considered



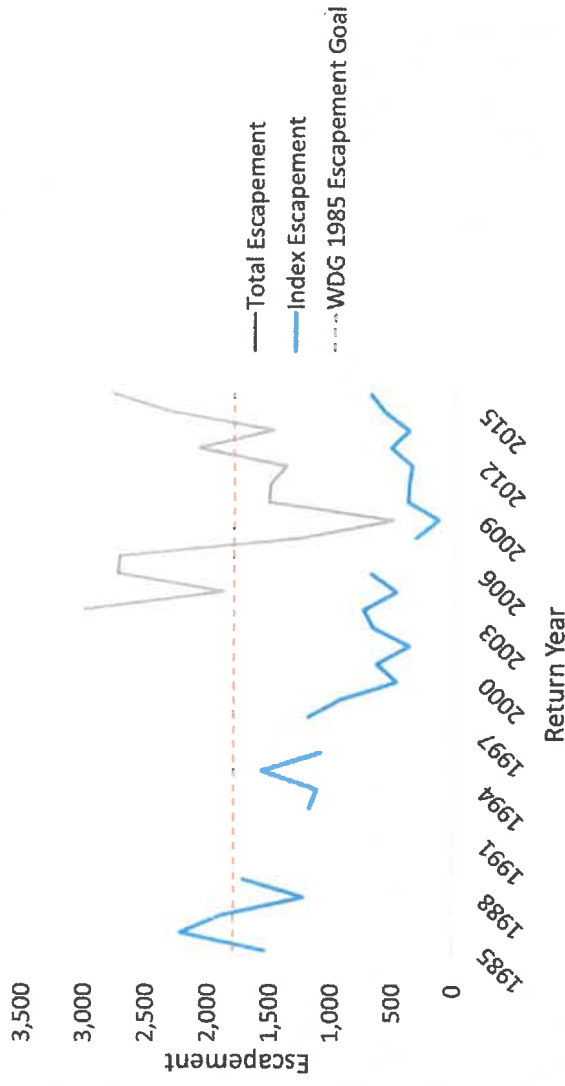
1. Stillaguamish Wild Winter Integrated Conservation Program
2. Snohomish/ Skykomish Wild Winter Integrated Conservation Program

ISIT/AHA Model used to assess program sizes

Stillaguamish Winter Steelhead

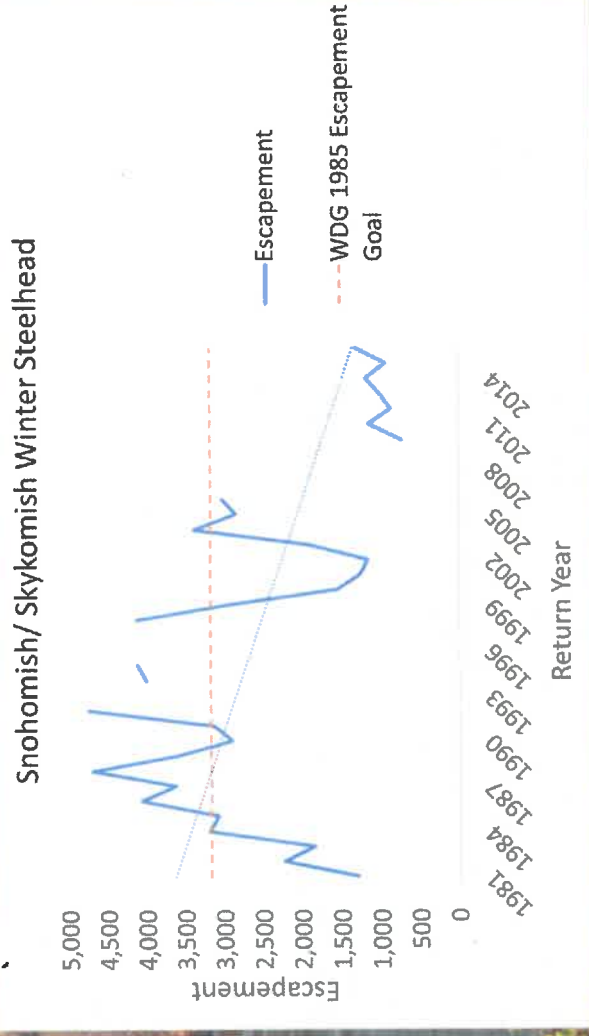
- ▶ Evaluated an integrated conservation program
- ▶ WDG 1985 Escapement Goal is 1,800 NOS
 - ▶ 2012 to 2016 abundance has averaged 1,999 NOS.
- ▶ A conservation hatchery program does not appear necessary at this time.

