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**Northwest  
Fisheries  
Science Center**

# Annual and Seasonal Effects of Smolt Transportation

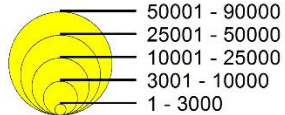
Lower Snake River Compensation Plan  
Annual Meeting 2026

April 23, 2026

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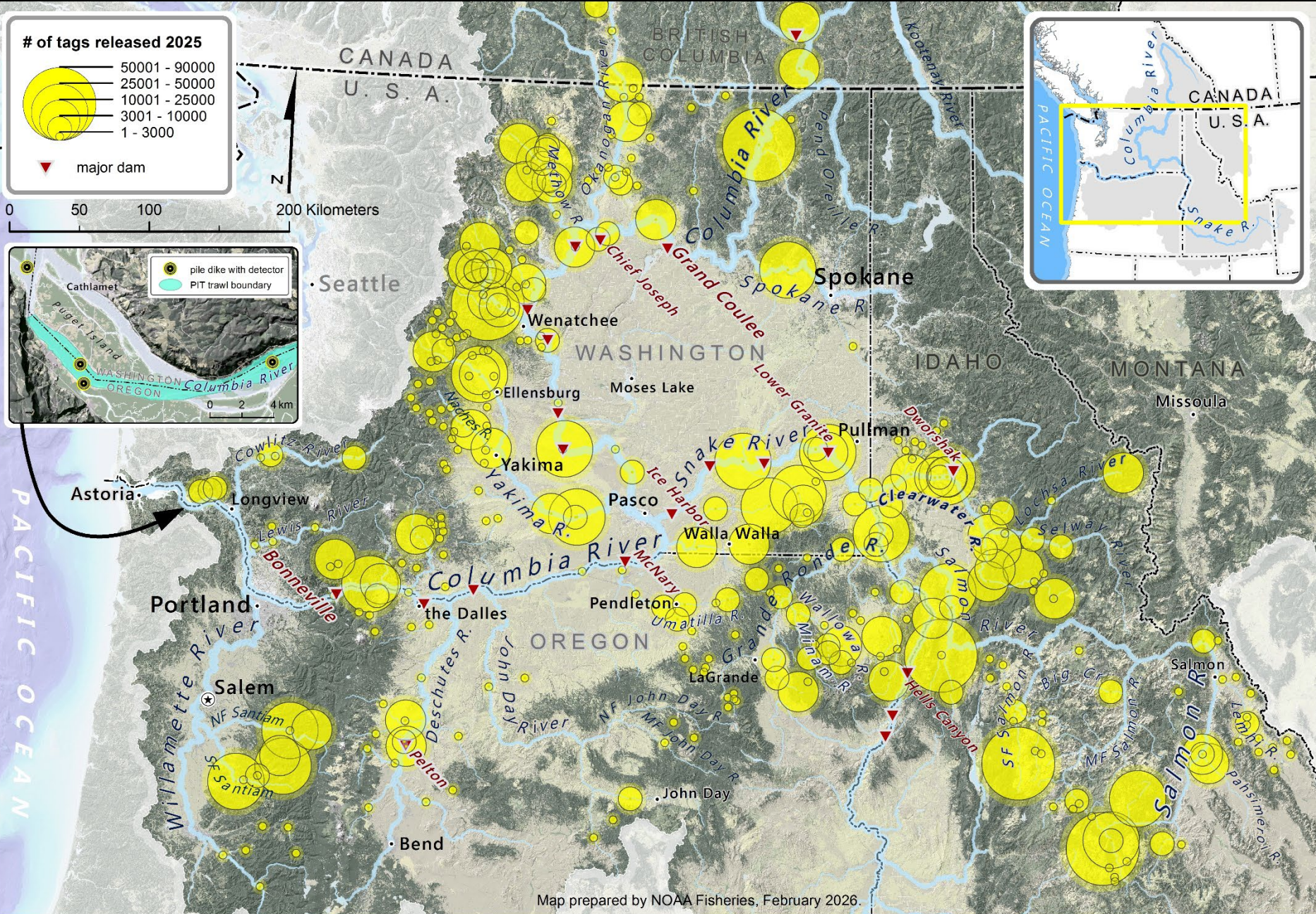
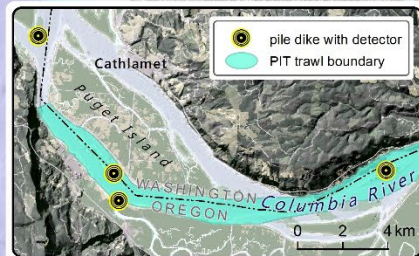


# # of tags released 2025



▼ major dam

0 50 100 200 Kilometers



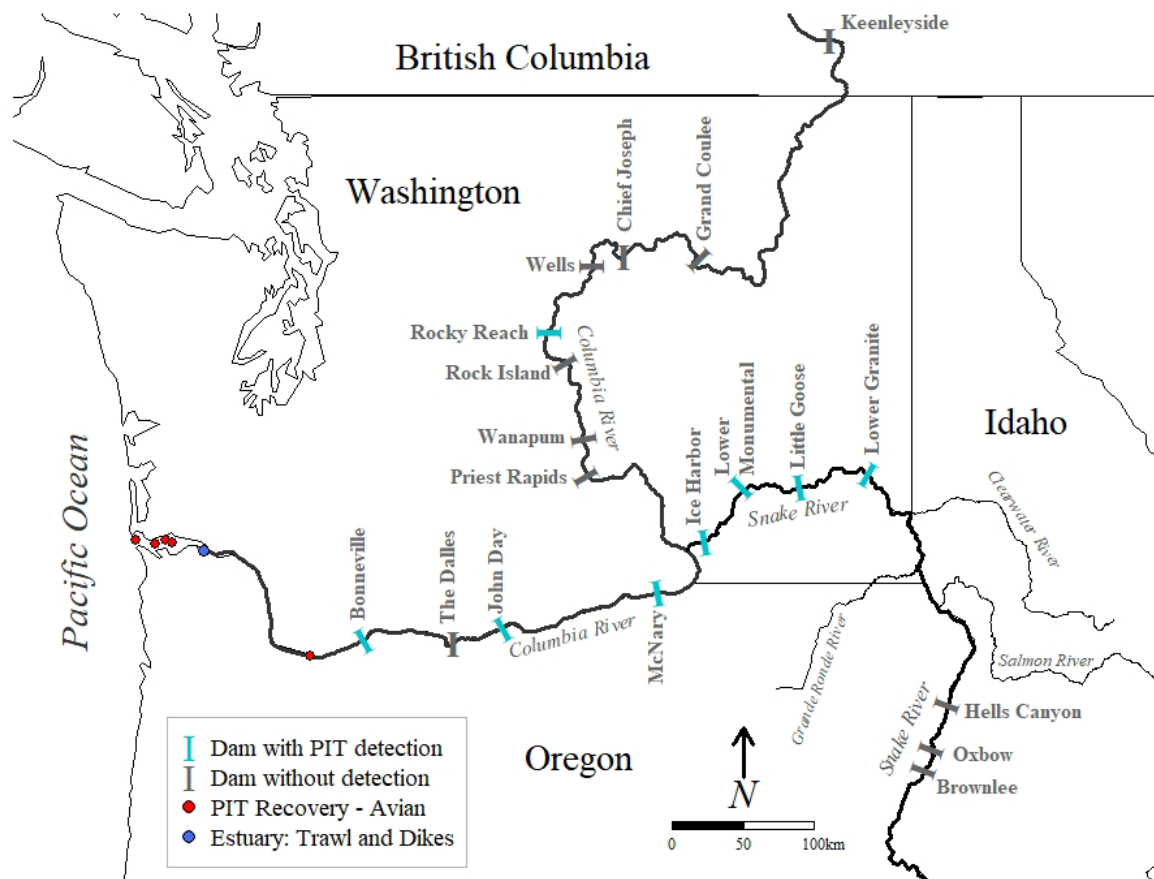
Map prepared by NOAA Fisheries, February 2026.

