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Science Center

# Annual and Seasonal Effects of Transportation

Update with 2024 Data

USACE Anadromous Fish Evaluation Program  
Annual Review 2024  
December 3, 2024

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# Smolt Transportation

Yearling Chinook & Steelhead (& a little sockeye)

Data from Smolt Migration Years 2019-2022

- Adult returns through Nov 24, 2024
- Added smolt migration year 2022
- Spillway-passed fish at LGR, 2020-2022

## Groups of PIT-Tagged Fish

### Tagged and released upstream of Lower Granite Dam

- “(T)ransported” – Entered gatewell, guided into Juvenile Fish Facility, collected in raceway, loaded into barge, transported in barge to below Bonneville Dam – LGR, LGS, LMN
- “(B)ypassed” – Entered gatewell, guided into Juvenile Fish Facility, directed to tailrace – LGR, LGS, LMN
- “(S)pilled” – Passed LGR via spillway
- Also have Transported and Bypassed tagged at Lower Granite

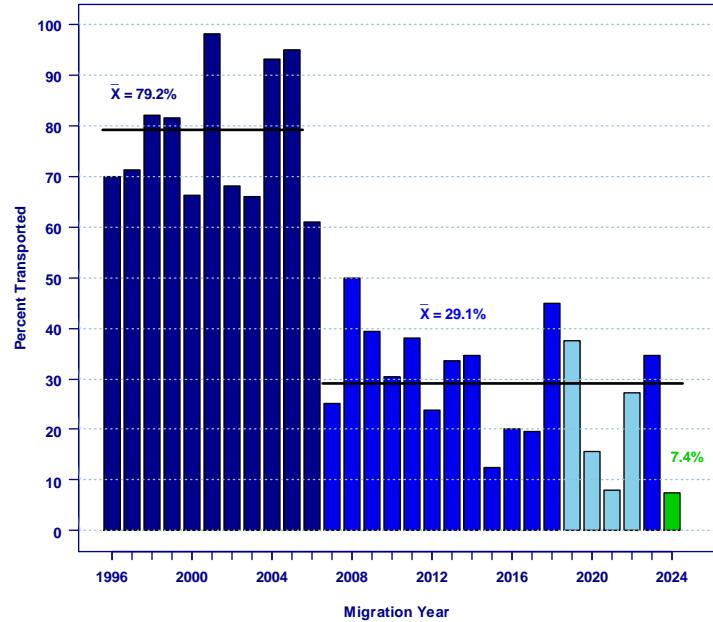
# Measurements

- Smolt-to-Adult Return Rates (SAR)
  - Smolts counted at collector dam, Adults counted at Lower Granite
  - Annual or sub-annual estimates and Regression versus Date
- SAR Ratios
  - Transported vs. Bypassed (T:B)
  - Spilled vs. Bypassed (S:B)
  - Transported vs. Spilled (T:S)
- Uncertainty: 90% bootstrap confidence intervals

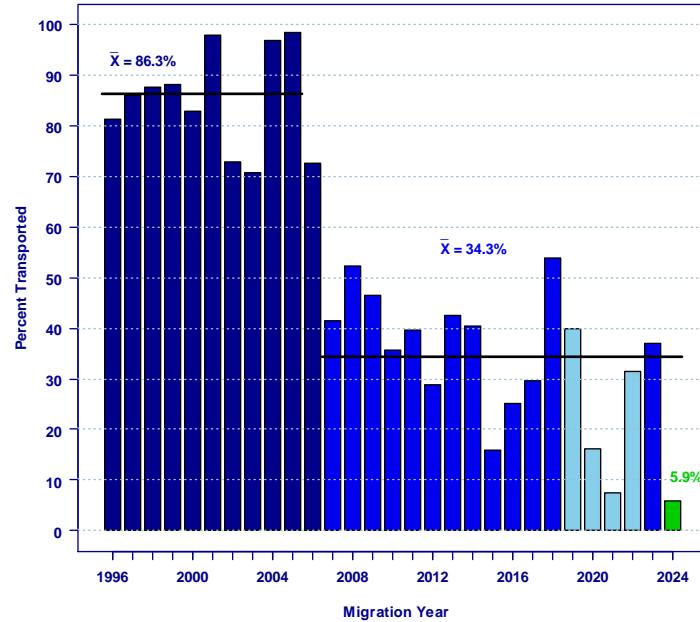
# Annual Estimated Percent Transported of Smolts Reaching LGR

