

Puget Sound Steelhead Advisory Group Recommendations
Provisional Hood Canal & Strait of Juan de Fuca Portfolio

Draft October 3, 2017

Population or Watershed	Run Timing	Designation	Fishery		Integrated Hatchery		Segregated Hatchery		Rationale for Provisional Recommendation
			Early-Timed (angler days) ^{1/}	Native-Timed (angler days) ^{2/}	PNI Limit	Proposed Program Size	DGF Limit (Proposed)	Proposed Program Size	
East Hood Canal	Winter	Contributing							Designation informed by smallest intrinsic potential of HC populations, 23% public land, & 100% lowland hydrology. Recommend Contributing over Stabilizing to provide greater support for wild fish recovery.
South Hood Canal	Winter	Contributing							Designation informed by second smallest intrinsic potential of Hood Canal populations, 38% public land, & 92% lowland hydrology. Recommend Contributing over Stabilizing to provide greater support for wild fish recovery.
Skokomish	Winter	Primary		C&R (1,500 angler days)	0.67	15,000 ^{3/}			Primary designation informed by largest intrinsic potential of all populations in HC/SIDF MPG with 71% of watershed in public land. Must be accompanied by habitat restoration and protection actions that benefit steelhead.
			C&K (450 angler days)				0.04 (0.022)	20,000	Group set aside recommendation regarding segregated program pending discussion of Central/SPS MPG.
West Hood Canal	Winter	Primary	Quilcene C&K (270 angler days)						Primary designation informed by second largest intrinsic potential of HC populations and 76% public lands.
Sequim/Discovery Bay	Winter	Primary							Group generally supported segregated program on the Big Quilcene but some questions remain regarding stock assessment information (see notes).
Dungeness	Winter/Summer	Primary	C&K (1,300 angler days)						Primary designation based on importance of maintaining long-term monitoring program on Snow Creek. Some advisors suggested revisiting this designation when DPS recommendations are completed to ensure restoration and protection priorities are clear.
SIDF Independents	Winter	Contributing							Primary designation informed by second largest intrinsic potential of SIDF populations and 86% public lands.
Elwha	Winter	Primary		C&R (630 angler days)		175,000 ^{5/}			Program size of 58,200 is dependent upon monitoring that confirms gene flow ≤ 0.02 .
									Designation informed by second smallest intrinsic potential in HC/SIDF MPG & 61% lowland or rain hydrology. Recommend Contributing over Stabilizing to provide greater support for wild fish recovery.
									Primary designation informed by second largest intrinsic potential of all populations in HC/SIDF MPG with 95% of watershed in public land.

- 1/ Assumes an average SAR of 1.08% (Dungeness average for BY 2000-2011), a 25% recreational harvest rate, and an average catch of 0.12 steelhead per angler trip.
- 2/ Assumes runsize equal to the average number of spawners from 2010-2015, 10% release mortality rate, and an average encounter of 0.12 steelhead per angler trip.
- 3/ Program included in Settlement Agreement.
- 4/ NOAA Fisheries provided 4(c) approval for 10,000 smolt program.
- 5/ NOAA Fisheries provided 4(e) approval for Lower Elwha Klallam program that will be phased-out as the number of natural-origin spawners increases.

Acronyms:

- DGF. Demographic gene flow.
- C&K. Recreational catch and keep fishery.
- C&R. Recreational catch and release fishery.
- PNL. Proportionate natural influence.

**Puget Sound Steelhead Advisory Group Recommendations
Provisional Central & South Puget Sound Portfolio**

Draft January 31, 2018

Population or Watershed	Run Timing	Designation	Fishery		Integrated Hatchery			Segregated Hatchery		Rationale for Provisional Recommendation	
			Early Timed (angler days)	Native-Timed (angler days)	Purpose	PNI Limit (Proposed)	Proposed Program Size	Purpose	DGF Limit (Proposed)		Proposed Program Size
North Lake Washington	Winter	Stabilizing	440 ^{1/}						(High)	30,000	Designation informed by limited numbers of natural-origin spawners, 90% lowland, and 13% public land. Pilot hatchery program evaluated after collection of monitoring information.
Cedar River	Winter	Contributing			Conservation	Reintroduction	25,000-50,000				Designation informed by limited number of natural-origin spawners. Initiate conservation program with 20-45 adults from Green River population when Green River population is consistently (one cycle) exceeding spawner objective (2,000).
Green River	Winter	Primary		Mark Selective (3,100 angler days)	Conservation /Harvest	0.67 (0.67)	100,000 (winter)				Designation informed by average number of spawners and intrinsic potential (both the largest for this MPG) and 51% of watershed in public ownership. Initiate winter steelhead catch-and-release fishery and transition to mark-selective fishery in a manner consistent with achieving conservation objectives.
			C&K Summer (3,500 angler days) ^{4/}						0.02 (0.02)	97,000 (summer)	PSSAG has not discussed this program?
White River	Winter	Primary		C&R (1,500 angler days) ^{5/}	Conservation /Harvest	0.67 (0.94)	60,000 (winter)				Designation informed by intrinsic potential (second largest for this MPG) and 60% of watershed in public ownership. Initiate winter steelhead catch-and-release fishery in a manner consistent with achieving conservation objectives
Puyallup/Carbon River	Winter	Primary									Designation informed by intrinsic potential (fourth largest for this MPG).
Nisqually River	Winter	Primary		C&R (> 3,100 angler days) ^{7/}							Designation informed by intrinsic potential (third largest for this MPG), 43% public land, and presence of water storage may reduce effects of climate change. Previously designated as Wild Steelhead Gene Bank.
South Puget Sound	Winter	Contributing	C&K (500 angler days) ^{8/}						(High)	50,000	Designation informed by 8% public lands and 98% lowland hydrology. Initiate hatchery program in Deschutes River, which does not have an indigenous steelhead run, when hatchery upgrade completed.
East Kitsap	Winter	Primary									Designation informed by PSSAG support for providing for a diversity of habitat types and support of local groups for habitat restoration.

- 1/ Assumes an average SAR of 0.50% (Green average for outmigration years 2000-2012), a 35% recreational harvest rate, and an average catch of 0.12 steelhead per angler trip.
- 2/ Assumes runsize of 1,500 natural-origin fish, 5% allowable exploitation rate, 10% release mortality rate, and an average encounter of 0.12 steelhead per angler trip.
- 3/ Assumes runsize of 2,000 natural-origin fish, 550 hatchery-origin fish, 5% allowable exploitation rate, 10% release mortality rate, and an average encounter rate of 0.12 steelhead per angler trip.
- 4/ Assumes 2001-2012 average catch of 417 and an average encounter rate of 0.12 steelhead per angler trip.
- 5/ Assumes runsize of 730 natural-origin fish, 5% allowable exploitation rate, 10% release mortality rate, and an average encounter of 0.12 steelhead per angler trip.
- 6/ Assumes runsize of 974 natural-origin fish, 600 hatchery-origin fish, 5% allowable exploitation rate, 10% release mortality rate, and an average encounter of 0.12 steelhead per angler trip.
- 7/ Assumes runsize of 1,500 natural-origin fish, > 5% allowable exploitation rate, 10% release mortality rate, and an average encounter of 0.12 steelhead per angler trip.
- 8/ Assumes an average SAR of 0.12% and an average catch of 0.12 steelhead per angler trip.

Acronyms:

- DGF. Demographic gene flow.
- C&K. Recreational catch and keep fishery.
- C&R. Recreational catch and release fishery.

Puget Sound Steelhead Advisory Group Recommendations
Provisional Northern Cascades Portfolio
 Draft September 7, 2018

Population or Watershed	Run Timing	Designation	Fishery		Purpose	Integrated Hatchery		Segregated Hatchery		Comments
			Early Timed (angler days)	Native-Timed (angler days)		PNI Limit (Proposed)	Proposed Program Size	DGF Limit (Proposed)	Proposed Program Size	
Drayton Harbor Tributaries	Winter	Stabilizing								
Nooksack River	Winter	Primary	C&K 1,625 ^{1/}	C&R 3,100 ²				0.02 (0.004)	150,000	Early Winter program of 150,000 approved by NOAA. See Fishery/Hatchery adaptive management provisions of June 27, 2018.
South Fork Nooksack River	Summer	Primary								
Samish River & Bellingham Bay Tributaries	Winter	Primary		C&R 1,094 ^{3/}						
Skagit River	Winter	Primary								
Nookachamps Creek	Winter	Primary								
Baker River	Summer/ Winter	Contributing		C&R 11,000 – 19,000 ^{4/}						
Sauk River	Summer/ Winter	Primary								
Stillaguamish River	Winter	Primary	C&K 4,767 ^{5/}	C&R 2,813 ^{6/}				≤ 0.02 (0.005)	130,000	Early Winter program of 130,000 approved by NOAA. See Fishery/Hatchery adaptive management provisions of June 27, 2018.
Deer Creek	Summer	Primary								
Canyon Creek	Summer	Primary								
Snohomish & Skykomish Rivers	Winter	Primary	C&K 37,350 ^{7/}	C&R 5,266 ^{8/}	Conservation or Harvest	≥ 0.67	?	≤ 0.02 (0.018)	167,000	Early Winter program of 167,000 approved by NOAA. See Fishery/Hatchery adaptive management provisions of June 27, 2018.
				C&R 4,984 ^{9/}				Harvest	≤ 0.02 (0.014)	74,000
Snoqualmie River		Primary								
Pilchuck River	Winter	Primary		C&R 2,138 ^{10/}						

N.F. Skykomish River	Summer	Contributing																			
Tolt River	Summer	Primary																			The group considered but was unable to reach a broadly supported recommendation regarding a three part proposal: 1) a conservation hatchery program for Tolt River summer steelhead; 2) a transition at Reiter Hatchery from the use of Skamania broodstock to the use of a Tolt-origin broodstock; and 3) a transition at Sunset Falls from passing Skamania-origin summer steelhead upstream to passing Tolt-origin summer steelhead upstream.