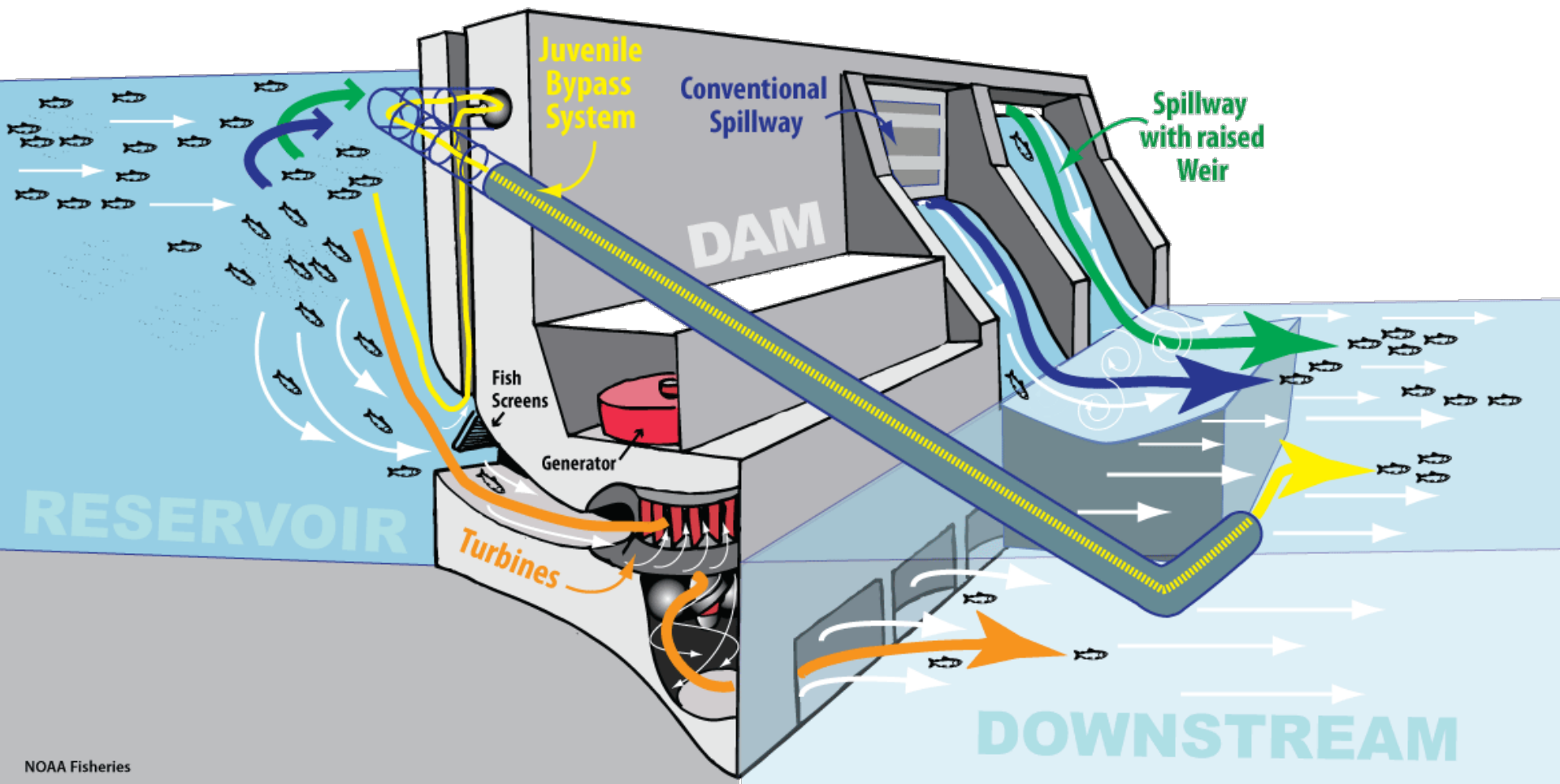


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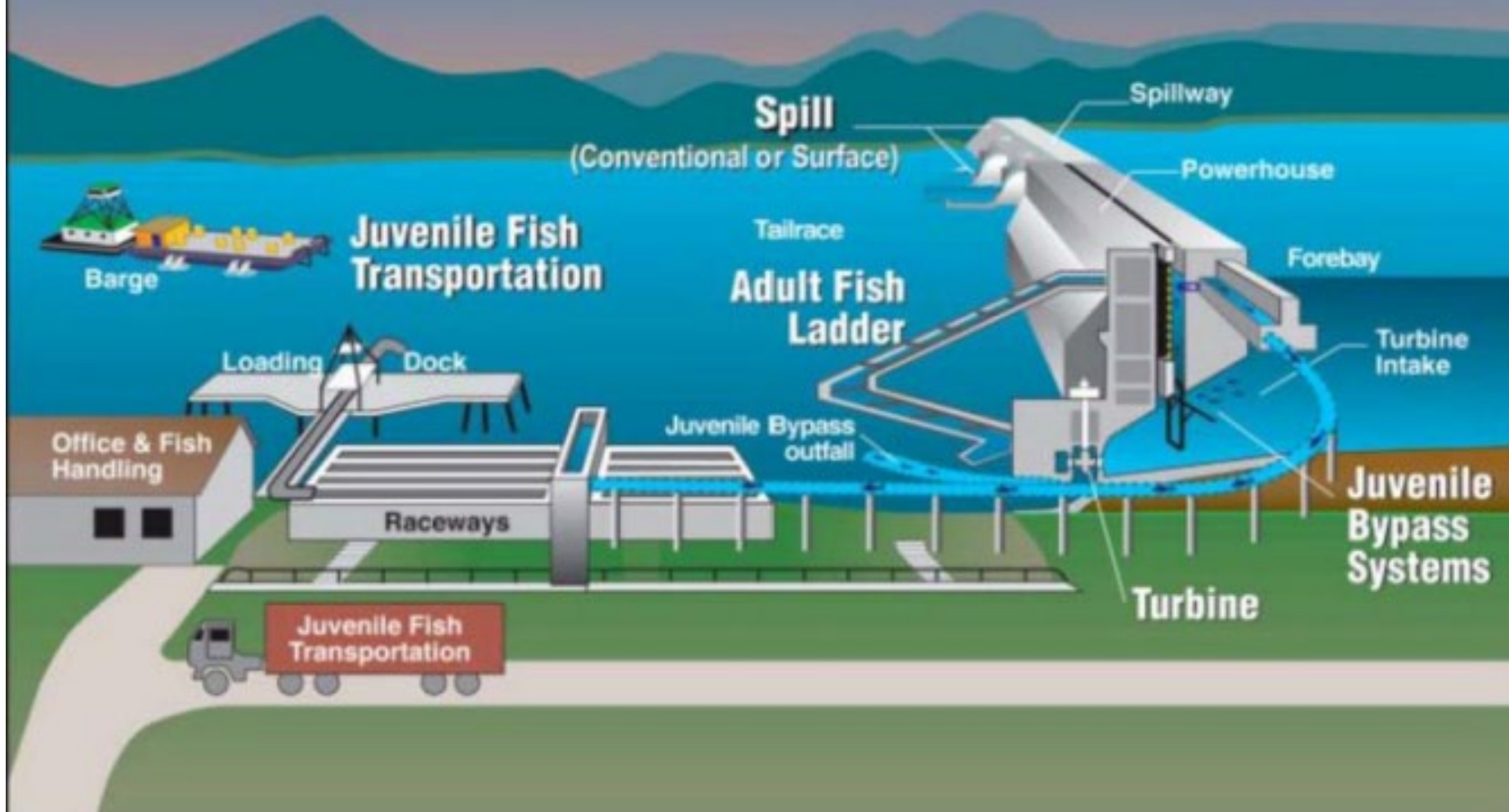
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# Fish Passage Routes



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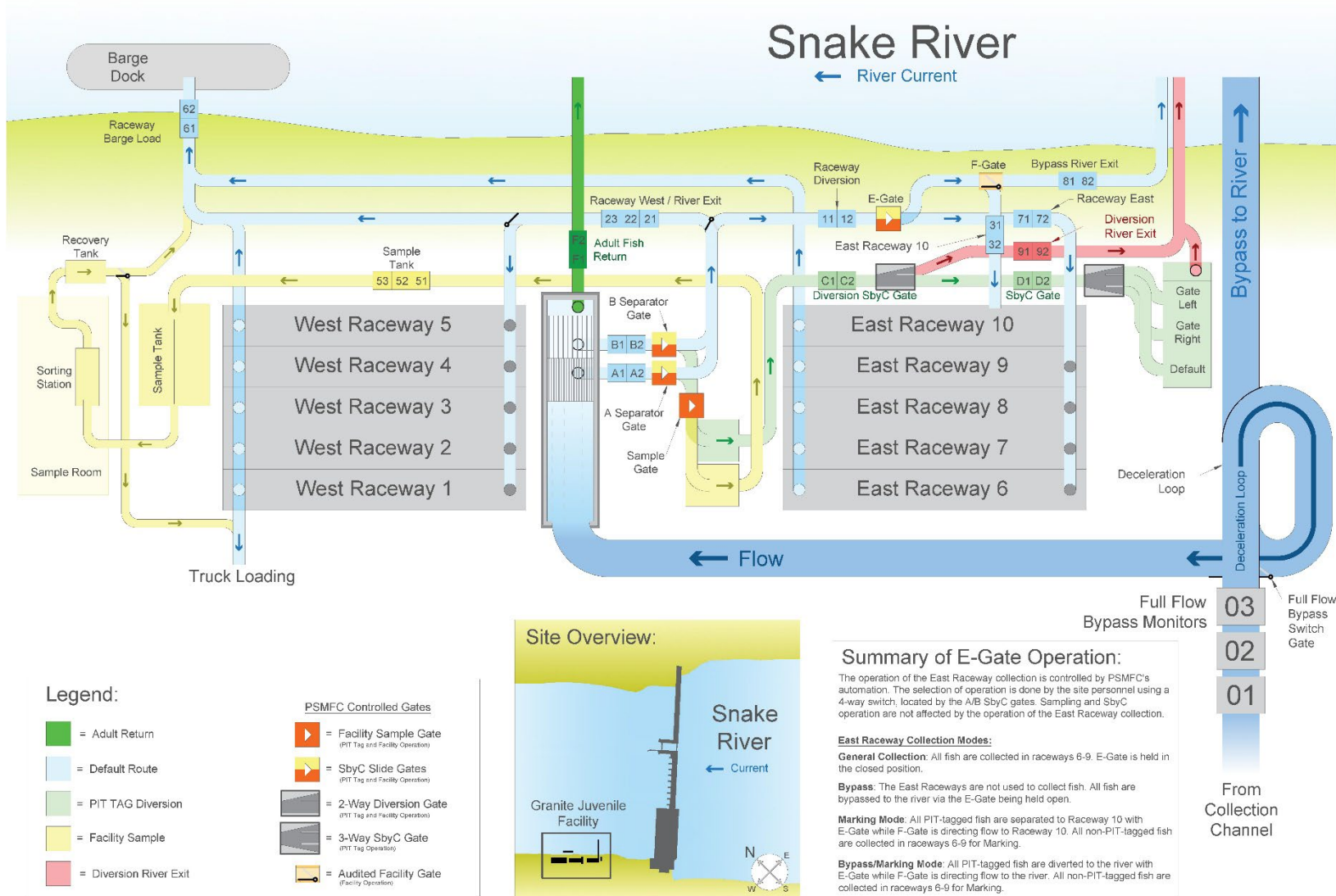
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PIT Tag Information System  
Columbia Basin | ptagis.org