## Fish originating upstream of Lower Granite Dam

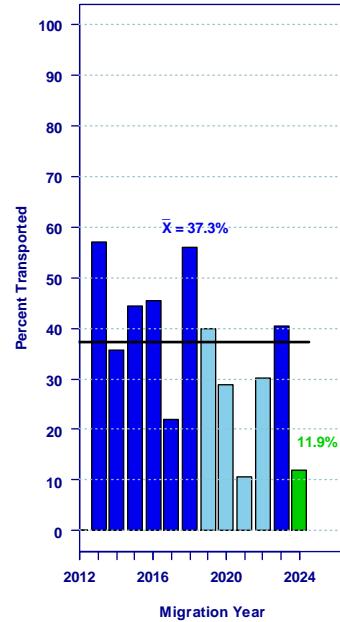
### Yearling Chinook



### Steelhead



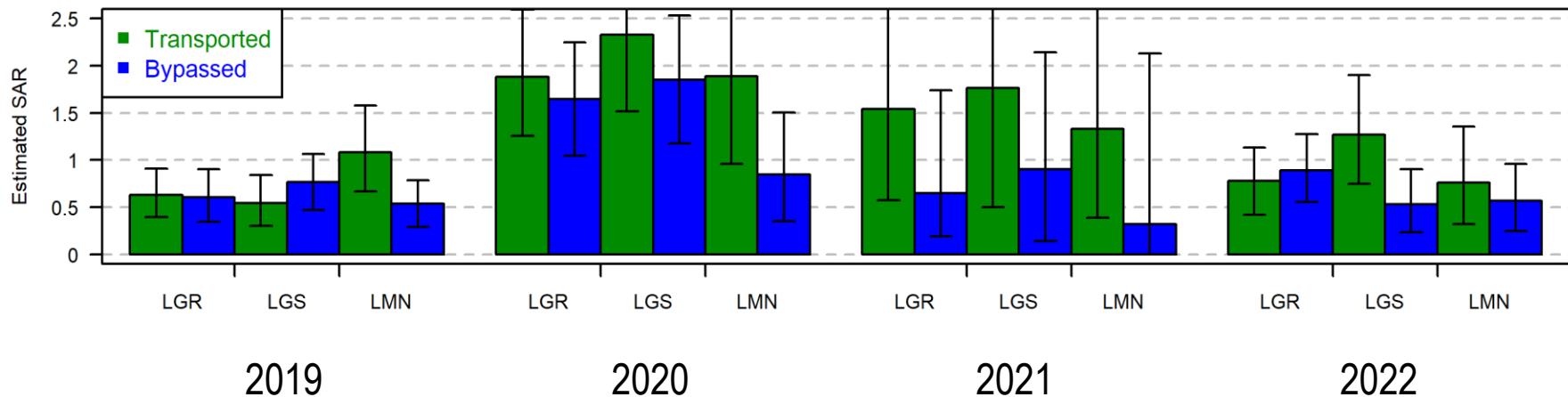
### Sockeye



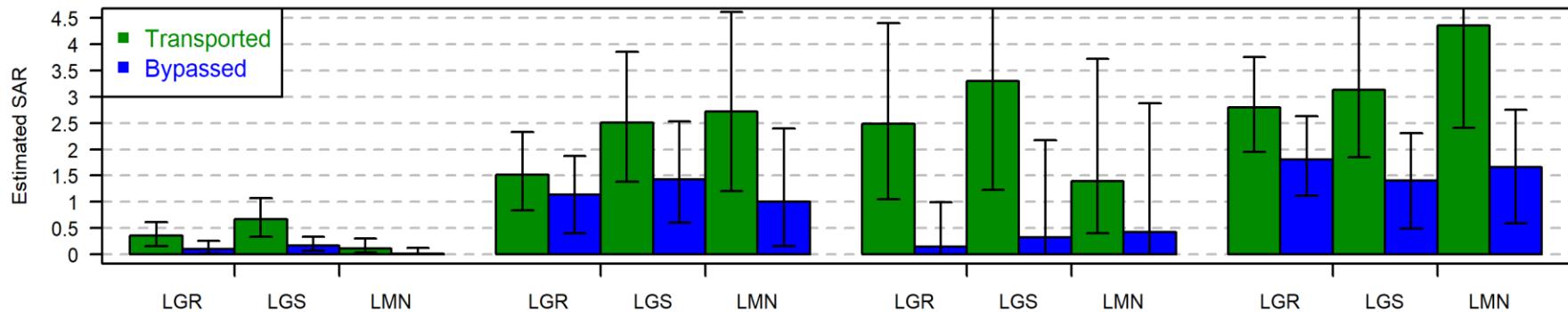