- 1/ Assumes 2001-2012 average catch of 195 and an average encounter rate of 0.12 steelhead per angler trip.
- 2/ Assumes 1,500 natural-origin fish return (75% of 2,000 spawner objective), 5% allowable exploitation rate, 10% release mortality rate, and an average encounter rate of 0.12 steelhead per angler trip. This analysis is for comparative purposes. The PSSAG previously (November 16, 2017 meeting) noted that initiating a catch and release fishery at 75% of the spawning objective can and may need to be adjusted to 80-100% before any fishery is initiated.
- 3/ Assumes 525 natural-origin fish return (75% of 700 spawner objective), 5% allowable exploitation rate (see "Coarse Scale Assessment of Fishery Management Options", draft November 6, 2017), 10% release mortality rate, and an average encounter rate of 0.12 steelhead per angler trip. This analysis is for comparative purposes. The PSSAG previously (November 16, 2017 meeting) noted that initiating a catch and release fishery at 75% of the spawning objective can and may need to be adjusted to 80-100% before any fishery is initiated.
- 4/ See description provided in document "Additional Follow-up Questions and Analyses: Potential Skagit River Integrated Hatchery Program". Updated draft March 27, 2018.
- 5/ Assumes 2001-2012 average catch of 572 and an average encounter rate of 0.12 steelhead per angler trip.
- 6/ Assumes 1,350 natural-origin fish return (75% of 1,800 spawner objective), 5% allowable exploitation rate see "Coarse Scale Assessment of Fishery Management Options", draft November 6, 2017), 10% release mortality rate, and an average encounter rate of 0.12 steelhead per angler trip. This analysis is for comparative purposes. The PSSAG previously (November 16, 2017 meeting) noted that initiating a catch and release fishery at 75% of the spawning objective can and may need to be adjusted to 80-100% before any fishery is initiated.
- 7/ Assumes 2001-2012 average catch of 4,482 and an average encounter rate of 0.12 steelhead per angler trip.
- 8/ Assumes 2,528 natural-origin fish return (75% of 3,370 spawner objective), 5% allowable exploitation rate see "Coarse Scale Assessment of Fishery Management Options", draft November 6, 2017), 10% release mortality rate, and an average encounter rate of 0.12 steelhead per angler trip. This analysis is for comparative purposes. The PSSAG previously (November 16, 2017 meeting) noted that initiating a catch and release fishery at 75% of the spawning objective can and may need to be adjusted to 80-100% before any fishery is initiated.
- 9/ Assumes 2,393 natural-origin fish return (75% of 3,190 spawner objective), 5% allowable exploitation rate see "Coarse Scale Assessment of Fishery Management Options", draft November 6, 2017), 10% release mortality rate, and an average encounter rate of 0.12 steelhead per angler trip. This analysis is for comparative purposes. The PSSAG previously (November 16, 2017 meeting) noted that initiating a catch and release fishery at 75% of the spawning objective can and may need to be adjusted to 80-100% before any fishery is initiated.
- 10/ Assumes 1,026 natural-origin fish return (75% of 1,368 spawner objective), 5% allowable exploitation rate see "Coarse Scale Assessment of Fishery Management Options", draft November 6, 2017), 10% release mortality rate, and an average encounter rate of 0.12 steelhead per angler trip. This analysis is for comparative purposes. The PSSAG previously (November 16, 2017 meeting) noted that initiating a catch and release fishery at 75% of the spawning objective can and may need to be adjusted to 80-100% before any fishery is initiated.

Skykomish Late-Winter Steelhead Conservation Program

HATCHERY EVALUATION AND ASSESSMENT TEAM
WASHINGTON DEPARTMENT OF FISH AND WILDLIFE
SEPTEMBER 7TH 2018



Questions from Last Time

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?
 - ▶ Consider off station acclimation sites where available?
- ▶ Limit length of program to 8 years or transition to harvest program?



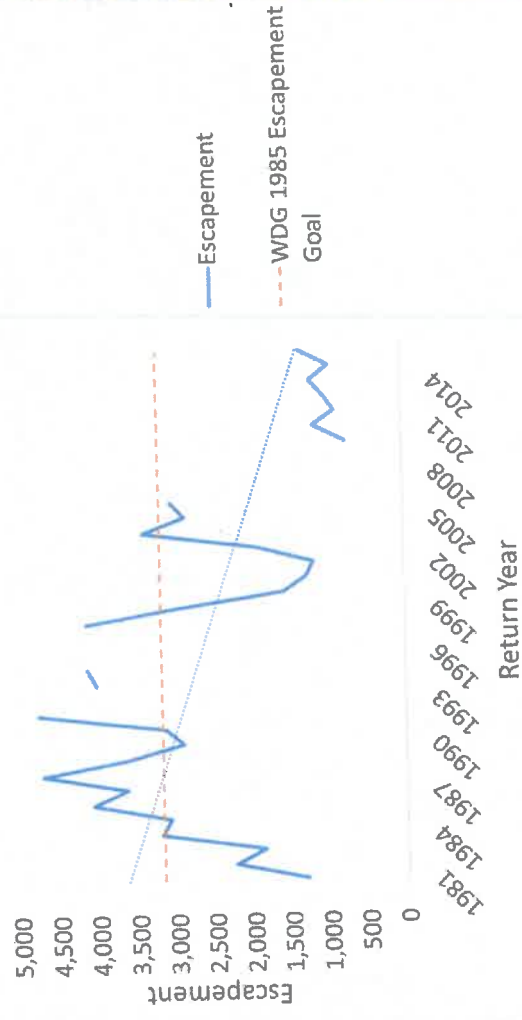
Changes to model

- ▶ Just ran the 100k program size
- ▶ Simulated out-planting/ acclimation sites
 - ▶ Assuming that 30% of fish return to the hatchery
 - ▶ Remaining 70% of fish to the spawning grounds.
- ▶ Assessed impact of smolt capacity and SAR%
 - ▶ Did not result in a significant change to the NOS over time, so was not included in presentation.

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 short-term decline since 2005
 - ▶ WDG 1985 Basin Wide Escapement Goal – 6,500
 - ▶ Snohomish/Skykomish portion 3,185
 - ▶ ~49% of total return

Snohomish/ Skykomish Winter Steelhead



Snohomish/Skykomish Conservation Program – Wild Parameters

- ▶ Natural Origin Parameter Overview
 - ▶ Smolt productivity = 110 smolts per female
 - ▶ Capacity = 65,555 smolts
 - ▶ Source: Thomas Buehrens
 - ▶ Requires ~2,200 adults to seed the watershed
 - ▶ 60 smolts per female at 2% egg to smolt survival.
 - ▶ SAR% = 4.5% (1986-2016)
 - ▶ SAR% = (Smolts at capacity)/(Escapement + Harvest)
 - ▶ Snohomish has historically had high SAR%
 - ▶ Five year average SAR = 1.63%