# Lower Granite Dam Smolt Bypass and Collection (GRJ)

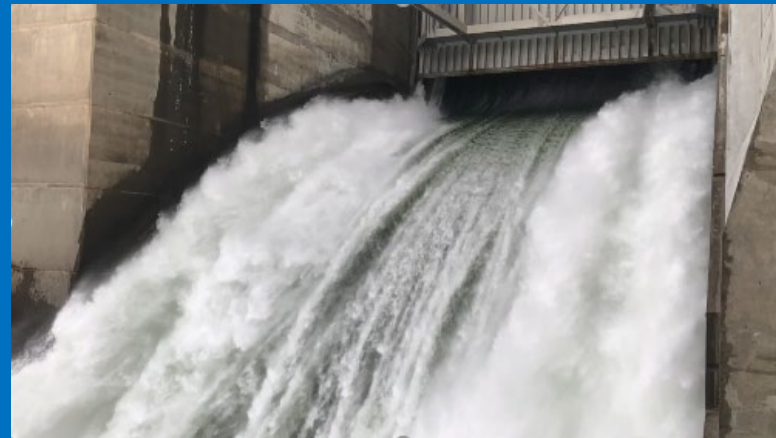
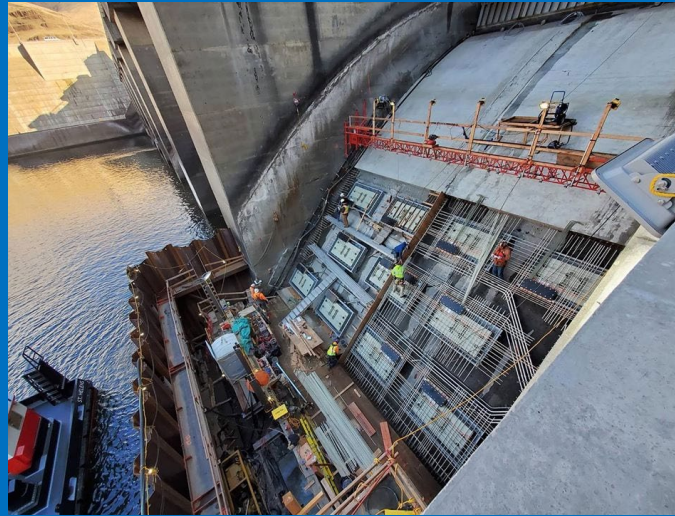
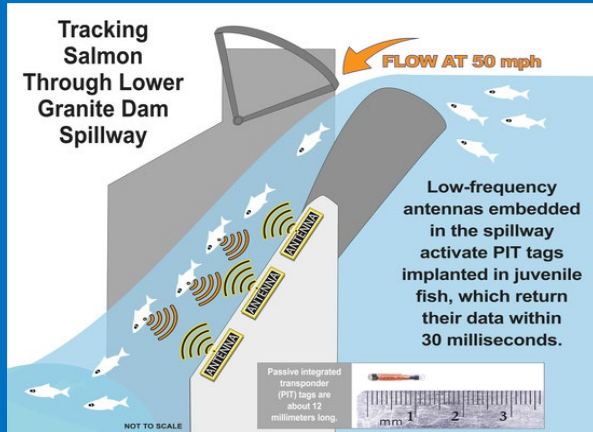
## Interrogation Site Configuration 170. Drawing Rev 1.



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# Spillway PIT Detection at Lower Granite Dam



# Analyses of data from Groups of PIT-Tagged Fish

## Tagged Upstream of Lower Granite Dam

- “(T)ransported” – Entered gatewell, guided into Juvenile Fish Facility, collected in raceway, loaded into barge, transported to below Bonneville Dam
- “(B)ypassed” – Entered gatewell, guided into Juvenile Fish Facility, directed to tailrace
- “(S)pilled” – Passed LGR via spillway, 2020-2023



# Stocks Barged In Springtime

- Yearling spring/summer Chinook
- Juvenile steelhead
- Subyearling fall Chinook
- Sockeye



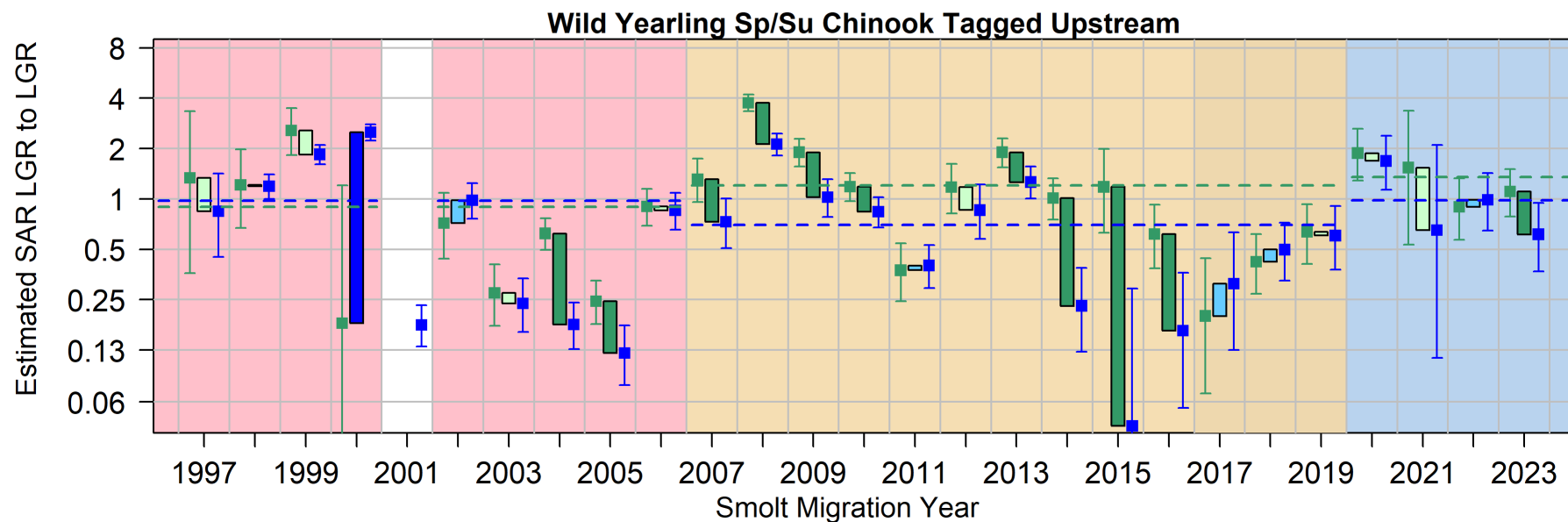
# Topics

1. Annual estimates of SAR and SAR ratios T:B and T:S
  - New visualization style
2. Seasonal Patterns in T:S



- Smolt-to-Adult Return Rates (SAR)
  - Smolts at collector dam, Adults at Lower Granite  
Adult returns through Jan 2, 2026 – Including smolt MY 2023
  - Annual or sub-annual estimates and Regression versus Date
  - For aggregations: median unbiased estimator (*note: non-zero when successes=0*)
- SAR Ratios
  - Transported vs. Bypassed (T:B) – LGR, LGS, LMN - MY 1997-2023
  - Spilled vs. Bypassed (S:B)
  - Transported vs. Spilled (T:S) } Lower Granite - MY 2020-2023
- Uncertainty: 90% bootstrap confidence intervals

Transported vs. Bypassed  
Annual Estimated SAR and T:B Ratio - Lower Granite to Lower Granite



