

Monitoring salmonid hatchery stocks with Parentage Based Tagging technology in the Columbia River basin



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Introduction

- Parentage-based tagging (PBT) is a large-scale, non-lethal tagging technology for monitoring and evaluating salmonid hatchery stocks.
- Currently used for Chinook, steelhead, and Coho salmon hatchery stocks in the Columbia River basin, Idaho (2012-present), in addition to the Snake River basin, Idaho (2008-present).

Above Bonneville Dam

	Spring Chinook	Summer Chinook	Fall Chinook	Steelhead	Coho
Brood stock	16,000	4,200	21,000	7,000	1,384
Juveniles Released	20,000,000	6,600,000	41,000,000	12,000,000	8,000,000
PBT Tag Rate	~100%	~100%	~100%	~100%	~28%

Below Bonneville Dam

Samples being collected and archived until funding is available to genotype

	Spring Chinook	Summer Chinook	Fall Chinook	Steelhead	Coho
Brood stock	7,000	N/A	14,000	3,000	N/A
Juveniles Released	11,000,000	N/A	27,000,000	3,000,000	12,000,000
PBT Tag Rate	~31%	N/A	~65%	0%	0%

Juveniles released - estimated from Fish Passage Center, migration year 2015

Implementation

1. Annually sample fin tissue from all hatchery brood stock — effectively tags nearly 100% of offspring released



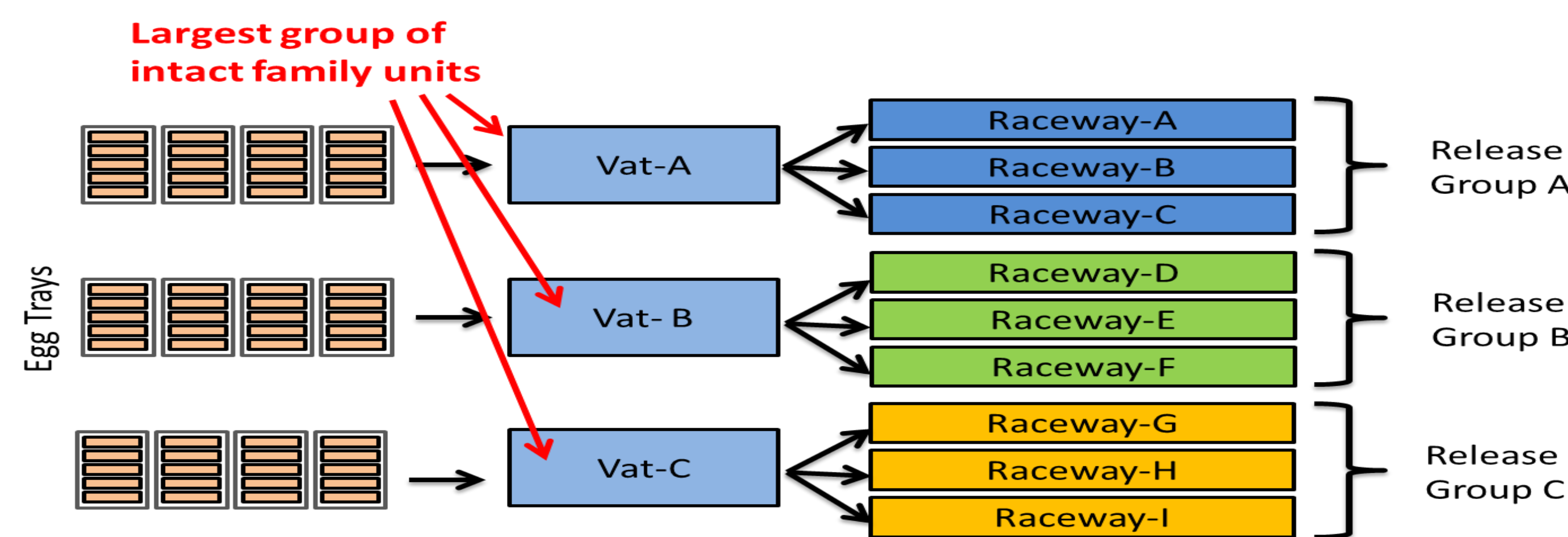
1. Spawn fish
2. Staff records hatchery-specific data
3. Collect fin tissue for PBT
4. Place tissue on Whatman paper and record sex and spawn date

II. Non-lethally tissue sample offspring (juveniles or adults), genotype, and assign back to parents — identifies age and hatchery of origin

Ability to follow stock/family groups — influenced by size of hatchery program, size/number of rearing vessels, management/research needs, and funding.