Snohomish/ Skykomish Conservation Program - Hatchery Parameters

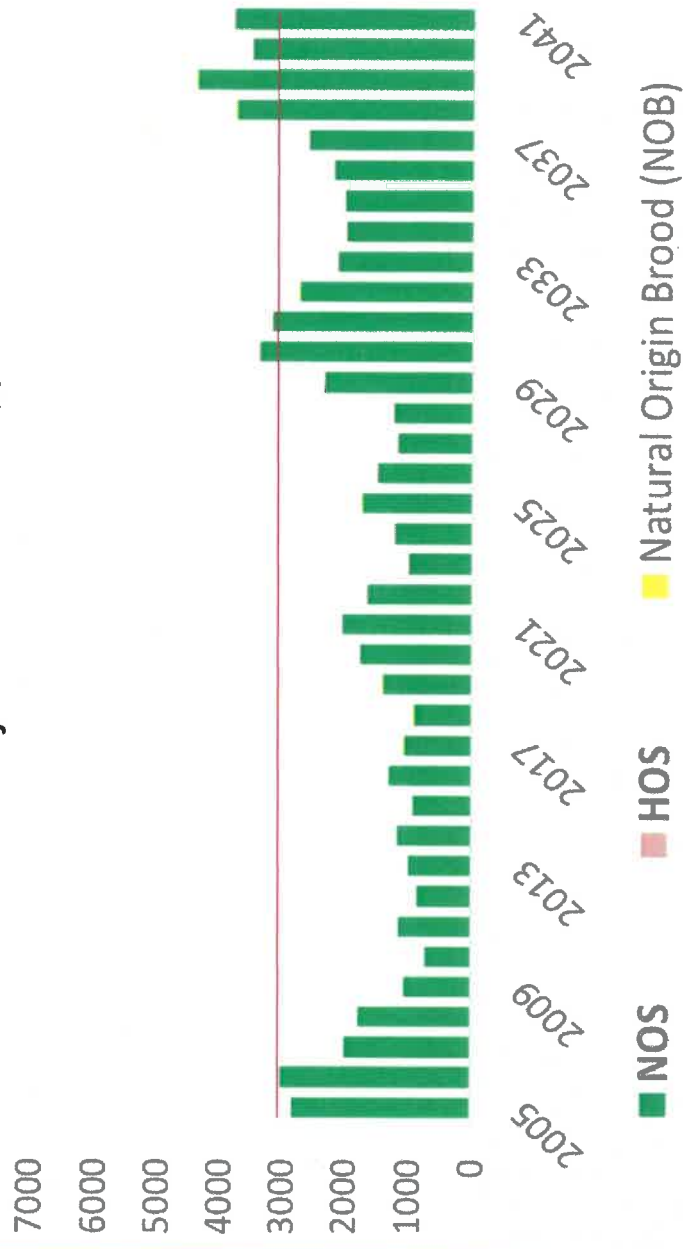
- ▶ Program Size:
 - ▶ Assessed 100,000 smolt program
 - ▶ Requires ~100 adults for broodstock.
 - ▶ Suggest using acclimation/ out-plant sites to supplement under utilized habitat.
- ▶ Hatchery SAR = 1.3%



Snohomish/ Skykomish- No Program

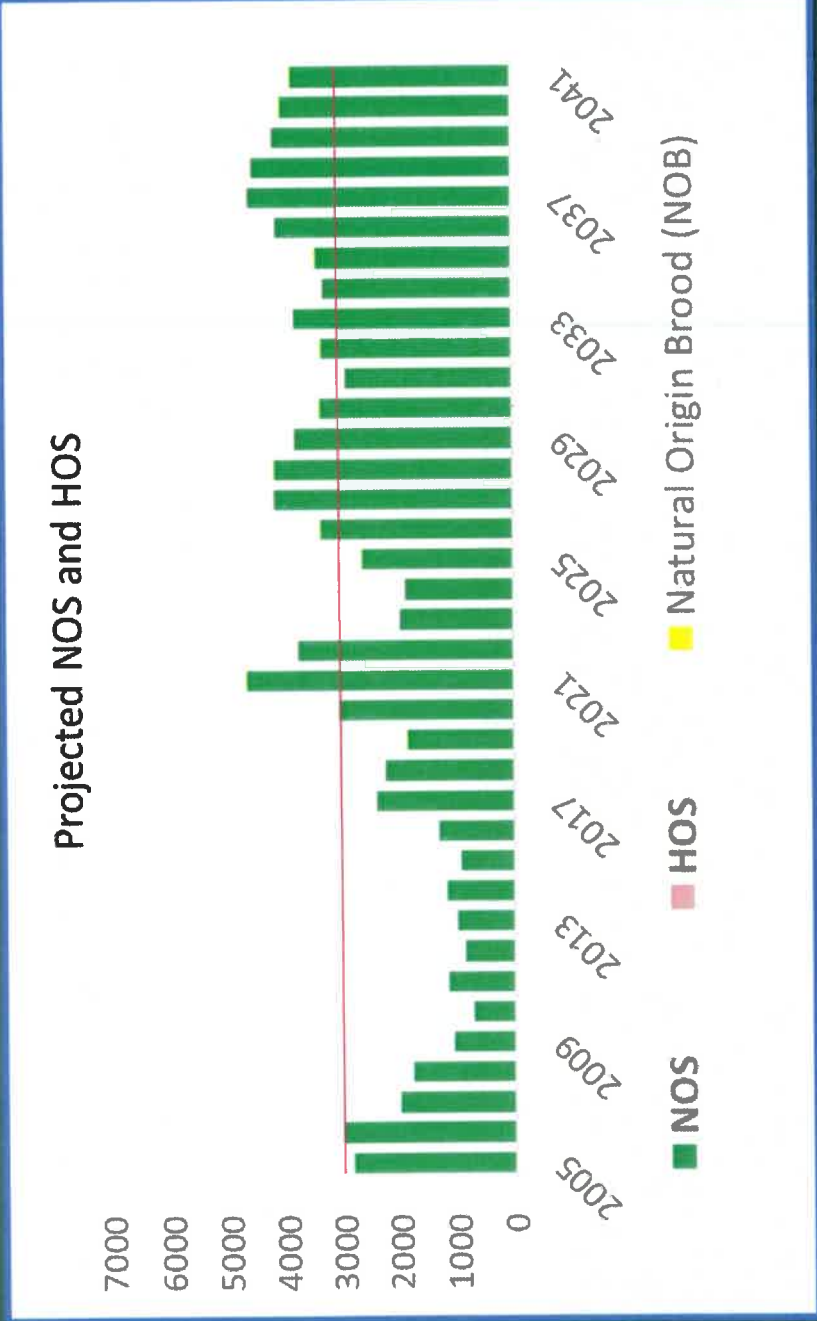
- ▶ Poor Ocean Conditions
- ▶ NOS: 2,203 (95%CI: 1,812 – 2,595)

Projected NOS and HOS



Snohomish/ Skykomish- No Program

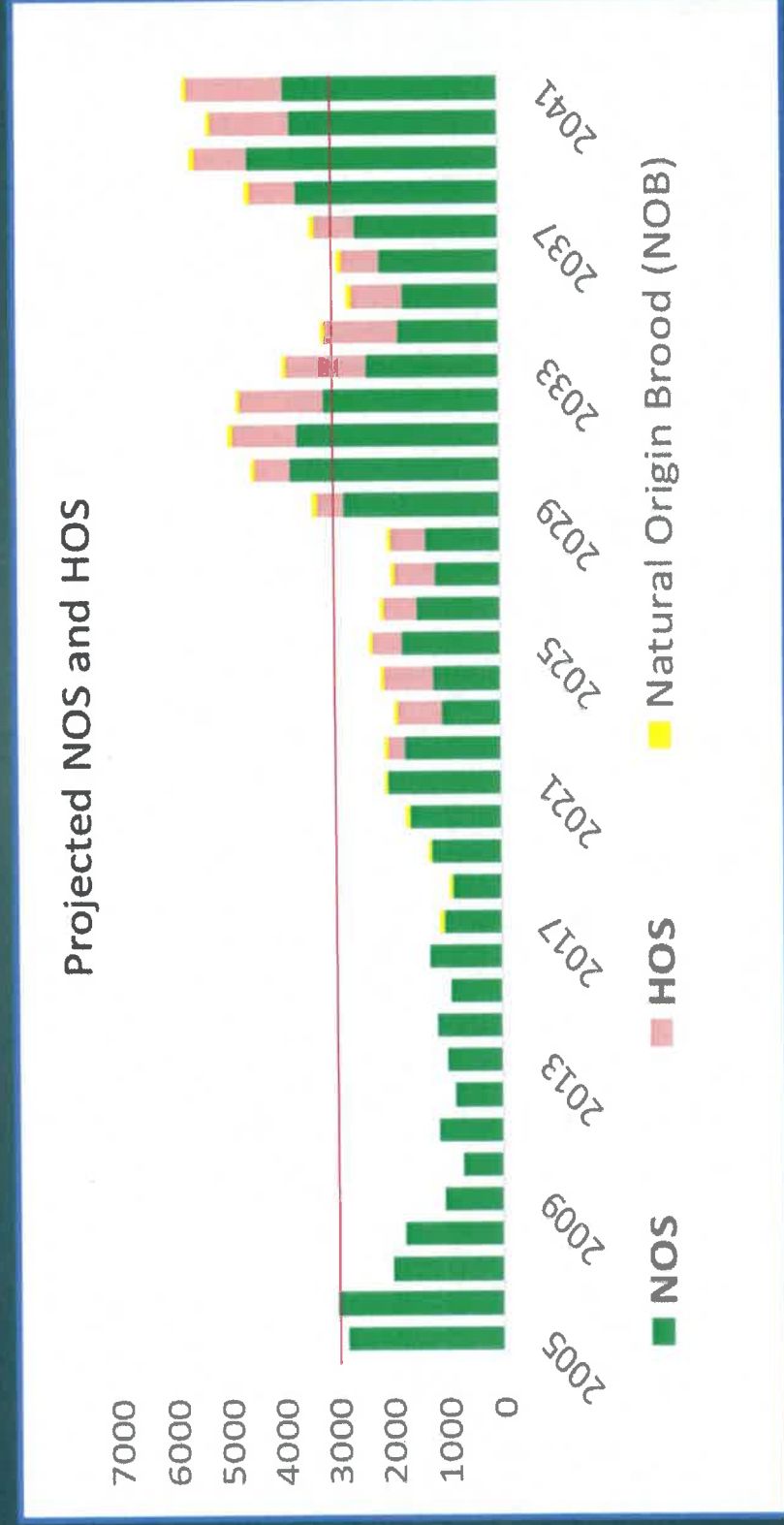
- ▲ Good Ocean Conditions
- ▲ NOS: 3,432 (95%CI: 3,093 - 3,771)