**Legend**

■ Estimated Transported SAR, 90% CI     ■ Estimated Bypassed SAR, 90% CI

■ T>B, signif

■ T>B, not signif

■ T<B, not signif

■ T<B, signif

**“Spill Regimes”**

1997-2006, excluding 2001

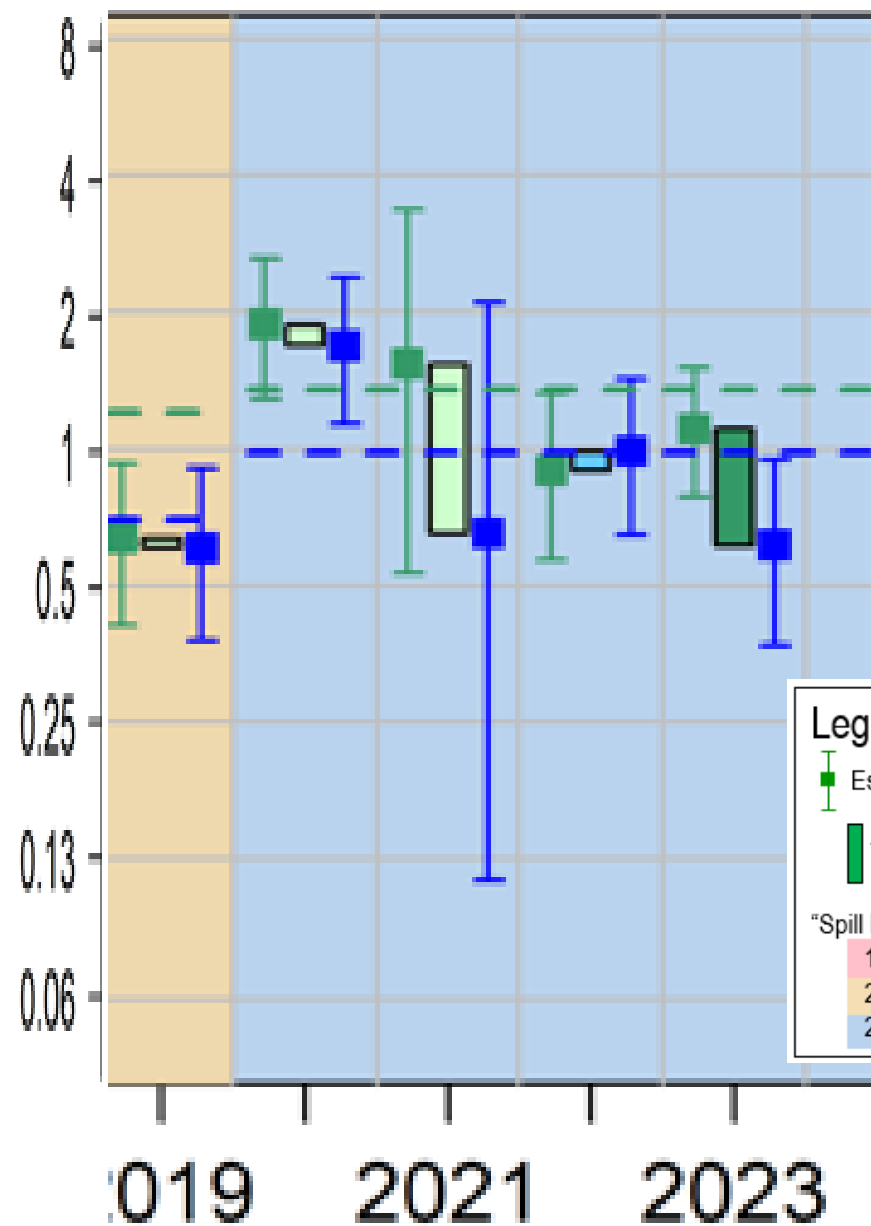
2007-2019

2020-2023

--- Mean Transported SAR in regime

--- Mean Bypassed SAR in regime

Estimated SAR LGR to LGR



### Legend

■ Estimated Transported SAR, 90% CI

■ Estimated Bypassed SAR, 90% CI

T > B, signif

T > B, not signif

T < B, not signif

T < B, signif

### "Spill Regimes"

1997-2006, excluding 2001

2007-2019

2020-2023

--- Mean Transported SAR in regime

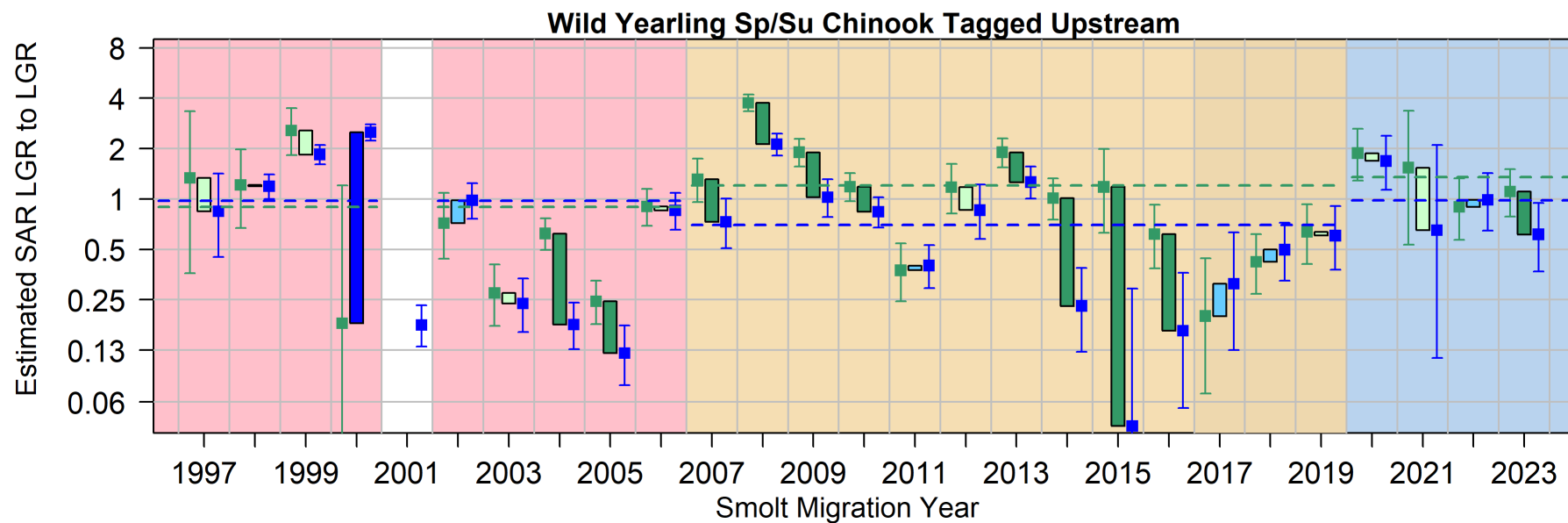
--- Mean Bypassed SAR in regime



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Transported vs. Bypassed  
Annual Estimated SAR and T:B Ratio - Lower Granite to Lower Granite



**Legend**

■ Estimated Transported SAR, 90% CI    ■ Estimated Bypassed SAR, 90% CI

■ T>B, signif

■ T>B, not signif

■ T<B, not signif

■ T<B, signif

**"Spill Regimes"**

1997-2006, excluding 2001

2007-2019

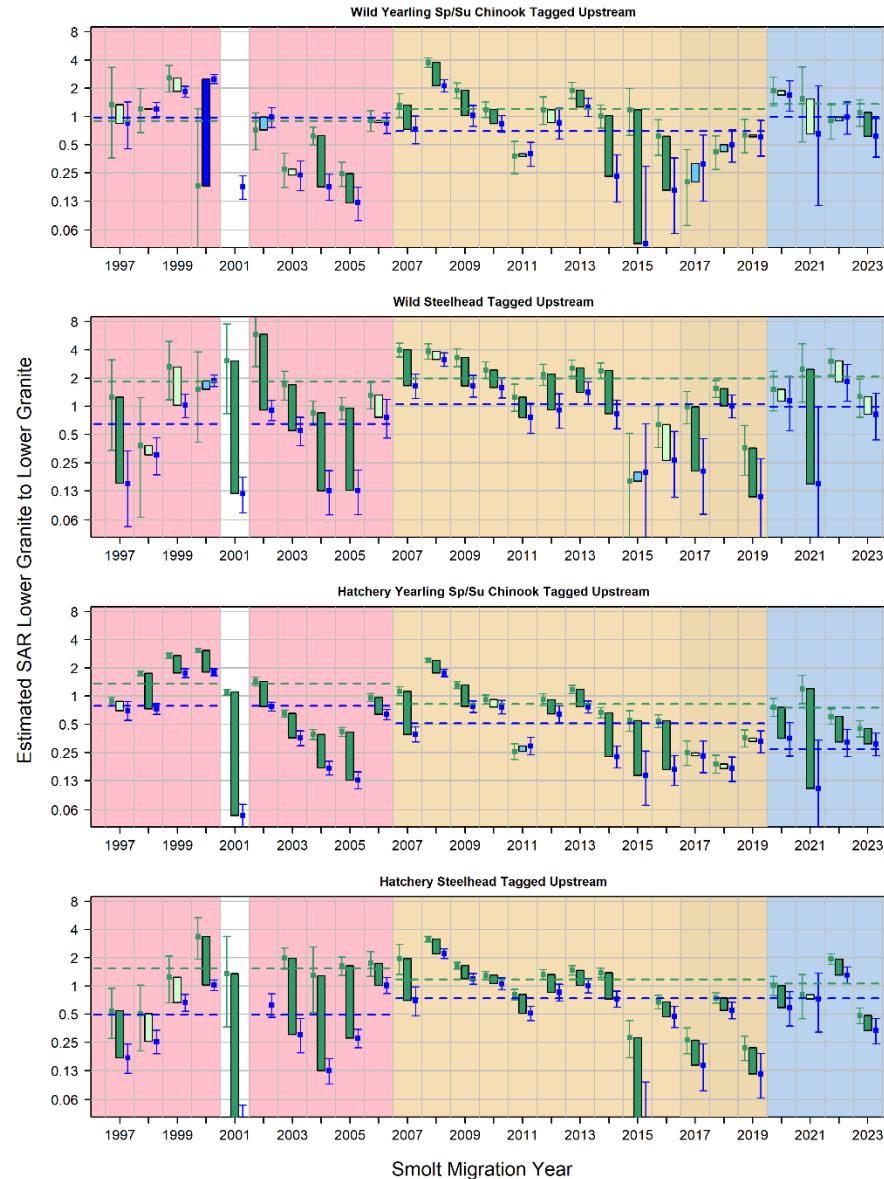
2020-2023

--- Mean Transported SAR in regime

--- Mean Bypassed SAR in regime

Transported vs. Bypassed  
Annual Estimated SAR and T:B Ratio - Lower Granite to Lower Granite