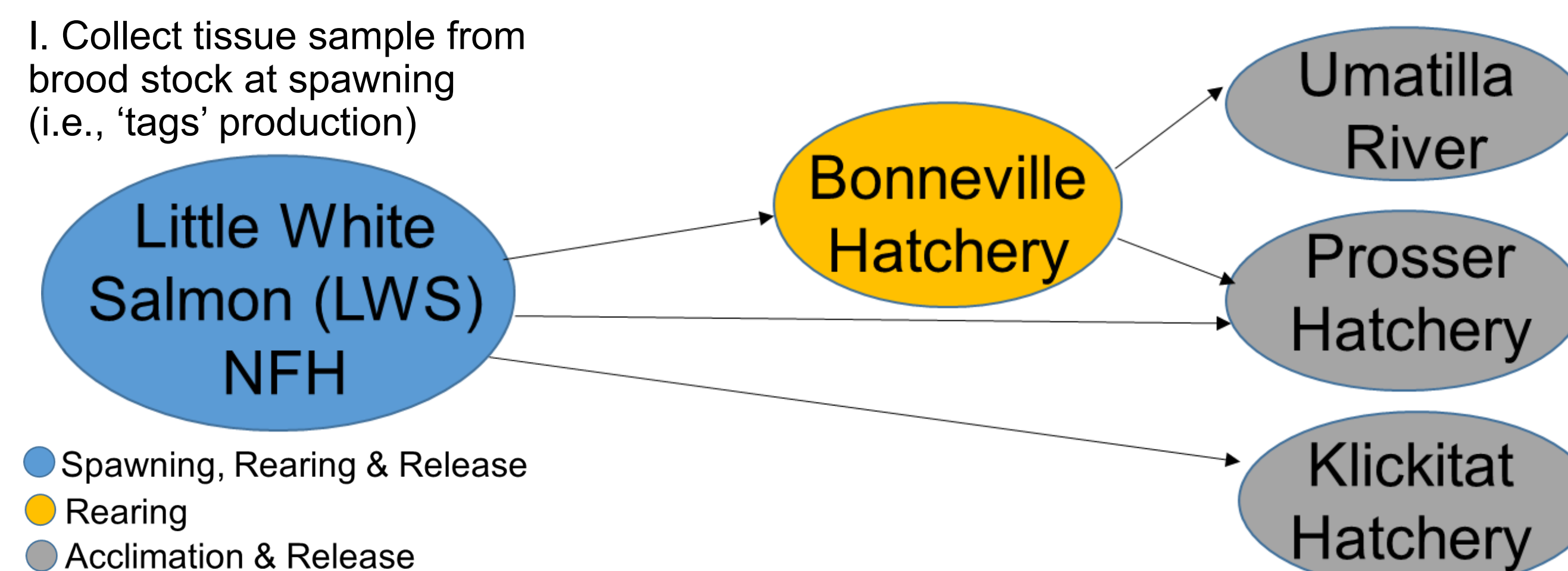
Best case scenario for following groups with PBT:

Release group size in intervals of your largest group of intact family units.



- Requires more detailed management than standard operating procedures
- Must maintain intact stock/family units during egg enumeration and marking
- Coordination of information is essential to success of following groups through release

Example of multiple stock groups and potential for information gained by following production:

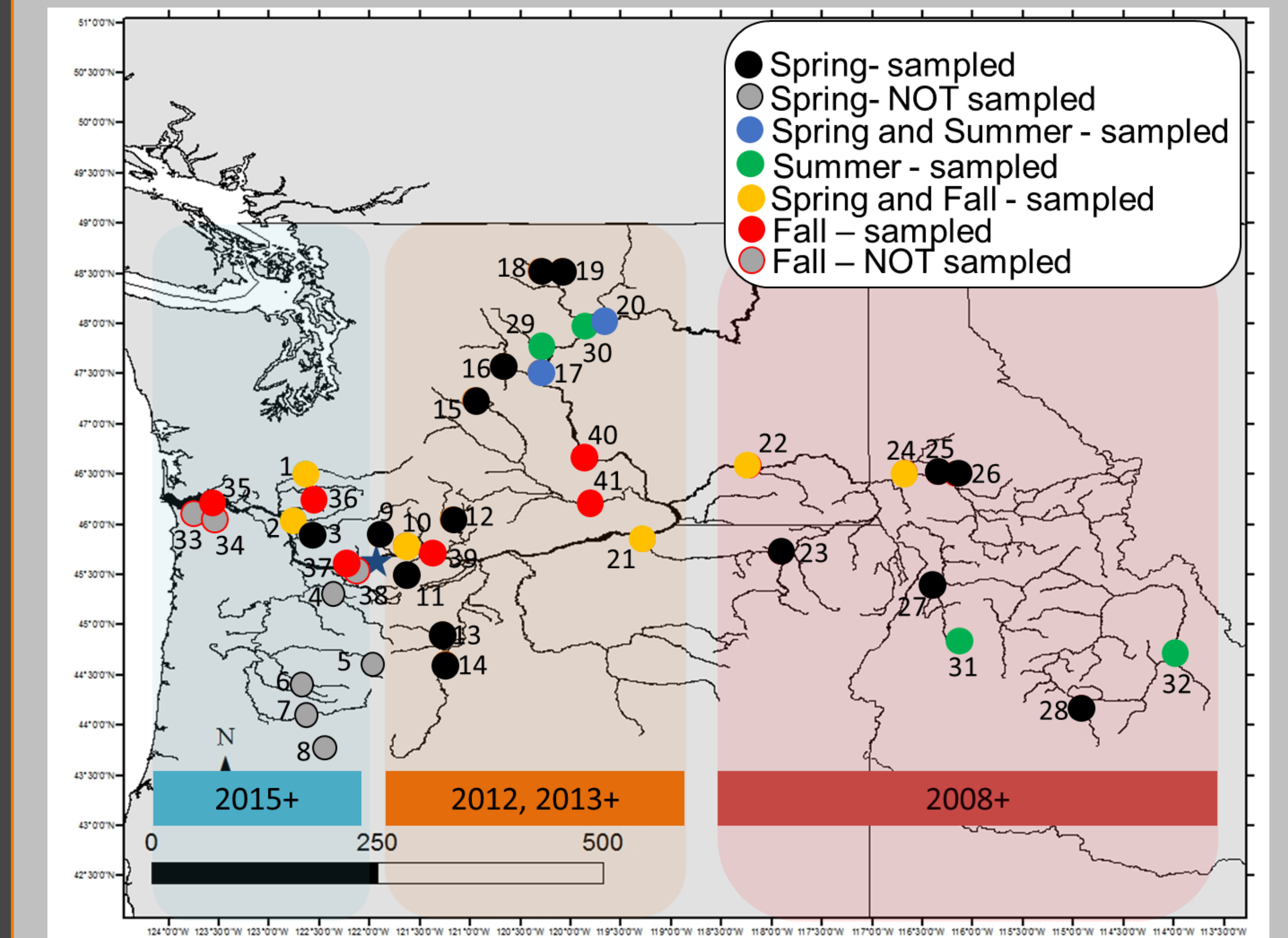


- I. Collect tissue sample from brood stock at spawning (i.e., 'tags' production)
 - At a minimum, PBT determines:
 - Stock of origin (LWS)
 - Brood year (e.g., 2012)
 - If follow entire production process, gain more information:
 - Rearing location (e.g., LWS, or Bonneville)
 - Release location (LWS-Prosser, LWS-Bonneville Hatchery-Prosser, etc.)

Example applications (see companion poster: Steele et al.):