# Annual Estimated SARs – T and B

## General Transport Period

### Wild Yearling Chinook



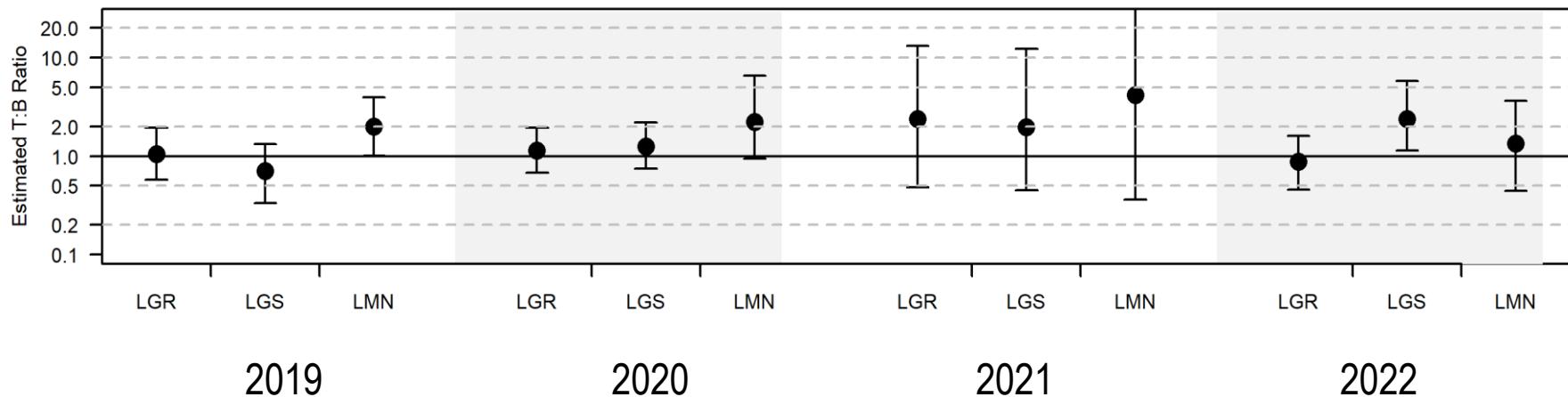
### Wild Steelhead



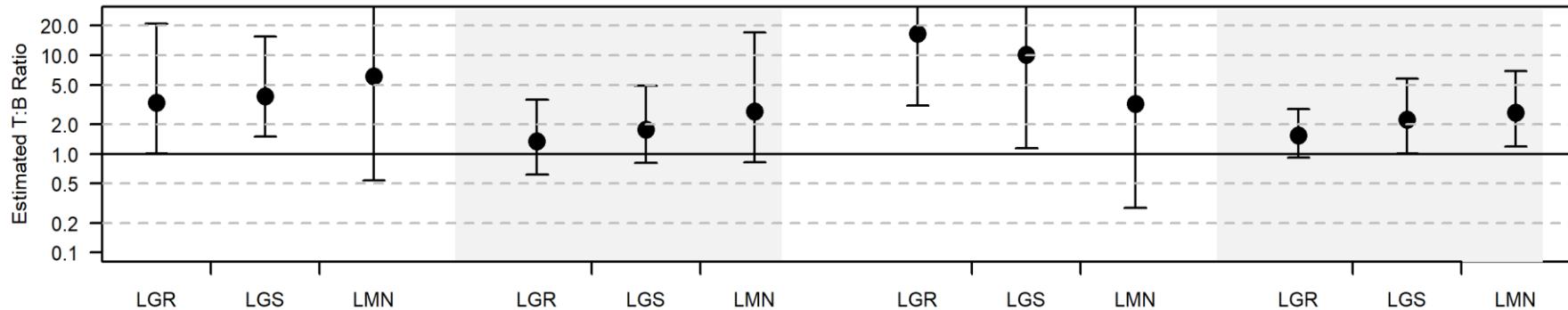