Tagged Upstream,  
In JFF at Lower Granite Dam  
Transported vs. Bypassed



**geomean T:B**

**Wild Chinook**

1.01 (0.81, 1.21)

1.90 (1.60, 2.26)

1.48 (0.93, 2.55)

**Wild Steelhead**

3.23 (2.20, 4.33)

2.01 (1.62, 2.59)

2.75 (1.94, 3.94)

**Hatchery Chinook**

1.88 (1.77, 2.00)

1.66 (1.52, 1.84)

2.87 (2.03, 4.69)

**Hatchery Steelhead**

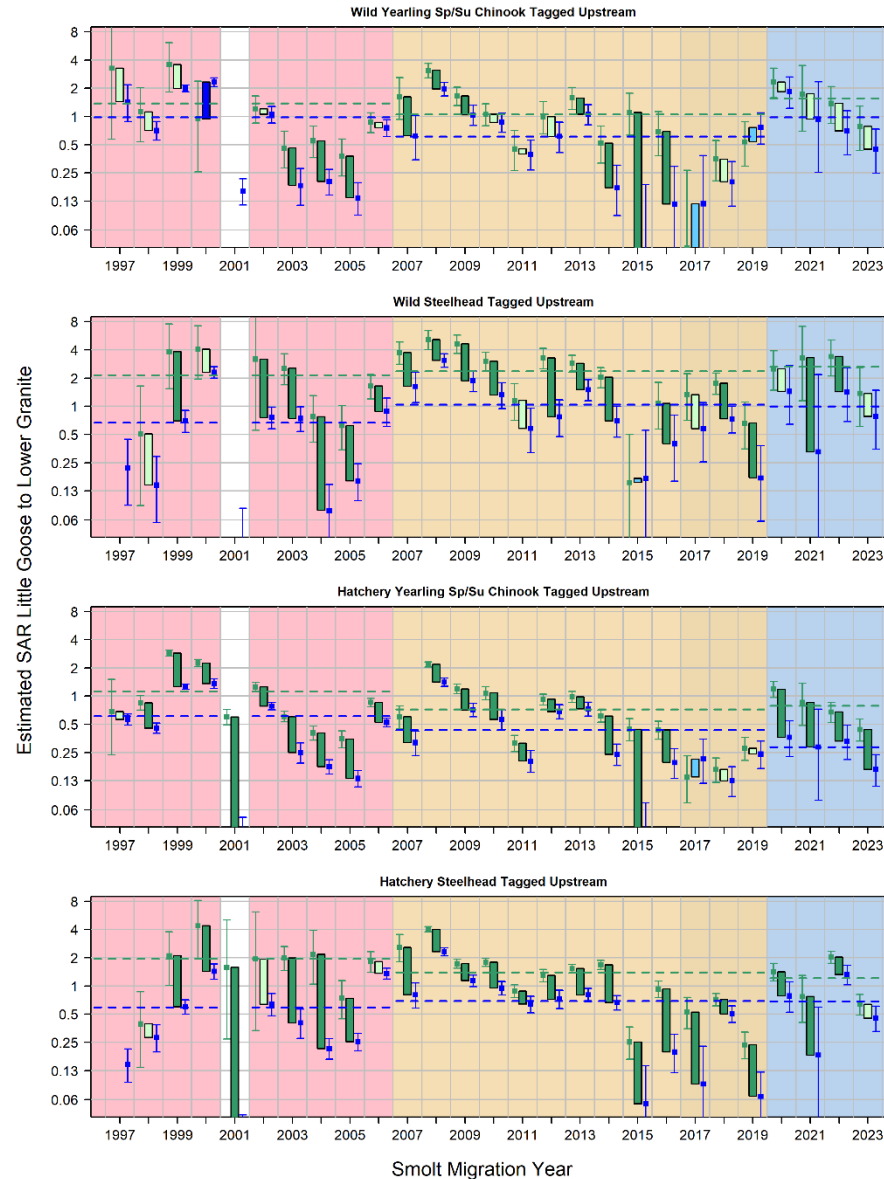
3.05 (2.46, 3.66)

1.96 (1.77, 2.17)

1.40 (1.07, 1.87)

Transported vs. Bypassed  
Annual Estimated SAR and T:B Ratio - Little Goose to Lower Granite

Tagged Upstream,  
In JFF at Little Goose Dam  
Transported vs. Bypassed



**geomean T:B**

**Wild Chinook**

1.59 (1.17, 2.02)

1.96 (1.61, 2.44)

1.73 (1.13, 2.74)

**Wild Steelhead**

3.70 (2.48, 5.10)

2.30 (1.83, 2.93)

2.80 (1.72, 4.44)

**Hatchery Chinook**

1.90 (1.66, 2.12)

1.85 (1.62, 2.20)

2.69 (1.92, 4.08)

**Hatchery Steelhead**

3.13 (2.23, 4.02)

2.45 (2.13, 2.94)

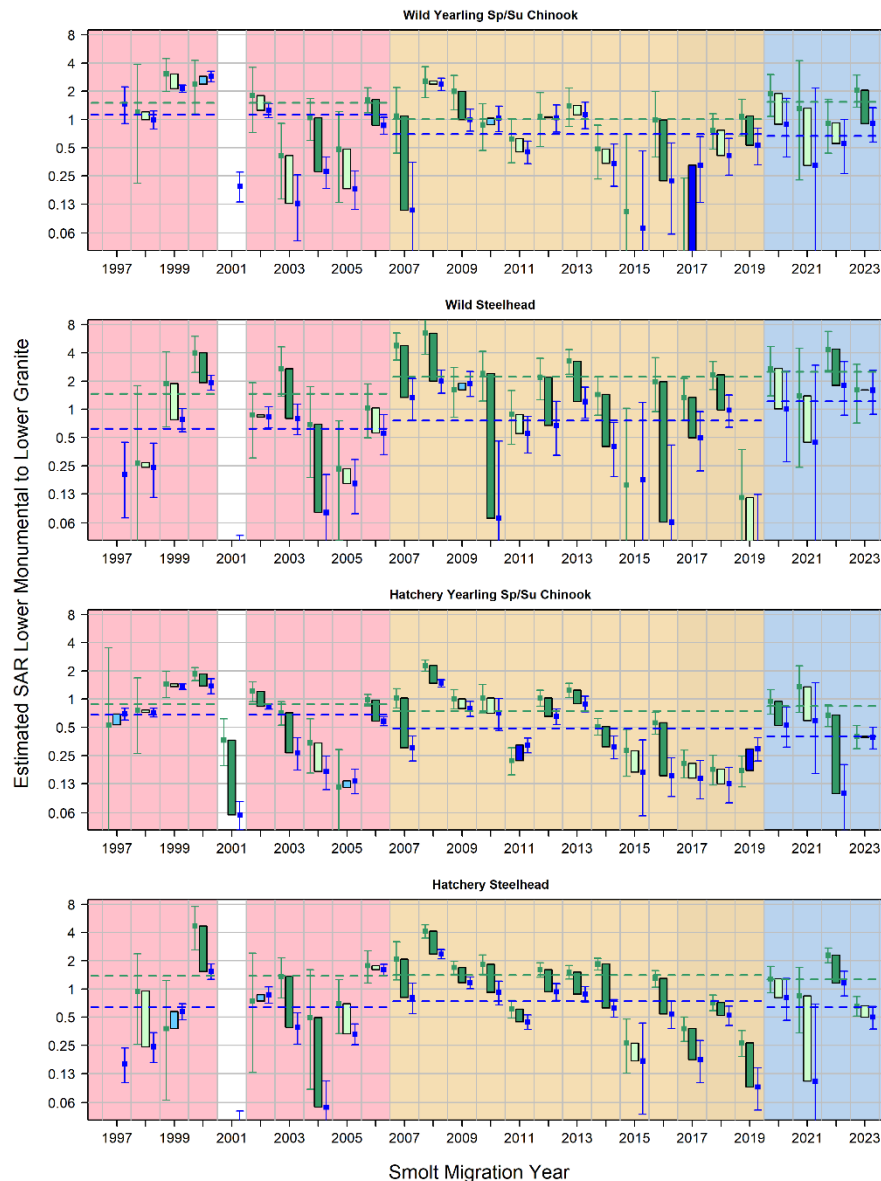
1.99 (1.37, 3.20)

Tagged Upstream,

In JFF at Lower Monumental Dam

Transported vs. Bypassed

Transported vs. Bypassed  
Annual Estimated SAR and T:B Ratio - Lower Monumental to Lower Granite