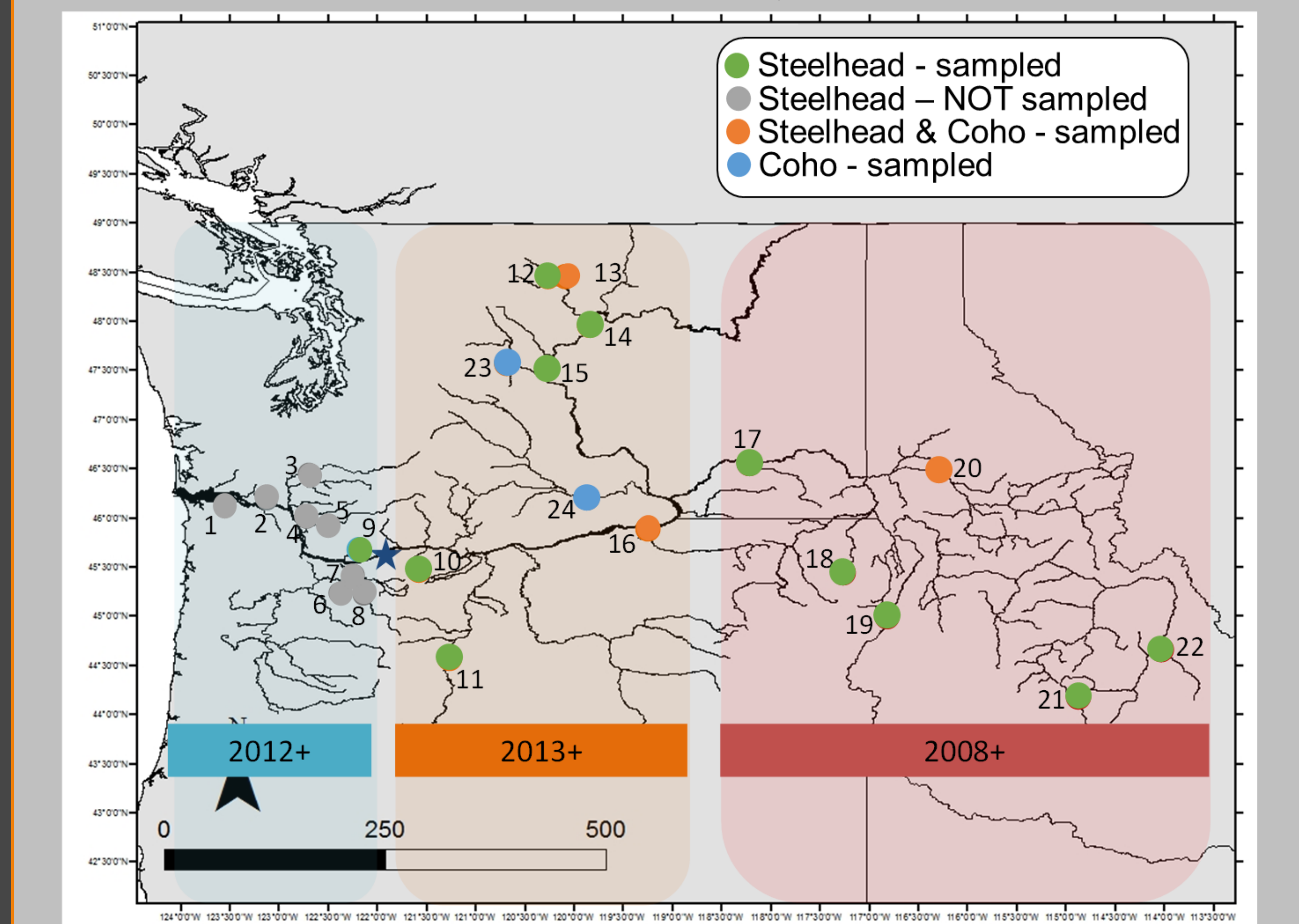
- Stock-specific fisheries contribution
- Stock-specific abundance and run timing
- Age distribution
- Effects of size, timing, release location on harvest, maturation, straying, ocean distribution

Spawning hatcheries Chinook Salmon



1-Cowlitz Salmon, 2-Kalama Falls, 3-Lewis River, 4-Clackamas, 5-Marion Forks, 6-South Santiam, 7-McKenzie, 8-Willamette, 9-Carson NFH, 10-Little White Salmon NFH, 11-Parkdale, 12-Klickitat, 13-Warm Springs NFH, 14-Round Butte, 15-Cle Elum SRF, 16-Leavenworth NFH, 17-Eastbank, 18-Methow, 19-Winthrop NFH, 20-Chief Joseph, 21-Umatilla, 22-Lyons Ferry, 23-Lookingglass, 24-Nez Perce Tribal, 25-Dworshak NFH, 26-Clearwater, 27-Rapid River, 28-Sawtooth, 29-Entiat NFH, 30-Wells, 31-SF Salmon, 32-Pahsimeroi, 33-NF Klaskanine, 34-SF Klaskanine, 35-Big Creek, 36-Toutle, 37-Washougal, 38-Bonneville, Tanner Cr Tule, 39-Spring Creek NFH, 40-Priest Rapids, 41-Prosser, Star-Bonneville Dam

Steelhead & Coho



1-Big Creek, 2-Abernathy FTC, 3-Cowlitz Trout, 4-Kalama Falls, 5-Merwin, 6-Clackamas, 7-Sandy, 8-Eagle Creek NFH, 9-Skamania, 10-Parkdale, 11-Round Butte, 12-Methow (Twisp), 13-Winthrop NFH, 14-Wells, 15-Eastbank, 16-Umatilla, 17-Lyons Ferry, 18-Wallowa, 19-Oxbow, 20-Dworshak NFH, 21-Sawtooth, 22-Pahsimeroi, 23-Leavenworth NFH, 24-Prosser
Star - Bonneville Dam
Note: Coho programs below Bonneville Dam not shown