Stillaguamish Winter Steelhead



Snohomish Skykomish Winter Steelhead Conservation Program

- ▶ Evaluated an integrated conservation program
- ▶ Assessed as Primary Population
 - ▶ PNI Threshold ≥ 0.67
 - ▶ pHOS $< 30\%$
- ▶ Population has shown a decline since 2005
 - ▶ WDG 1985 Basin Wide Escapement Goal – 6,500
 - ▶ Snohomish/Skykomish portion
 - ▶ ~49% of total return



Snohomish/Skykomish Conservation Program – Wild Parameters

- ▶ Natural Origin Parameter Overview
 - ▶ Smolt productivity = 110 smolts per female
 - ▶ Capacity = 65,555 smolts
 - ▶ Source: Thomas Buehrens
 - ▶ SAR% = 4.5%
 - ▶ SAR% = (Smolts at capacity)/(Escapement + Harvest)
 - ▶ Snohomish has historically had high SAR%
 - ▶ Five year average SAR = 1.63%

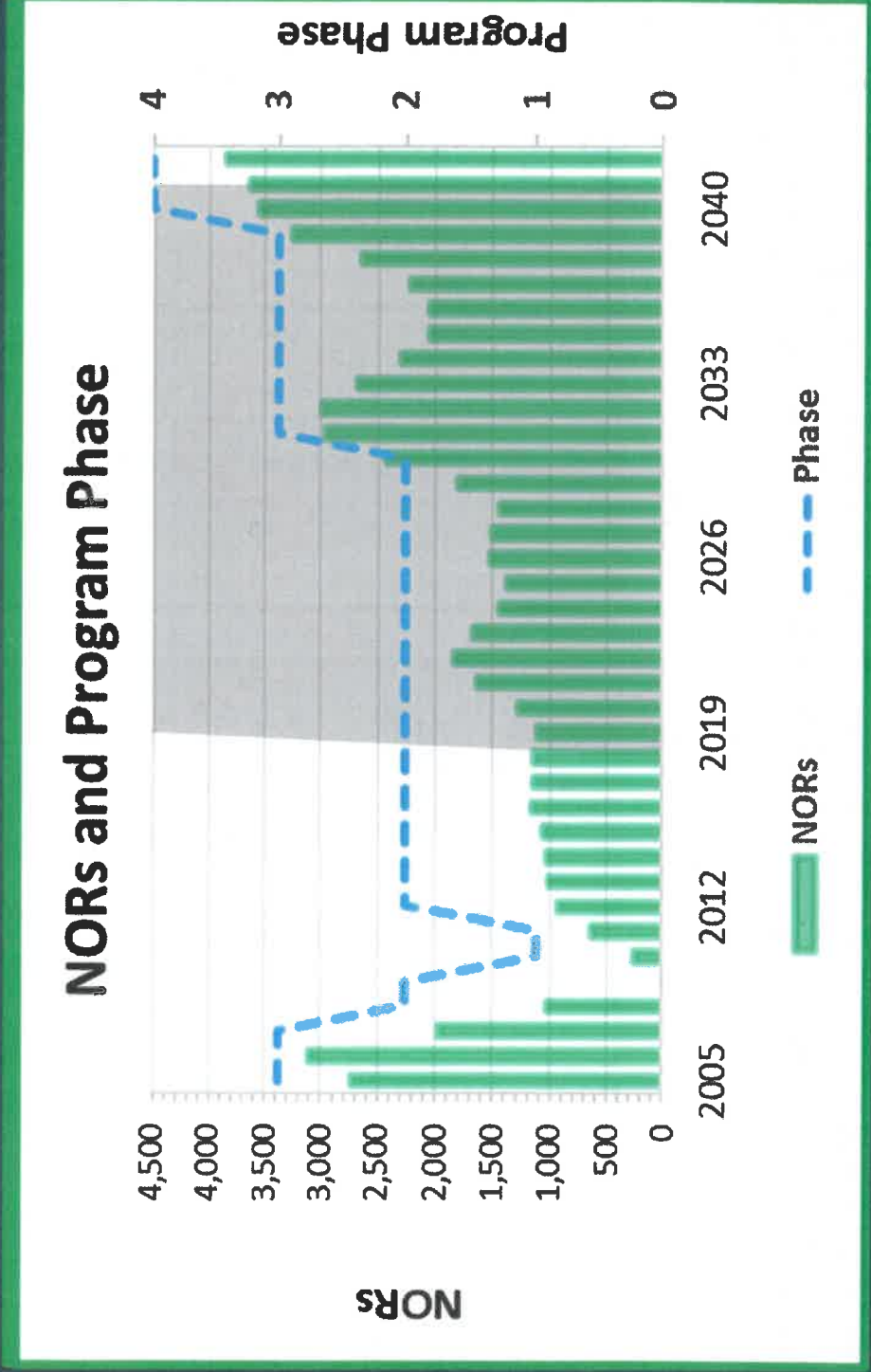


Snohomish/ Skykomish Conservation Program - Hatchery Parameters

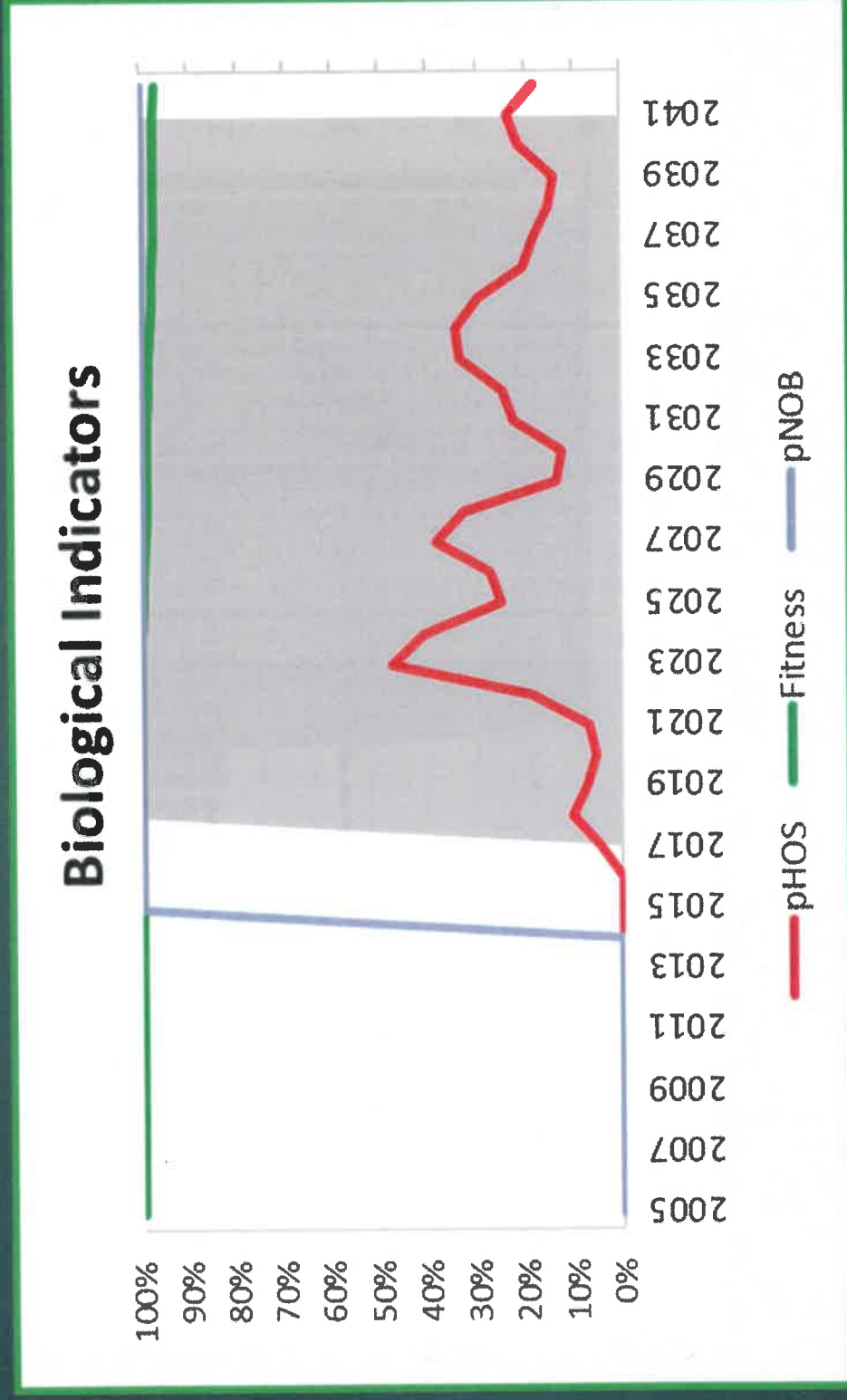
- ▶ Program Size:
 - ▶ Assessed 100,000 smolt program and maximum program size of 250,000 smolts
 - ▶ 250k limited by broodstock collection
 - ▶ 30% of the run + 20% pre-spawn mortality
 - ▶ 5-year average = 256 spawners
 - ▶ Program needs = 248 spawners
- ▶ In-basin stray rate
 - ▶ Assumed that 70% of fish return to the hatchery
- ▶ Hatchery SAR = 1.3%



Snohomish/Skykomish Model Results- 100k



Snohomish/Skykomish Model Results-250k



Conclusions & Questions

Program Objective: Increase natural spawners with acceptable genetic effects.