## geomean T:B

### Wild Chinook

1.85 (1.26, 2.47)  
1.45 (1.14, 1.88)  
2.42 (1.39, 3.87)

### Wild Steelhead

2.37 (1.49, 3.41)  
4.10 (3.19, 5.04)  
2.19 (1.21, 3.77)

### Hatchery Chinook

1.33 (1.07, 1.61)  
1.49 (1.31, 1.73)  
2.34 (1.59, 3.75)

### Hatchery Steelhead

2.18 (1.35, 3.01)  
1.92 (1.67, 2.22)  
2.48 (1.84, 3.23)

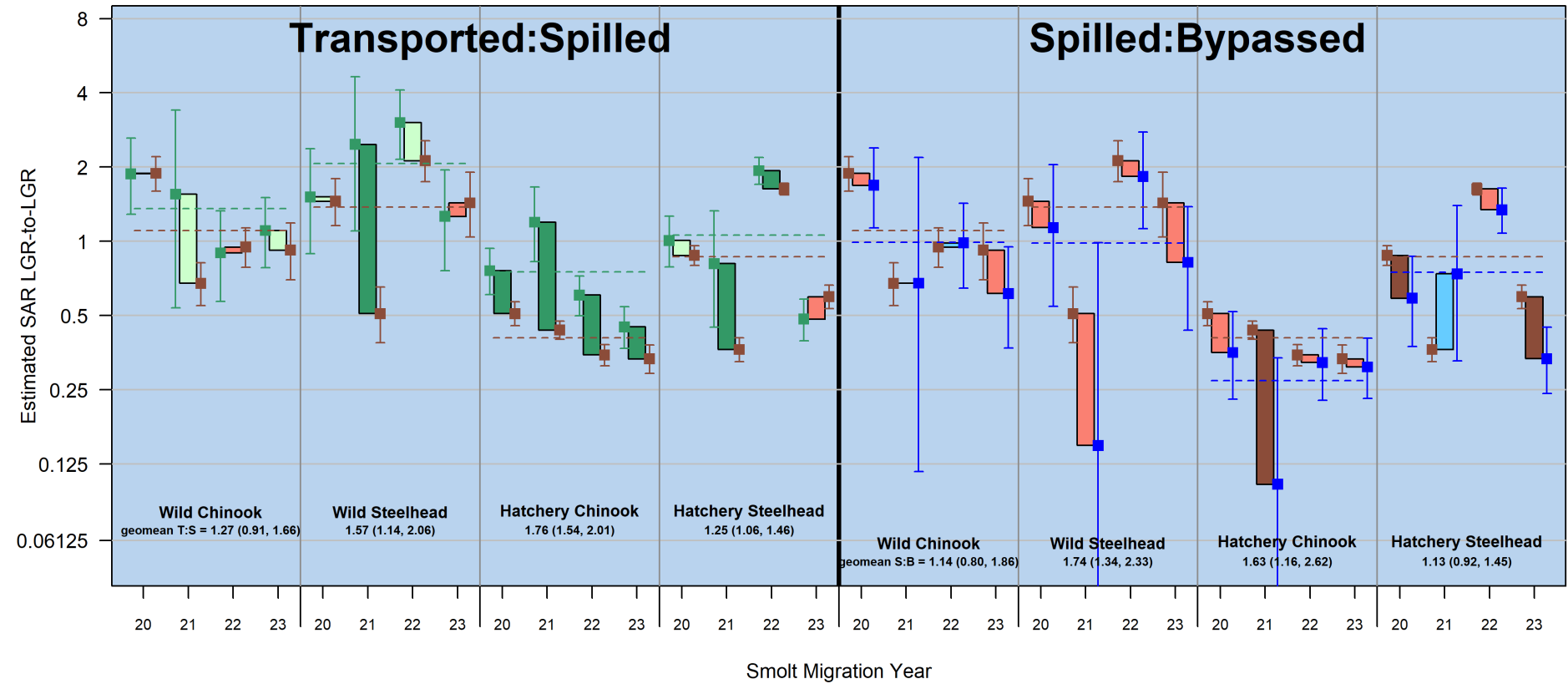


# **Spilled vs. Transported and Bypassed**

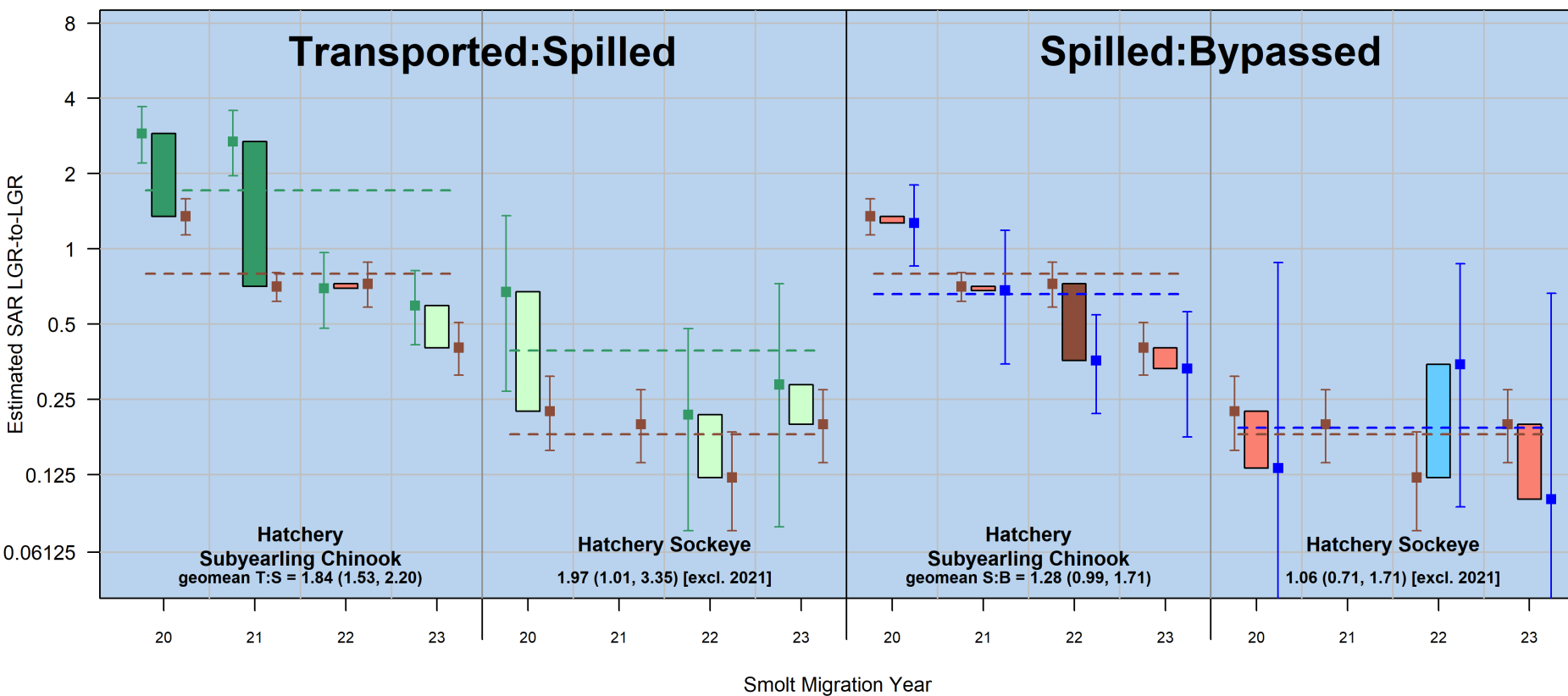