Snohomish/ Skykomish- 100k Program

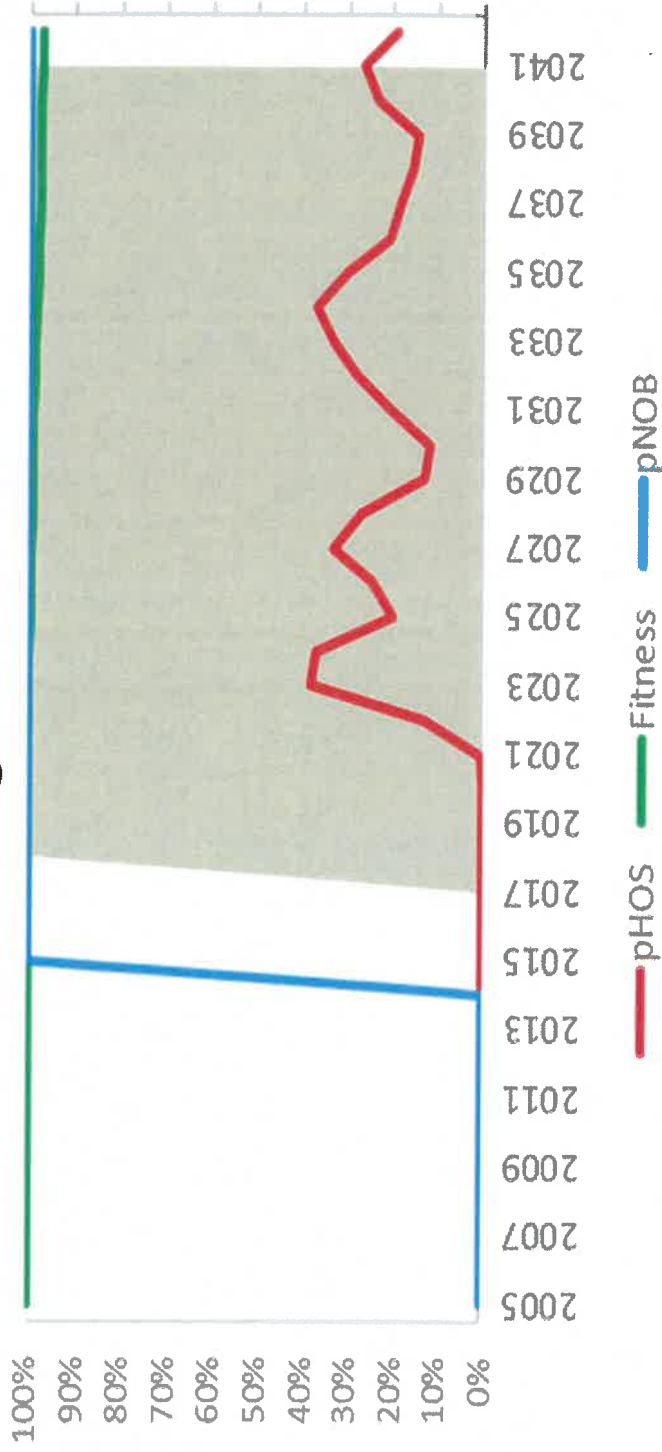
- ▶ Poor Ocean Conditions
- ▶ Population Fitness (2041): 99.1%
- ▶ pHOS: 20.4% (95%CI: 15.5 - 25.3%)
- ▶ PNI: 0.83 (95%CI: 0.79 - 0.87)
- ▶ NOS: 2,372 (95%CI: 1,935 – 2,809)
- ▶ Program HOS: 602 (95%CI: 438 - 767)