Conclusion: Program projected to increase spawners by 10 – 25% with fitness loss of less than 3%.

Questions:

- ▶ Reduce smolt release and “allow” greater proportion of returning adults to spawn off-station?
- ▶ Limit length of program to 8 years or transition to harvest program?



Follow-up Questions and Analyses
Tolt River Conservation Program and Phase-out of Reiter Ponds Skamania Program
 Draft June 26, 2018

PSSAG Questions from May 10 Meeting

- 1) What is the basis for the 5% stray rate of returning adults to the Tolt River for juveniles released from the Tokul Creek Hatchery?**

The 5% stray rate is based on a paper by Westley et al. (2013) on the stray rates of salmon and steelhead in the Columbia River basin. As was suggested at the May PSSAG meeting, it will be essential to monitor the program, including the ecological interactions.

- 2) Limited spawning areas exist in the South Fork Tolt River for summer steelhead. Would super imposition be a concern?**

The program size is linked to the number of returning natural-origin adults to ensure that less than 30% of the returning natural-origin adults (or eggs) are used in the hatchery conservation program in any year. The program size was also designed to limit the risk of super imposition by linking the number of smolts released to the abundance of natural-origin spawners.

Breakpoints for the number of smolts to release were informed by estimates of the MSY spawner objective, the interim recovery objectives, and critical spawner levels. The Department of Game identified an MSY objective of 120 spawners based upon the habitat area and potential smolt production. Similarly, the Puget Sound Steelhead Technical Recovery Team (TRT) estimated that 160 spawners would be necessary to produce the potential smolt production at a 5% smolt to adult survival rate. The TRT also identified a critical breakpoint of 50 spawners. Spawner levels below this were projected to place the population at a high risk of extinction over a short time period.

The NOS breakpoints, maximum smolt releases, and projected average hatchery-origin spawners are summarized in the table below.

Natural-Origin Spawners (NOS)	Maximum Smolt Release	Projected Average Hatchery-Origin Spawners (HOS)
NOS < 50	5,200 – 8,000	78 - 120
50 ≤ NOS < 120	8,000	120
NOS ≥ 120	3,500	52

3) Would competition between the juveniles from the conservation hatchery program and the natural-origin spawners be a concern?

We do not anticipate that competition between the juveniles from the conservation hatchery and from natural-origin production would be a concern. That is because the hatchery-origin juveniles will be released as smolts and are expected to migrate from the watershed quickly.

4) More details and justification will be needed for the transition strategy for the replacement of the existing Reiter program that relies on Skamania-origin broodstock.

The existing Skamania program at Reiter Ponds will be phased out as sufficient Tolt origin broodstock are built-up to replace the 116,000 smolts that are now produced annually, with no reduction in the total release size. We anticipate that there will be at least one 4-year period of releases when juveniles from both the Skamania- and Tolt-origin broodstock will be released. Smolts from the Tolt-origin broodstock will be tagged differentially to facilitate monitoring and to ensure the use of the correct broodstock in the subsequent generation.

References

Westley, P.A.H., T.P. Quinn, and A.H. Dittman. 2013. Rates of straying by hatchery-produced Pacific salmon (*Oncorhynchus* spp.) and steelhead (*Oncorhynchus mykiss*) differ among species, life history types, and populations. *Can. J. Fish. Aquat. Sci.* 70: 735–746.

Through the Eyes of Steelhead

Draft June 25, 2018

Our rivers and Puget Sound once teemed with steelhead – more than half a million – but these waters are no longer fish friendly. Poorly planned growth and development threaten the legacy of productive rivers and abundant steelhead that we would like to leave for future generations. And despite our good intentions, our protection of seals and sea lions has resulted in a gauntlet in which most juvenile steelhead are eaten before they can successfully pass on to the Pacific Ocean. Through the eyes of steelhead, our waters no longer offer the cool, clean, accessible, and food-rich environment in which they thrived for eons.

The critical importance of habitat was highlighted in the proposed listing of Puget Sound steelhead in 2006 (71 FR 15666):

“In addition to being a factor that contributed to the present decline of Puget Sound steelhead populations, the continued destruction and modification of steelhead habitat is the principal factor limiting the viability of the Puget Sound steelhead DPS into the foreseeable future.”