## **Lower Granite Dam 2020-2023**



# Estimated SAR, T:S, and S:B - Lower Granite to Lower Granite



# Estimated SAR, T:S, and S:B - Lower Granite to Lower Granite

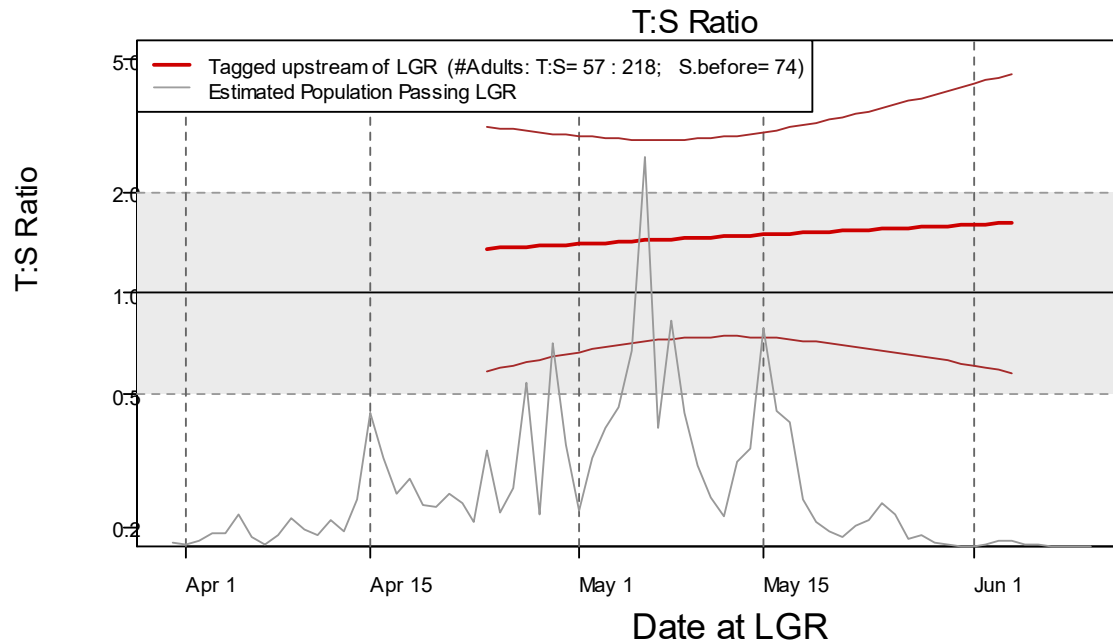
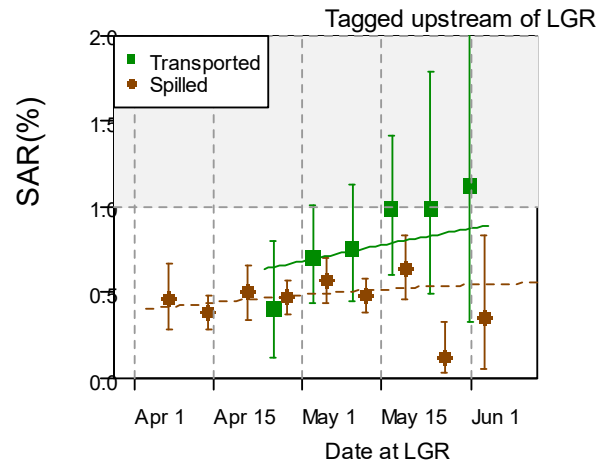


# Within-Season Patterns in Transported:Spilled Ratio

## Hatchery Chinook

# Hatchery Chinook 2020

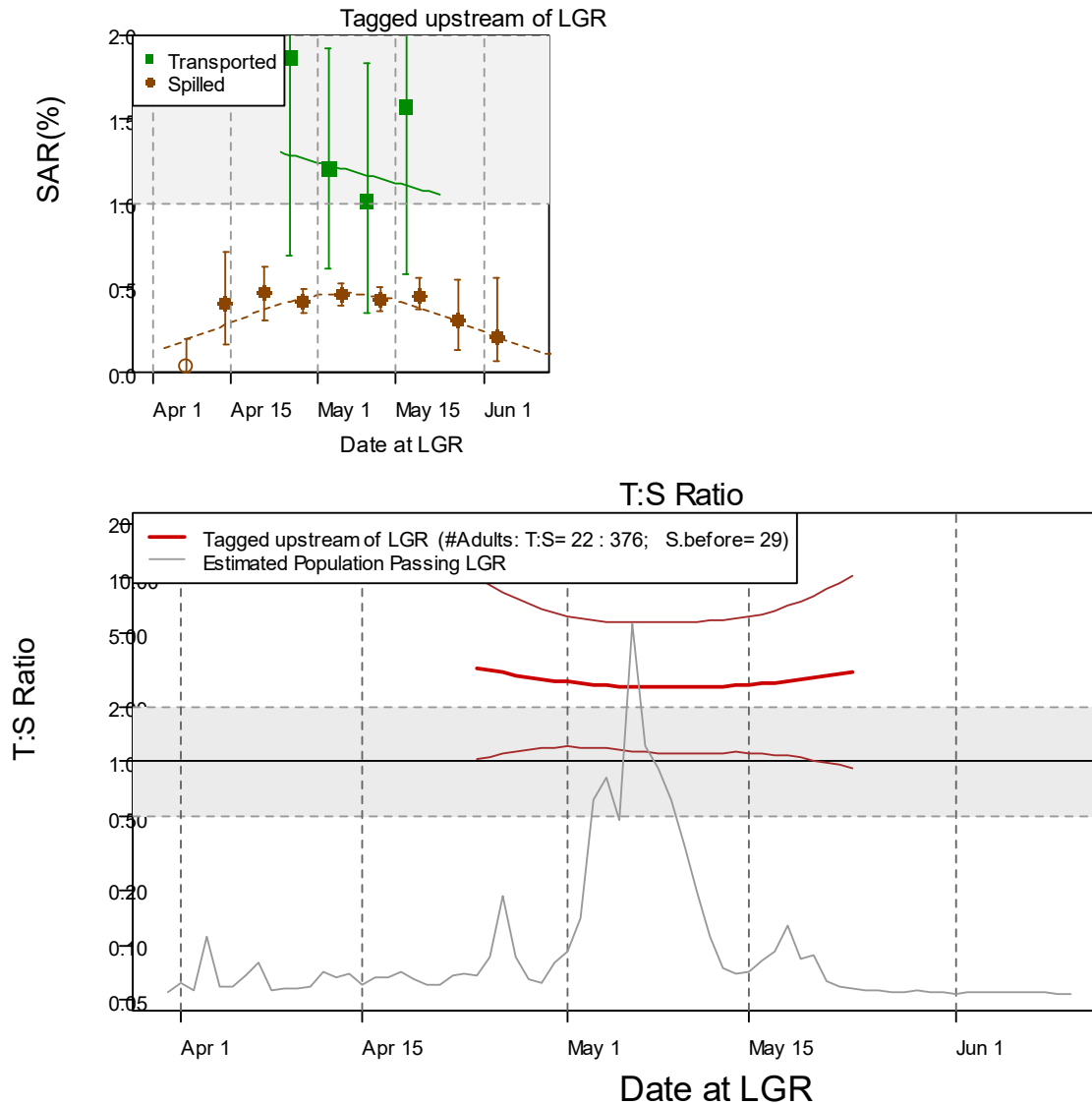
Transported or Spilled at Lower Granite Dam