Snohomish/ Skykomish- 100k Poor Ocean



Snohomish/ Skykomish- 100k Poor Ocean

Biological Indicators

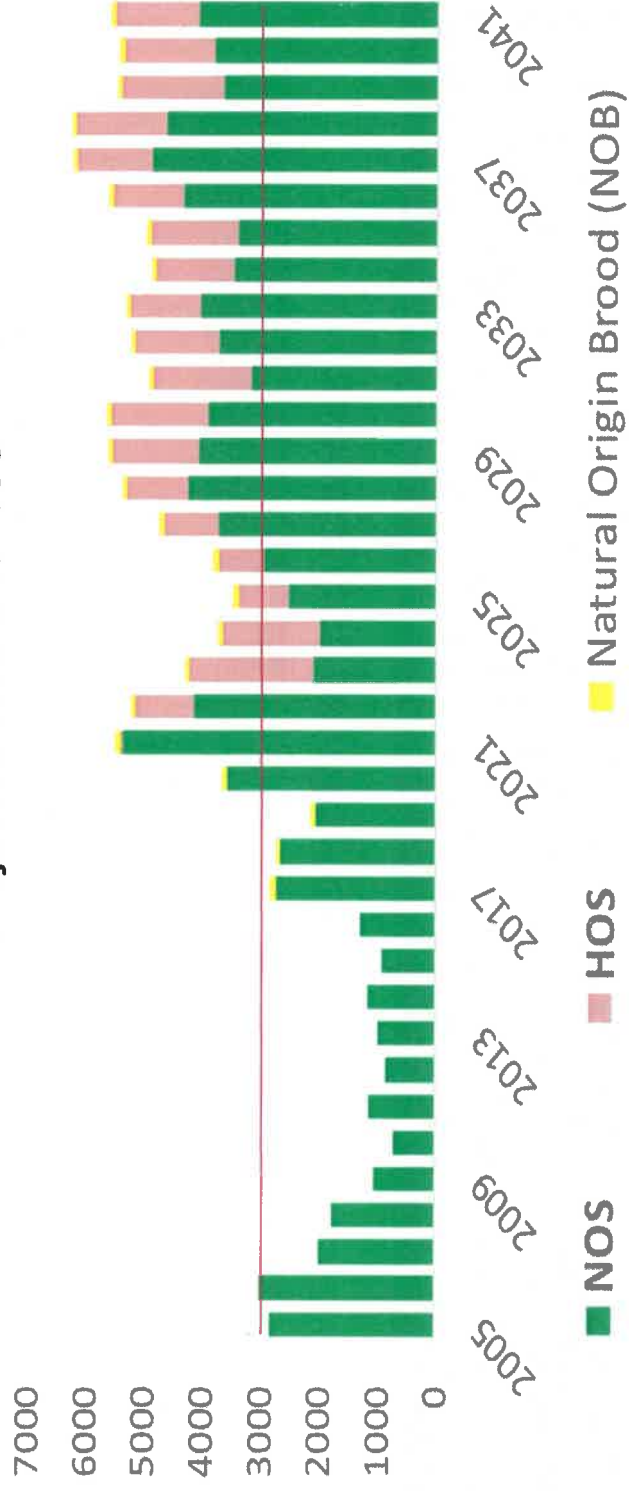


Snohomish/ Skykomish- 100k Program

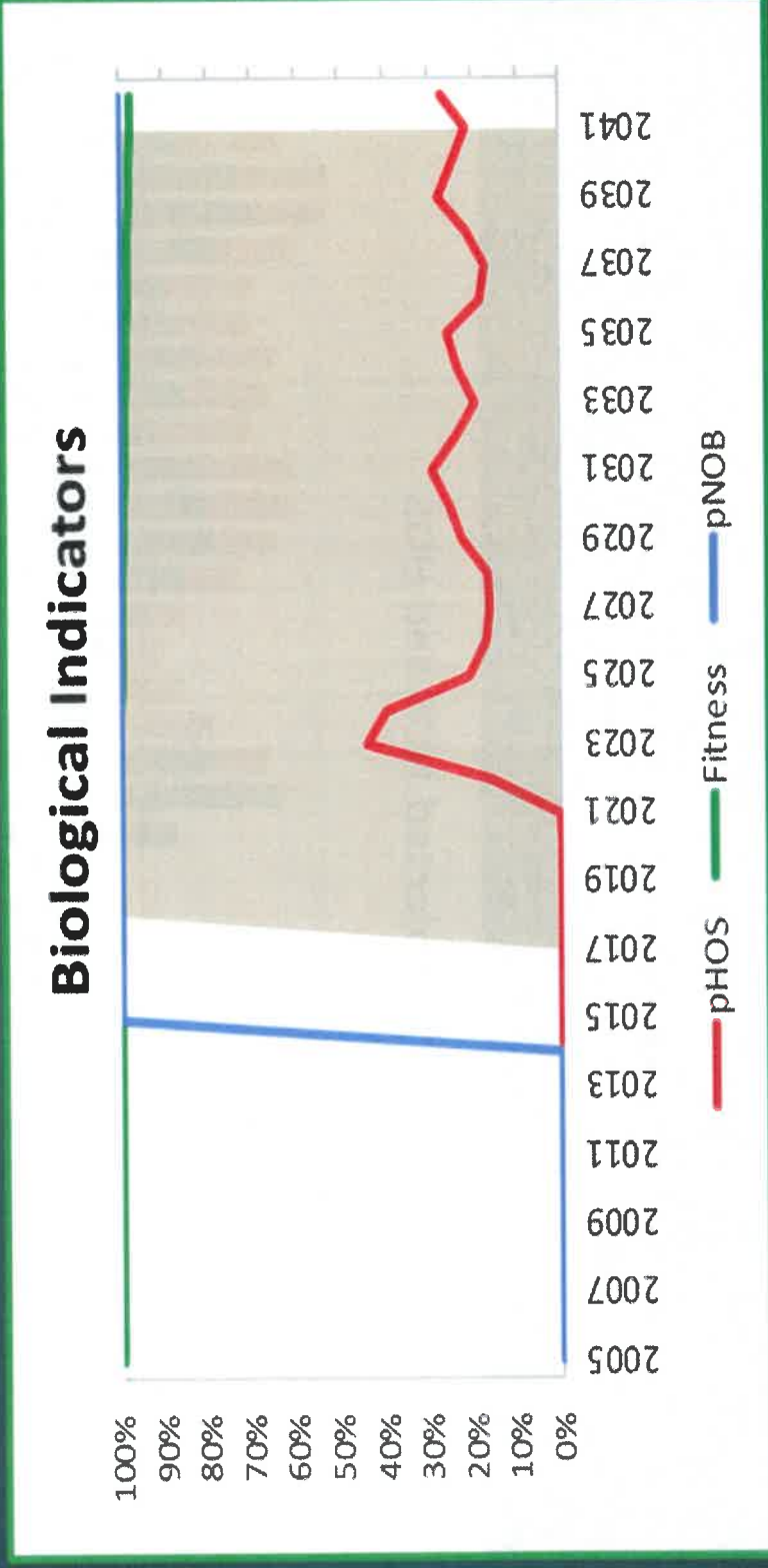
- ▶ Good Ocean Conditions
- ▶ Population Fitness (2041): 99.1%
- ▶ pHOS: 21.0% (95%CI: 16.4 - 25.6%)
- ▶ PNI: 0.83 (95%CI: 0.79 - 0.86)
- ▶ NOS: 3,681 (95%CI: 3,338 - 4,024)
- ▶ Program HOS: 885 (95%CI: 685 - 1,085)


Snohomish/ Skykomish- 100k Good Ocean

Projected NOS and HOS



Snohomish/ Skykomish- 100k Good Ocean





Conclusions

- ▶ Supplementation is projected to result in an increase of 150 to 250 NOSSs and 600 to 800 HOSSs.
- ▶ SAR% still appears to have the greatest control over the number adults returning.
- ▶ Supplementation helps to balance out losses of natural origin smolts in freshwater due to habitat loss or natural disasters/ adverse conditions (flooding and droughts).
- ▶ During Good Ocean conditions, program is likely to produce hatchery returns above the escapement goal, with the potential to consider transitioning to harvest program.

Mid-South Sound hatchery steelhead evaluation

HATCHERY EVALUATION AND ASSESSMENT TEAM
WASHINGTON DEPARTMENT OF FISH AND WILDLIFE



Background and approach

- ▶ Used three approaches to assess the programs.
 1. Smolt to adult return (SAR%)
 - a. North Lake Washington Tribs. segregated early-winter steelhead
 - b. Cedar River Winter-Late steelhead reintroduction
 - c. Deschutes River segregated early-winter steelhead
 2. Demographic Geneflow Model (DGM)
 - a. Green River segregated summer steelhead
 3. All-H-Analyzer Model (AHA)
 - a. Green River Winter-Late steelhead
 - b. White River Winter-Late steelhead



AHA Model

- ▶ Data intensive model developed by the HSRG, that uses habitat, hatchery and harvest data to predict impact on natural origin populations.
- ▶ The AHA Model was used to estimate potential program sizes, pHOS and PNI and population recovery.
- ▶ Model primary needs:
 - ▶ Goals for transitioning between recovery phases
 - ▶ Requires smolt capacity and productivity and SAR% data.
 - ▶ Harvest rates
 - ▶ Release data, broodstock data (pNOB and pHOB), Spawning Ground data (NOS and HOS).
- ▶ Has a built in life cycle model that incorporates the Pacific Ocean Decadal Oscillation (PDO).

Step 1. ISIT SET-UP

What do we want to achieve?

Open Data File

Species	Steelhead Yearling
---------	--------------------

Region/Basin	Green River
Population Name	Late Winter Steelhead
Current Designation	Primary
Current Recovery Phase	Recolonization

Hatchery Program 1	
Purpose	Both
Broodstock Policy	Integrated

Hatchery Program 2	
Purpose	NA
Broodstock Policy	NA

Fishery Labels	Ocean
	Puget Sound
	Terminal

Click here to set
Biological Targets by Recovery Phase:
1. Natural Production
2. Harvest

Step 2. AHA

What's our working hypothesis?

Click here to enter
Key Assumptions for:
1. Natural Production
2. Fish passage and SAR
3. Harvest
4. Hatchery Production

RETURN TO
PREVIOUS SCREEN

Step 3. Status and Trends

How are we doing?

Click here to enter
Annual Data:
1. Catch
2. Escapement
3. Hatchery

Save Data File

Step 4. Life Cycle Model

What's our long-term strategy?

A. Set Random and Systematic
Variability for:
1. Early Marine Survival
2. Exploitation Rate
3. Habitat Potential
4. Fitness Effect
5. Freshwater Survival
6. Ocean Survival

B. Set Harvest Policy

C. Refine Hatchery Reform Strategy
1. Phase triggers
2. Management Constraints

D. Scenario Analysis

Step 5. Management Targets

What's the plan for this year?

Enter Run Forecast
and Calculate
Annual Management Targets

FUTURE OPTIONS

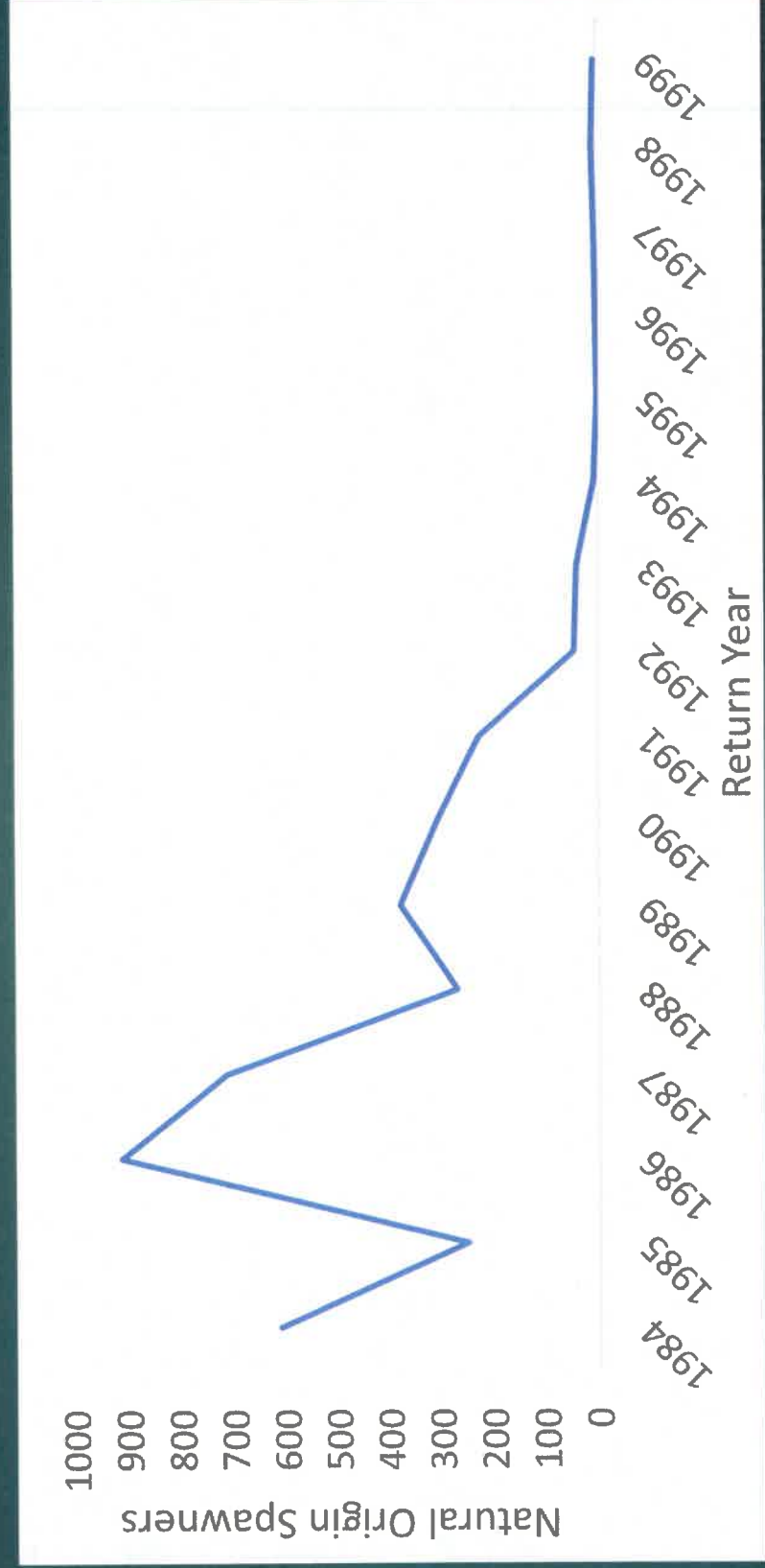
Viability Analysis

Run Forecast

North Lake Washington

- ▶ Assessed a segregated early-winter steelhead program with a 30,000 smolt release.
- ▶ Potentially a stabilizing or contributing population.
- ▶ Assumptions:
 - ▶ Used a range of SAR% from 0.25% to 1%
 - ▶ Other Puget Sound segregated programs have averaged around 0.5%
 - ▶ Used a harvest rate of 35%.
- ▶ Natural populations appear to be functionally extinct.