Despite the recognized importance of habitat protection and restoration, we are concerned by the current lack of focus on restoring the productive waters necessary for steelhead survival and recovery. We were dismayed, for example, to learn that the Puget Sound Partnership has not identified steelhead as one of the vital signs for tracking the ecosystem health of Puget Sound. Although Chinook salmon are identified as a vital sign, significant differences exist between the life history of Chinook salmon and steelhead and the stressors constraining recovery.

Comprehensive recommendations regarding the protection and restoration of habitat are beyond the scope of our advisory group, but we would be derelict in our responsibilities if we did not speak to the preeminent importance of these factors in conserving and recovering Puget Sound steelhead. We offer several principles as well as specific actions that have been identified in our discussions.

Principles

- 1) Each of us must contribute to the conservation of steelhead. The importance of a holistic approach to conservation and recovery planning (Habitat, Hydropower, Harvest, and Hatcheries-or All-H) is widely recognized, but perhaps less often do each of us think about what we could do to make our rivers and Puget Sound a better place for steelhead.
- 2) Diverse steelhead populations residing throughout our watersheds provide insurance for the future. Steelhead once returned to our rivers throughout the year, and occupied everything from small headwater streams to the large rivers entering Puget Sound. A diverse population requires a diversity of places to live. Restoring this habitat and population diversity, particularly with our changing climate, will provide steelhead with the raw materials to persist in an ever-changing landscape.
- 3) Protection of our existing habitat is as important as habitat restoration. Private, local, state, and federal funding for habitat restoration is likely to remain, at best, a small fraction of what is

necessary to conserve and recover steelhead throughout the Puget Sound basin. Protecting what is left is essential, and protecting relatively intact watersheds is critical.

- 4) Maintaining and restoring natural processes benefits people and fish. For example, we all enjoy a walk along a wooded shoreline, and those very same trees ensure cool, clear, productive water for steelhead. Wetlands can be effective in reducing flood damage and prevent the scouring out of steelhead eggs that have been deposited in the streambed. Nature can provide cost effective benefits – to people and fish alike – but your state legislature and Congress need to know that you support enhanced funding for salmon and steelhead restoration in Puget Sound.
- 5) We are all river stewards, for water flows downhill, and carries with it our imprint as well as those upstream of us. Even a small action, when joined with thousands of similar actions throughout the watershed, may become consequential as the river flows on its journey to the sea.

Perhaps an old proverb sums up our principles - “Where there is water there is fish. If we take care of the water, the fish will take care of us.”

Specific Actions

- 1) Advocate for the completion and implementation of the recovery plan. NOAA Fisheries is now committed to completing a draft recovery plan in 2018, and a final recovery plan in 2019. Completion of the plan may increase funding and motivate efforts to restore our watersheds. Take the time to comment on the draft plan to ensure that it fully addresses what we know needs fixing, including passage barriers, silt deposits that are smothering steelhead eggs, and frequent flooding that is washing away steelhead eggs.
- 2) Participate with watershed groups, Lead Entities, Local Integrating Organizations, Regional Fishery Enhancement Groups, conservation and fishing organizations, the Puget Sound Partnership, and other entities working to conserve and improve our watersheds. Individually we have a small voice – collectively we can make a difference.
- 3) Voice your support to local governments and the state legislature for necessary changes to state and local habitat protection measures (e.g., Critical Areas, Growth Management, Shoreline Protection) to ensure our watersheds are maintained and fish friendly.
- 4) Develop and implement actions to reduce the number of juvenile steelhead eaten by seals as the steelhead make their way to the Pacific Ocean. Contact members of our Congressional delegation to discuss potential improvements to the Marine Mammal Act that would facilitate a reduction in predation rates.
- 5) Support improved protective measure by local governments and businesses to reduce contaminants in point-source discharge, encourage the Department of Ecology to consider the needs of steelhead in stormwater planning, and stress the importance of implementing actions to increase compliance with existing measures.

- 6) NOAA should identify Best Management Practices (BMPs) so each of us understands how we can contribute to restoring our watersheds and conserving steelhead. The Department, working with the tribes, Puget Sound partnership, and other entities should ensure that BMPs are easily accessible and understood.
- 7) The Department and tribes should identify and implement actions to reduce the incidence of Nanophyetus parasites reducing the survival rates of juvenile steelhead in south Puget Sound rivers.
- 8) Reduce the loss in productivity associated with operation of the dams on the Skagit River. NOAA, the Department, the tribes, and other entities should use the upcoming relicensing of the dams to address the decline in productivity associated with operation of hydroelectric dams on the hydrology, gravel recruitment, channel structure, riparian structure, and food availability in the Skagit River.