# Annual Estimated T:B Ratio

## General Transport Period

### Wild Yearling Chinook - T:B



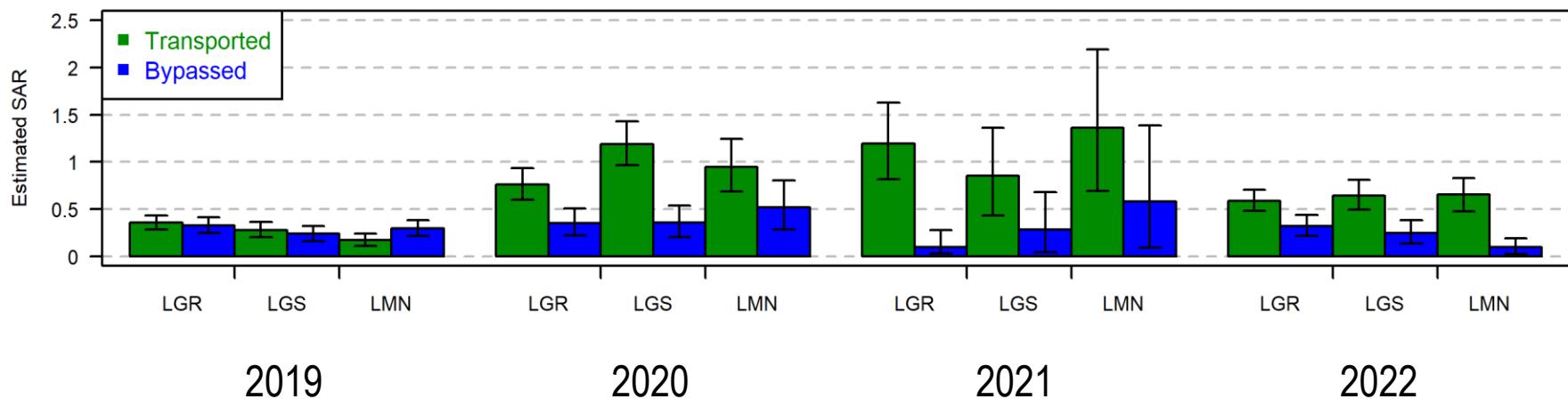
### Wild Steelhead - T:B



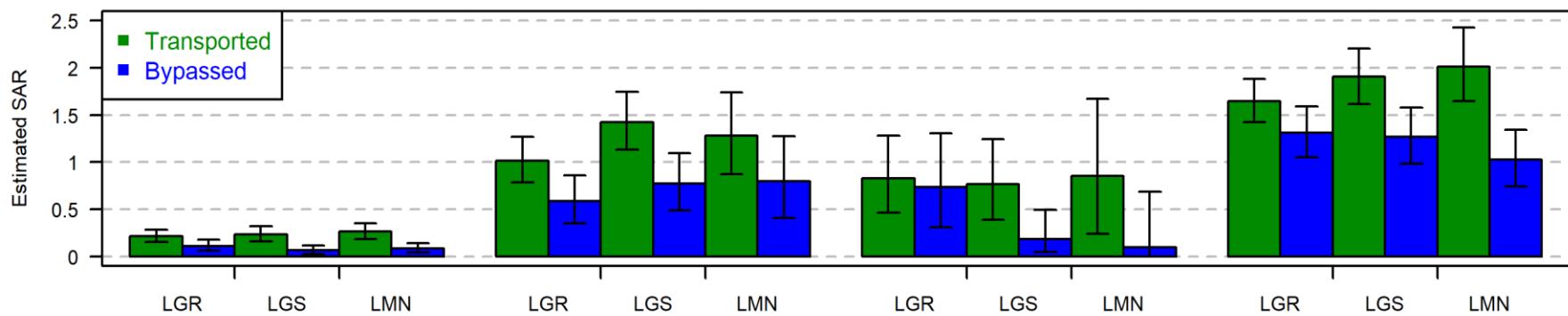
# Annual Estimated SARs – T and B

## General