North Lake Washington



North Lake Washington Results

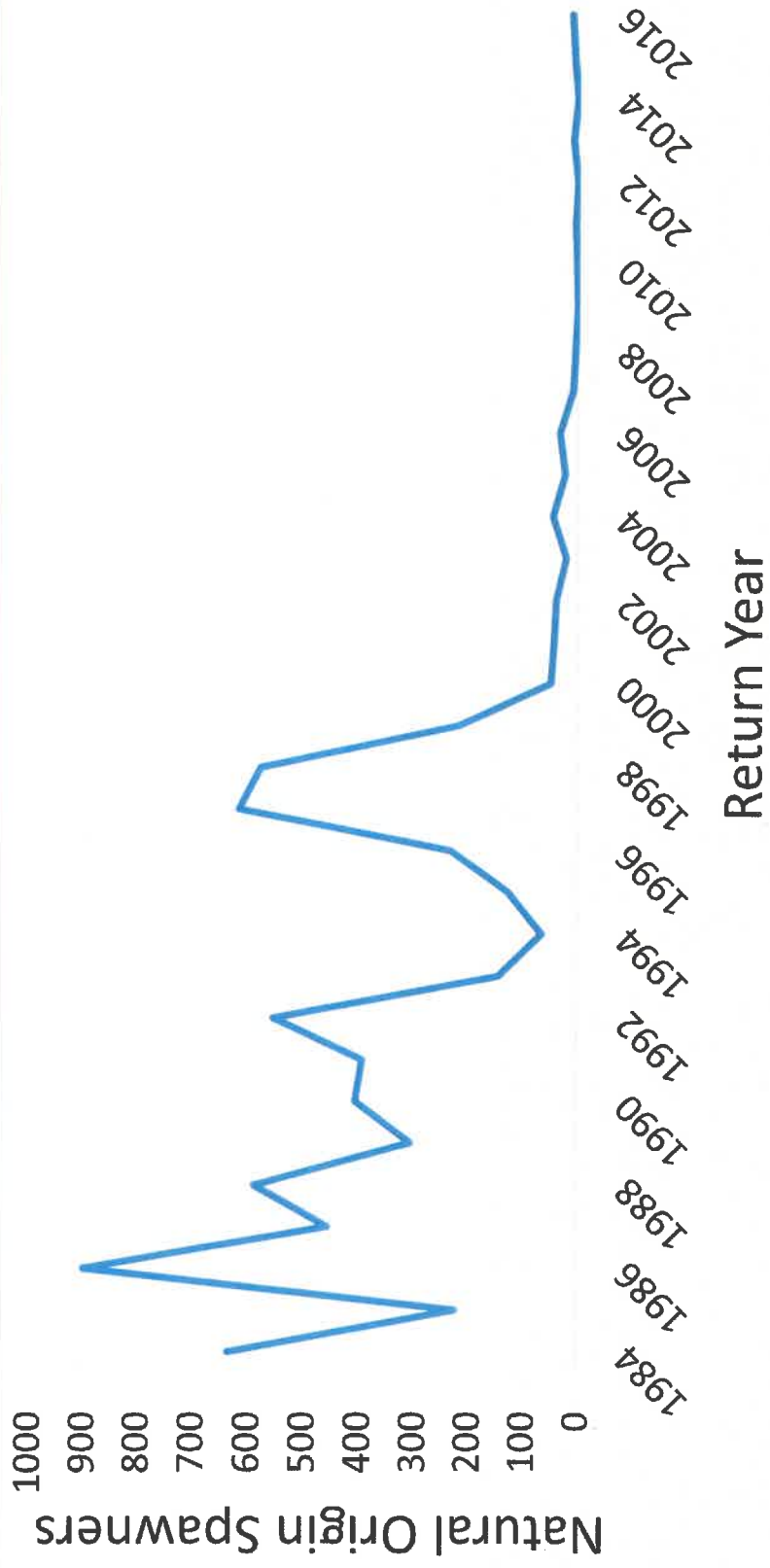
- ▶ A release of 30,000 yearling smolts with a 0.5% SAR
- ▶ Total return of 150 adults
- ▶ Harvest of 53 adults
- ▶ 440 angler days.

SAR%	Returns		Harvest			Angler Days		
	Release		15%	25%	35%	15% Harvest Rate	25% Harvest Rate	35% Harvest Rate
0.50%	30,000	150	23	38	53	188	313	440

Cedar River Winter-Late

- ▶ Natural population went functionally extinct during the early 2000's.
 - ▶ 1984 to 1999 abundance averaged 402 spawners.
- ▶ Assessed a reintroduction program using wild Green River winter-late steelhead.
- ▶ Used the SAR% approach to model potential program sizes.
 - ▶ Smolt to adult survival is unknown for the Cedar River.
 - ▶ Used a range of SAR% from 0.25% to 2%.