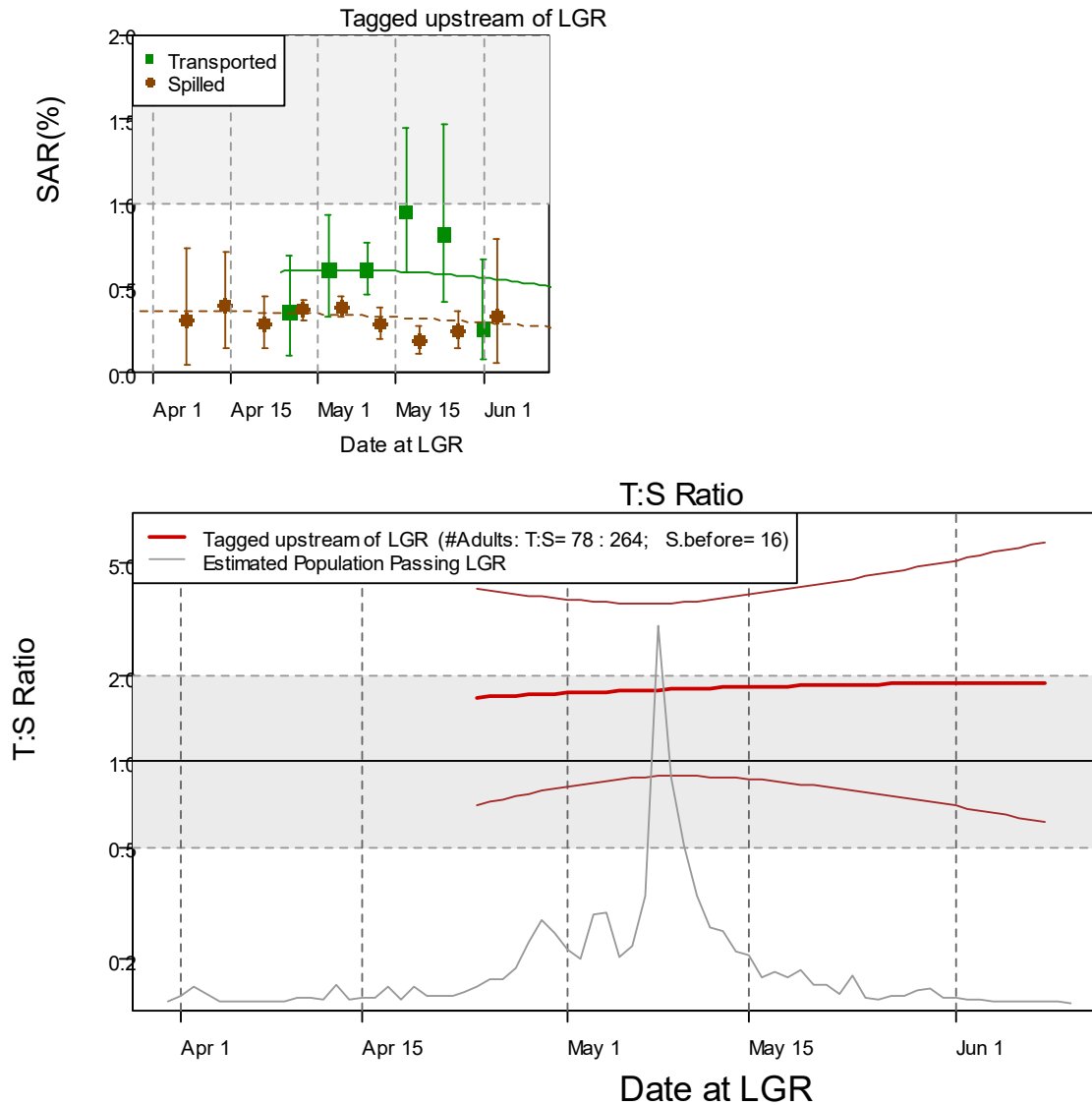
# Hatchery Chinook 2021

Transported or Spilled at Lower Granite Dam



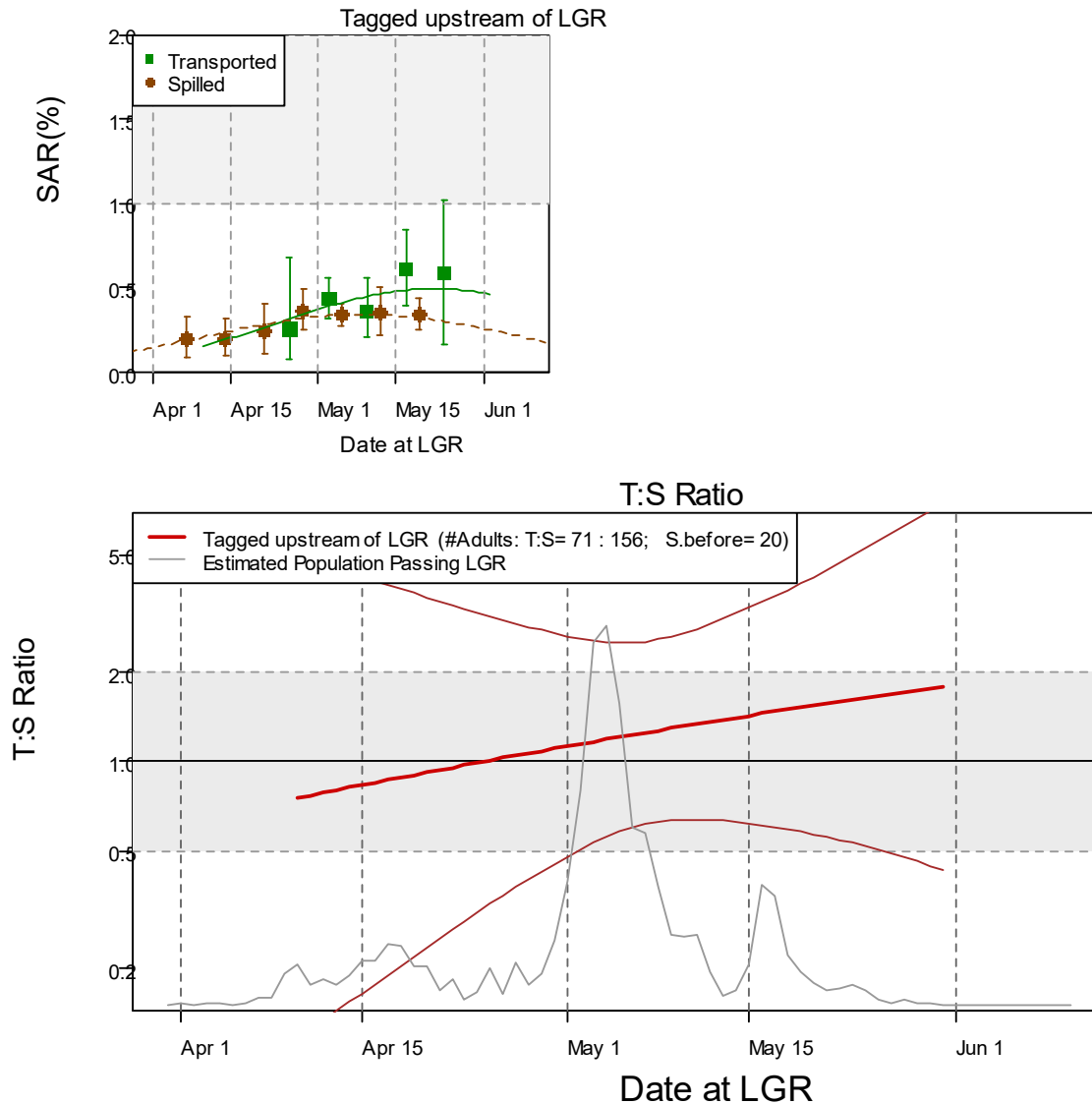
# Hatchery Chinook 2022

Transported or Spilled at Lower Granite Dam



# Hatchery Chinook 2023

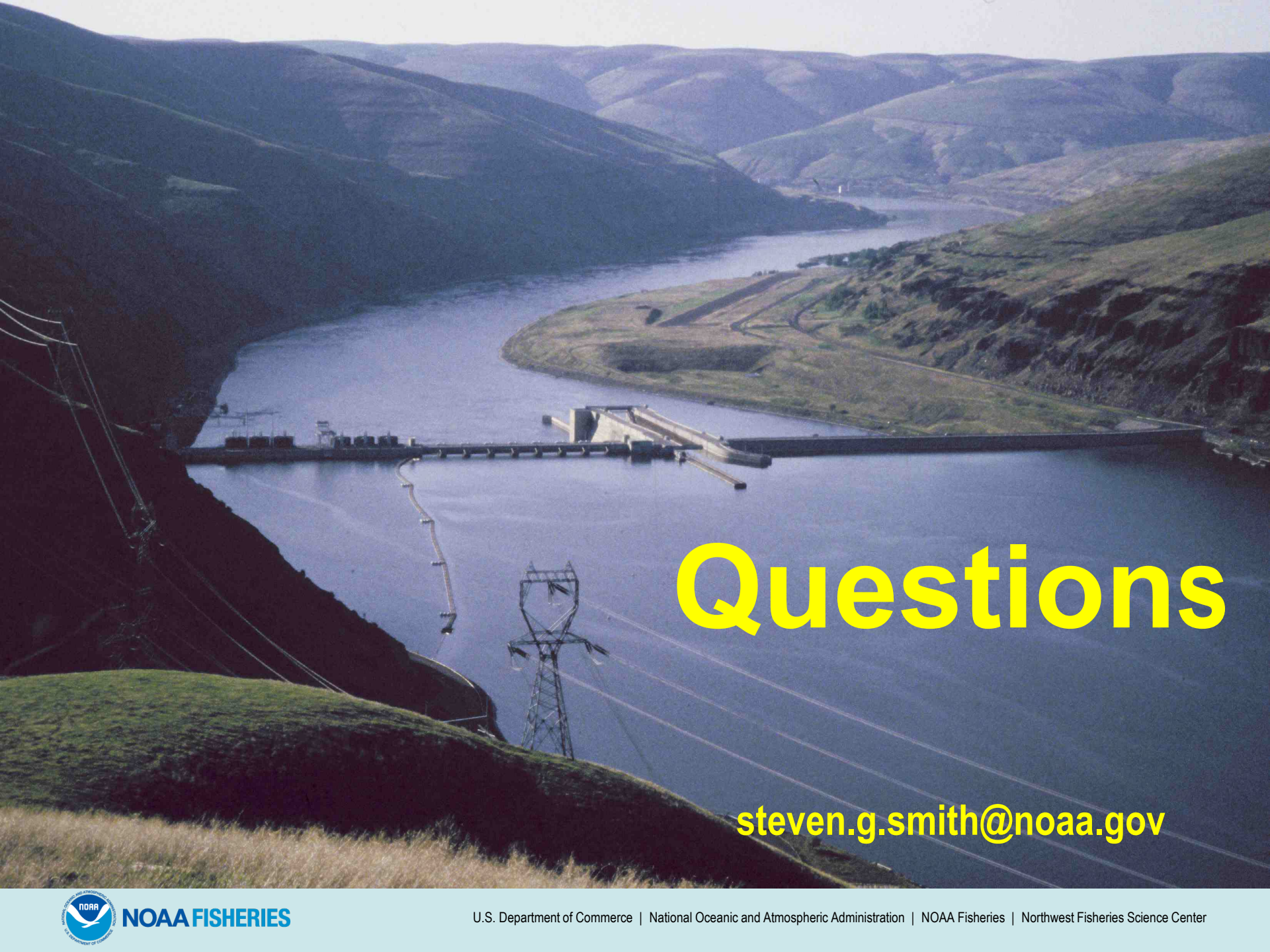
Transported or Spilled at Lower Granite Dam



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# Conclusions

- 1a. For fish entering Juvenile Fish Facility at collector dams,  
SAR higher for transported than for bypassed in almost all cases.
  - Includes wild spring/summer Chinook
  - Includes Lower Monumental Dam
- 1b. For fish arriving at Lower Granite Dam 2020-2023,  
average SAR for transported was higher than for spilled.
  - Across six stocks, (geometric) mean T was 25% to 97% higher.
  - Difference significant for all but wild Chinook.average SAR for spilled was higher than for bypassed.
2. Transport vs. Spill ratio was fairly constant within seasons.
  - Maybe a slight suggestion that ratio increases later in season.

A wide-angle photograph of a large concrete dam spanning a river. The river flows from the background towards the dam. The surrounding landscape consists of rolling hills and mountains, some covered in green vegetation and others in bare, rocky terrain. In the foreground, a grassy hillside slopes down towards the river. A tall electrical transmission tower stands on the left side of the river, with power lines stretching across the scene. The sky is clear and blue.

# Questions

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