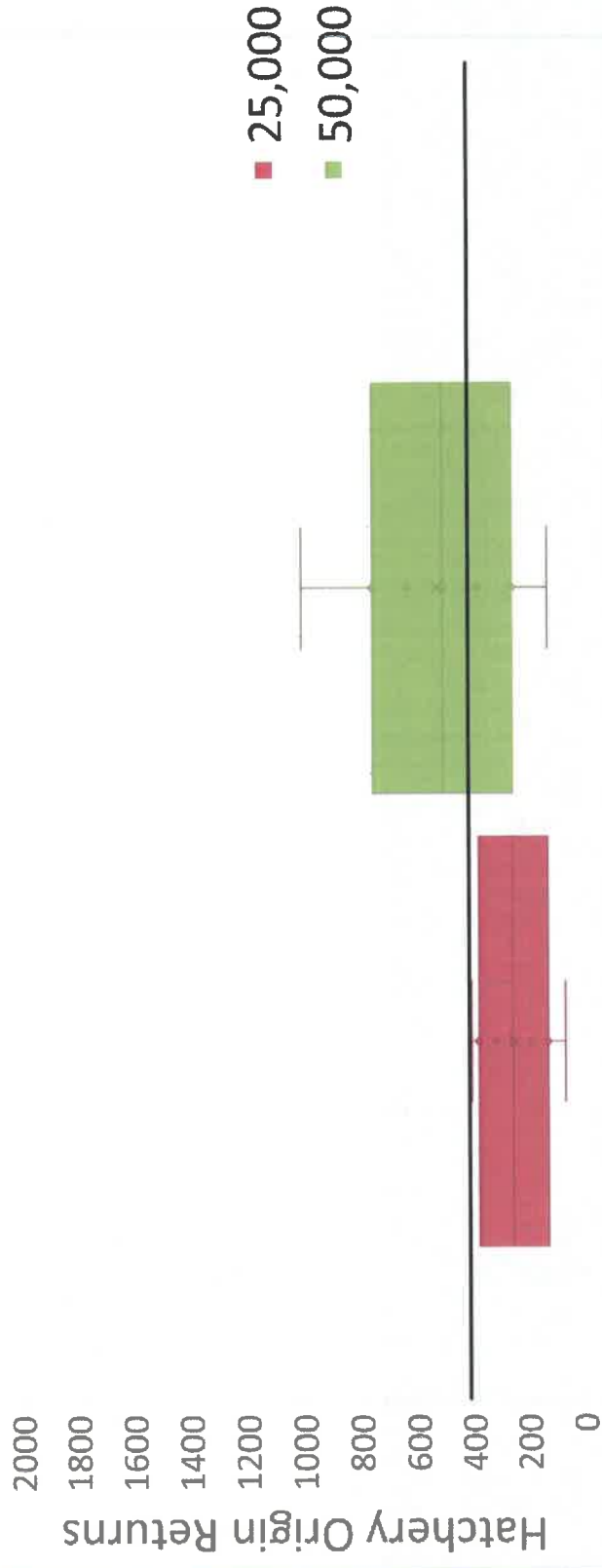
Cedar River Winter-Late



Results

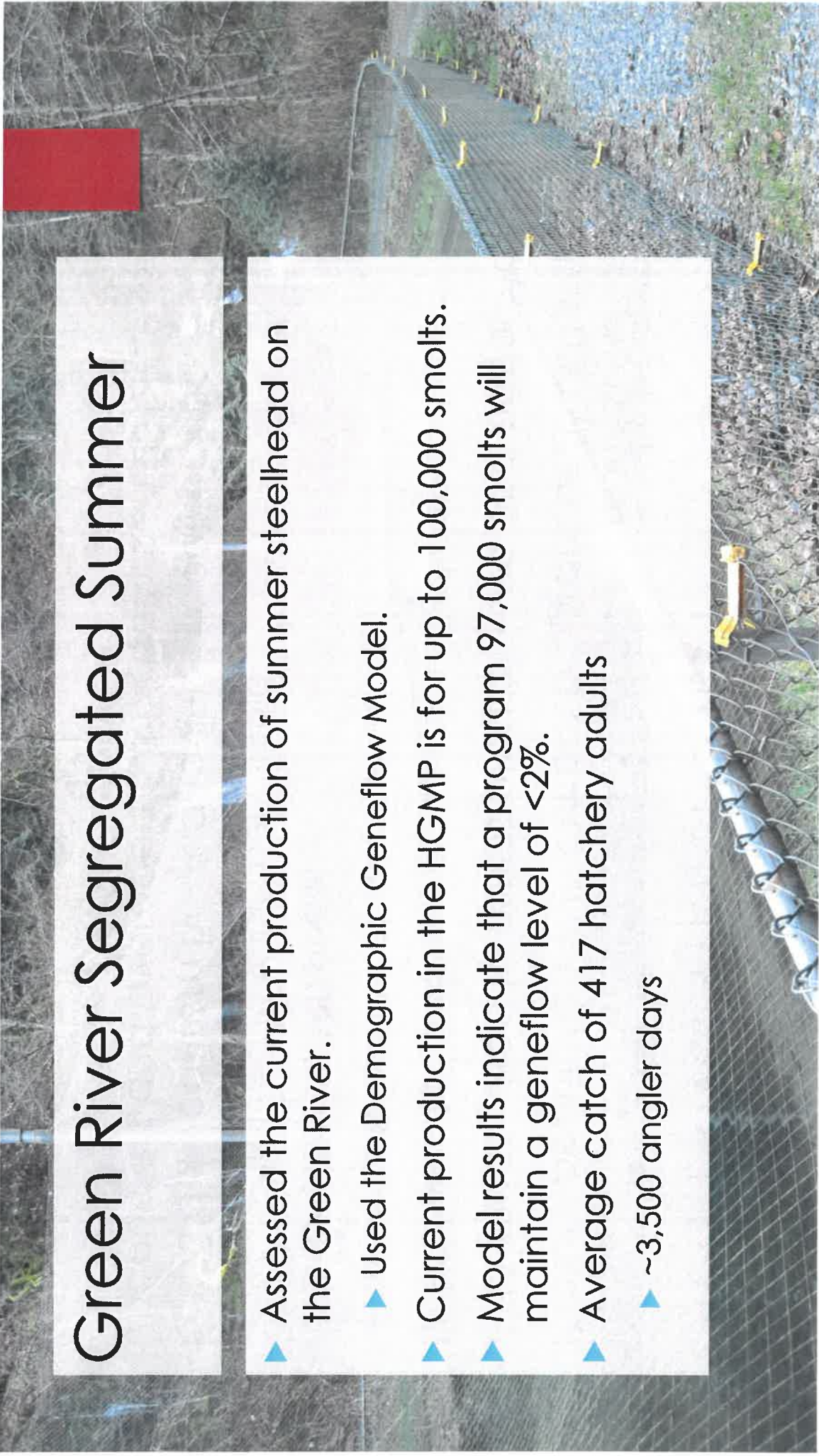
- ▶ A program size of 25,000 to 50,000 would be needed to get sufficient returns.

Cedar River Winter Late Steelhead



Green River Segregated Summer

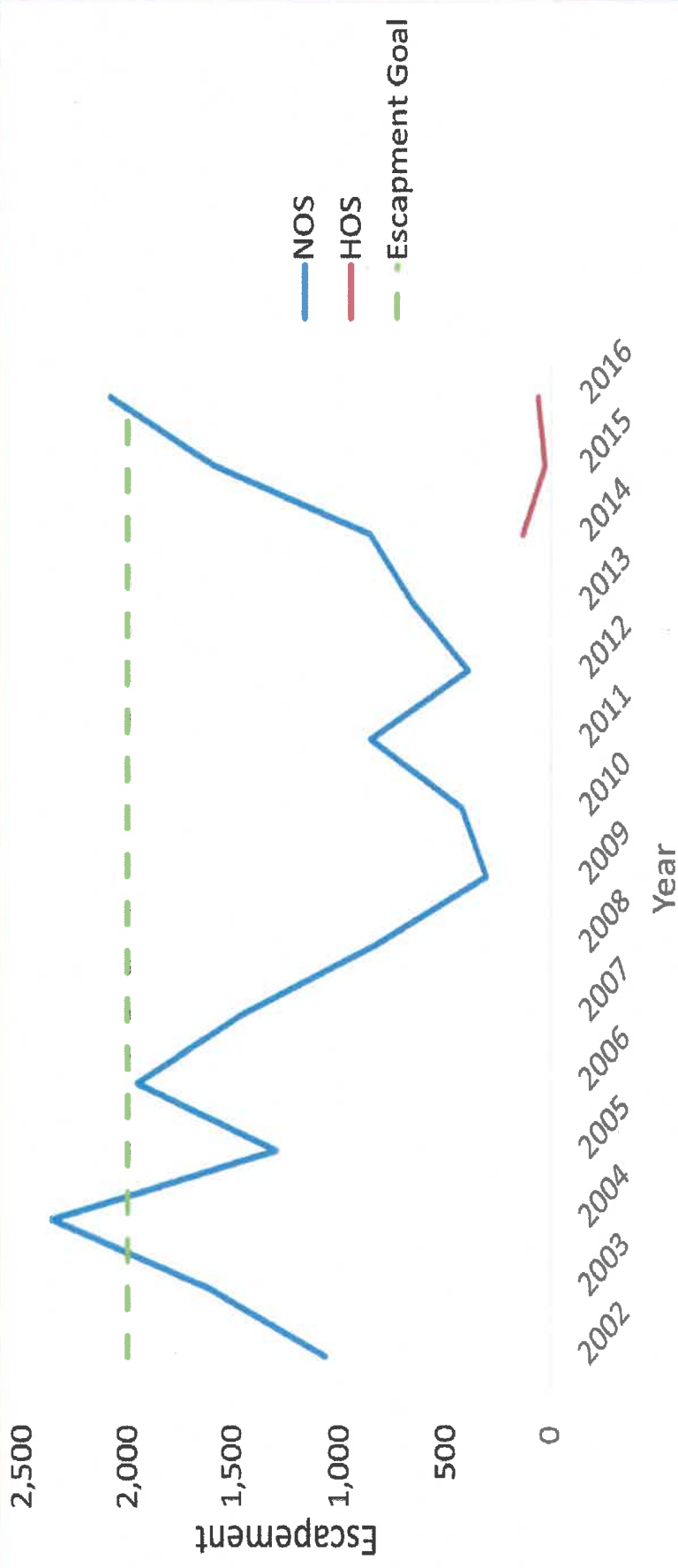
- ▶ Assessed the current production of summer steelhead on the Green River.
 - ▶ Used the Demographic GeneFlow Model.
- ▶ Current production in the HGMP is for up to 100,000 smolts.
- ▶ Model results indicate that a program 97,000 smolts will maintain a geneflow level of <2%.
- ▶ Average catch of 417 hatchery adults
 - ▶ ~3,500 angler days



Green River Winter-Late

- ▶ Primary population with current program of 55,000 smolts.
- ▶ AHA model used to assess program size and performance.
- ▶ Model inputs
 - ▶ SAR = 1.5%
 - ▶ Capacity = 40,590 smolts
 - ▶ Productivity = 110 smolts per female
- ▶ pHOS derived from hook and line broodstocking encounters and averaged 5.85% between 2014-2016.

Green River Winter-Late

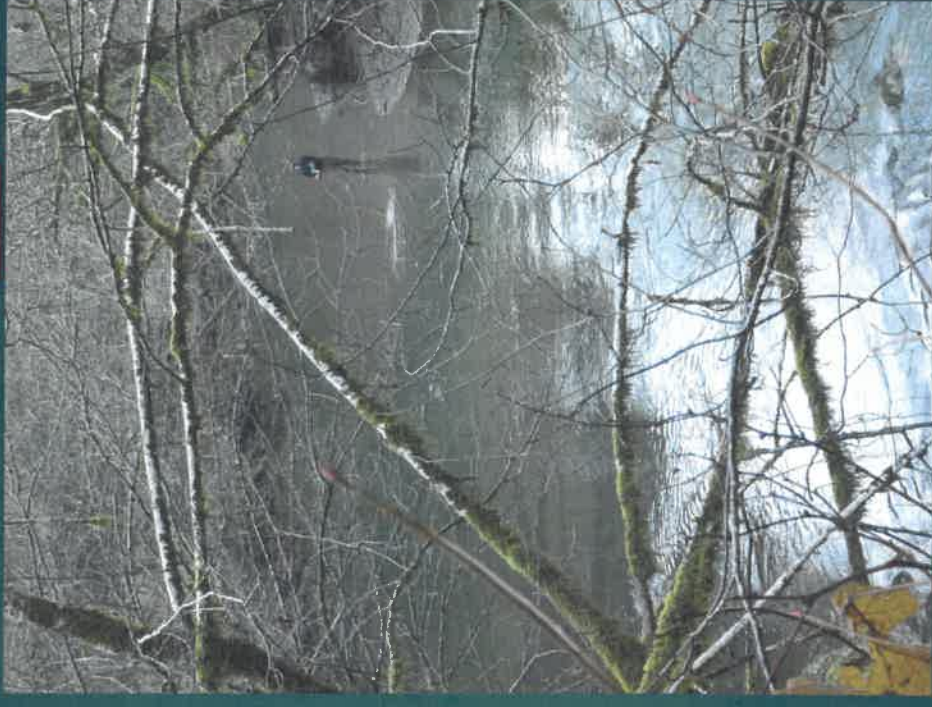


Potential programs

- ▶ Assessed program sizes of 55,000 to 110,000
- ▶ Broodstock Needs
 - ▶ Fecundity = 4,000 eggs per female.
 - ▶ 110,000 requires 84 adults
 - ▶ 30% of the run (2002-2016 average) = 355 spawners
- ▶ Assessed hatchery programs with a SAR of 0.5%

Results Continued

- ▶ 55,000 (current program)
 - ▶ Within HSRG standards for SAR of 0.5%.
 - ▶ pHOS (10%); PNI = (83%)
- ▶ 110,000
 - ▶ Within HSRG standards for SAR of 0.5%.
 - ▶ pHOS (25%); PNI = (67%)



Harvest Results

- ▶ A fishery would be considered if 75% of the escapement goal (EG) is reached (1,500 fish)
- ▶ Option 1: Current program Catch and Release Fishery
 - ▶ 3,100 angler days
- ▶ Option 2: 110,000 release and mark selective fishery
 - ▶ Harvest 138 hatchery fish with 3,100 angler days
- ▶ Option 3: 110,000 release Catch and Keep Fishery when above EG of 2,000 spawners
 - ▶ Harvest 50 natural and 14 hatchery fish
 - ▶ 420 angler days

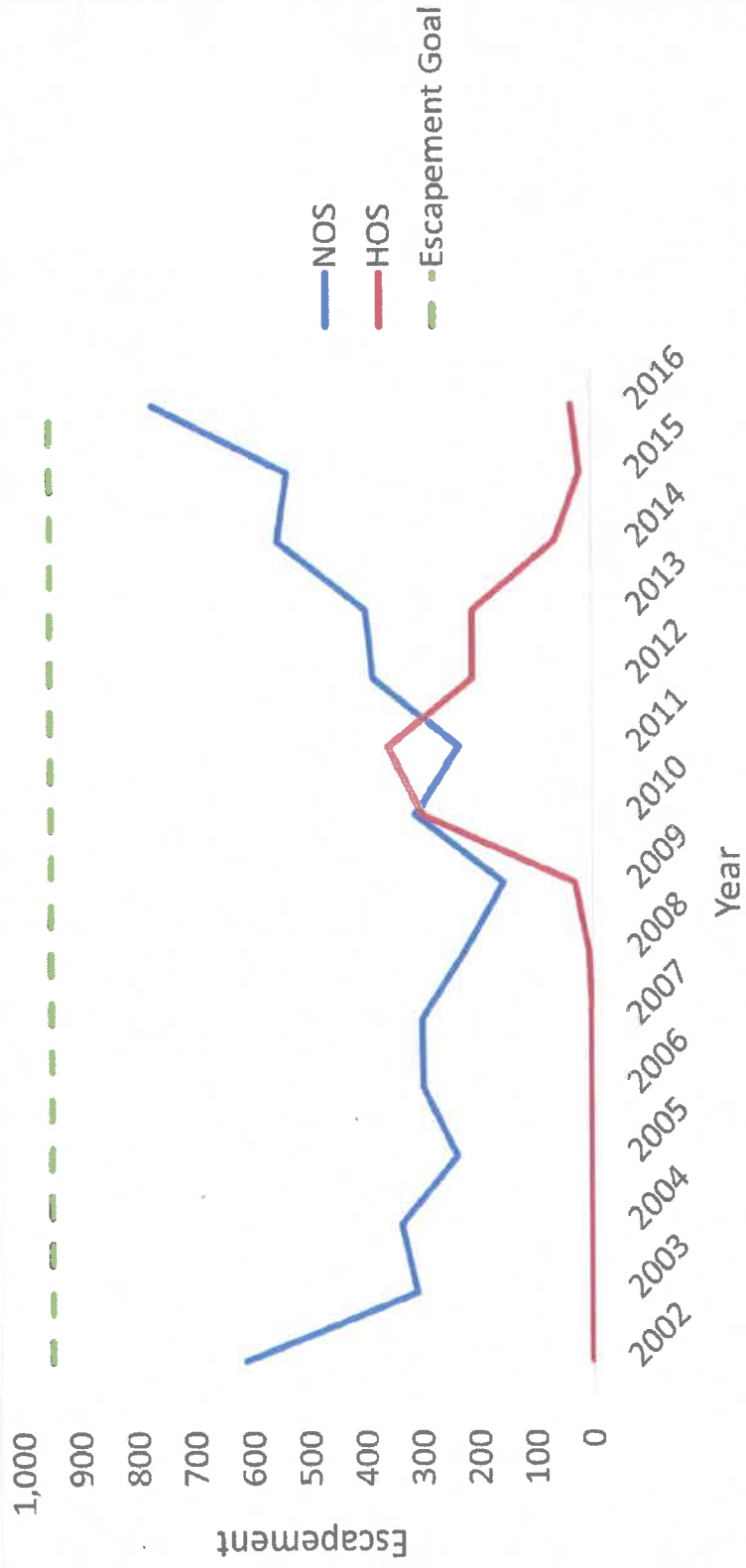


White River Winter-Late

- ▶ Primary population, current program size up to 60,000 smolts
- ▶ AHA model used to assess program size and performance.
- ▶ Model inputs
 - ▶ SAR = 1.5%
 - ▶ Capacity = 36,899 smolts
 - ▶ Productivity = 110 smolts per female
- ▶ pHOS based on returns to the White River trap has averaged 24% since the inception of the program.



White River Winter-Late



Potential programs

- ▶ Assessed program sizes of 60,000 (current) to 198,000.
- ▶ Broodstock Needs
 - ▶ Fecundity = 3,209 eggs per female.
 - ▶ 198,000 requires 172 adults
 - ▶ 120,000 requires 108 adults
 - ▶ 75,000 requires 75 adults
- ▶ 30% of the run during average (2002-2016) years = 116 spawners
- ▶ Assessed programs with a SAR of 0.5%

Results Continued

- ▶ 60,000 (Current program)
 - ▶ Within HSRG standards for SAR of 0.5%.
 - ▶ pHOS (6.4%); PNI (94%)
- ▶ 198,000
 - ▶ Exceeds HSRG maximum broodstock limit <30% of the NORs
 - ▶ pHOS (29.5%); PNI (77%)
- ▶ 120,000
 - ▶ Within HSRG standards for SAR of 0.5%.
 - ▶ pHOS (20.2%); PNI (83%)

Harvest Results

- ▶ A fishery would be considered if 75% of the escapement goal (EG) is reached (730 fish)
- ▶ Option 1: Current program Catch and Release Fishery
 - ▶ 1,500 angler days
- ▶ Option 2: 120,000 release and mark selective fishery
 - ▶ Harvest 15 hatchery fish with 1,500 angler days
- ▶ Option 3: 110,000 release Catch and Keep Fishery when above EG of 974 spawners
 - ▶ Harvest 24 natural and 15 hatchery fish
 - ▶ 200 angler days



Nisqually River

- ▶ Wild Steelhead Management Zone – Primary population, No hatchery releases
- ▶ Fishery Options
 - ▶ Option 1: Current program Catch and Release Fishery if 75% of the escapement goal (EG) is reached (1,500 fish)
 - ▶ 3,100 angler days
 - ▶ Option 2: Catch and Keep Fishery when above EG of 2,000 spawners
 - ▶ Harvest 50 natural
 - ▶ 420 angler days

Deschutes Early-winter segregated

- ▶ No natural population
- ▶ Steelhead were historically released in the Deschutes River – discontinued in 2005 due to low survival.

	SAR%	Returns			Angler Days		
		Release (Low)	Release (Med)	Release (High)	Release (Low)	Release (Med)	Release (High)
Historic Survival (BY 1995 to 2004)		25,000	50,000	100,000	25,000	50,000	100,000
High	0.12%	30	60	121	252	504	1,008

Questions?