Transport Period

### Hatchery Yearling Chinook

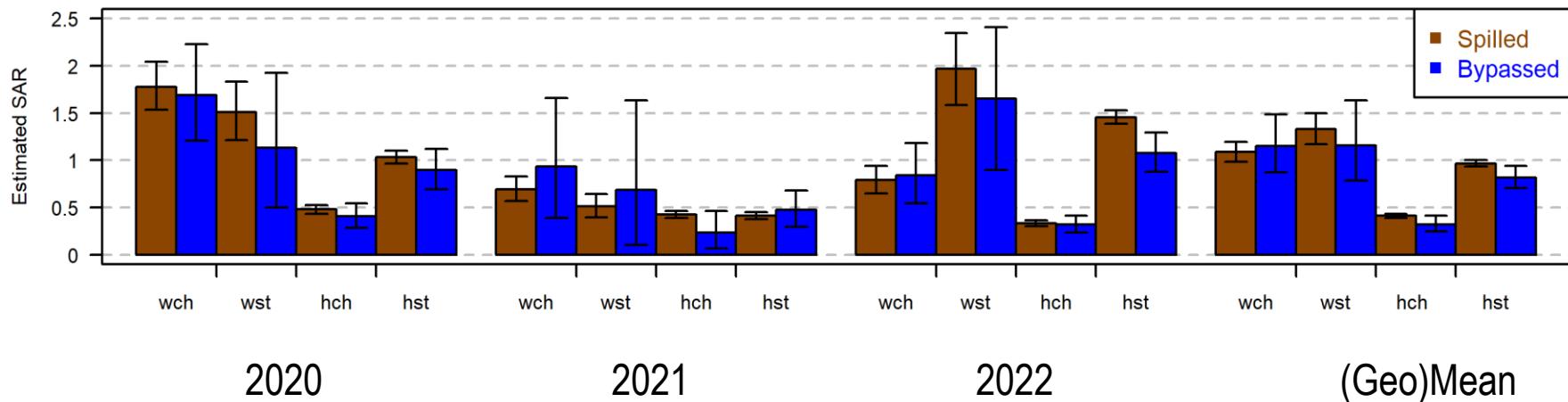


### Hatchery Steelhead

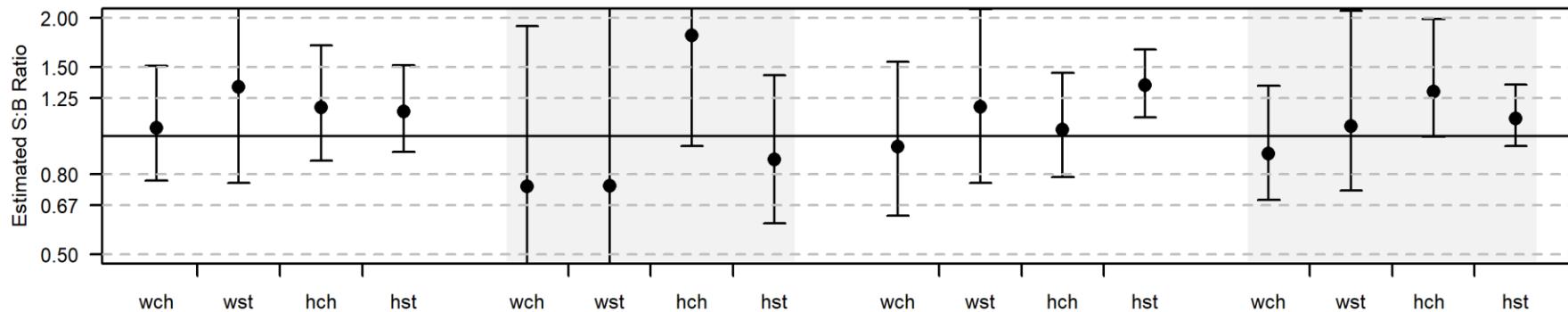


# Annual Estimated S:B – Entire Year

## Spilled and Bypassed SAR%

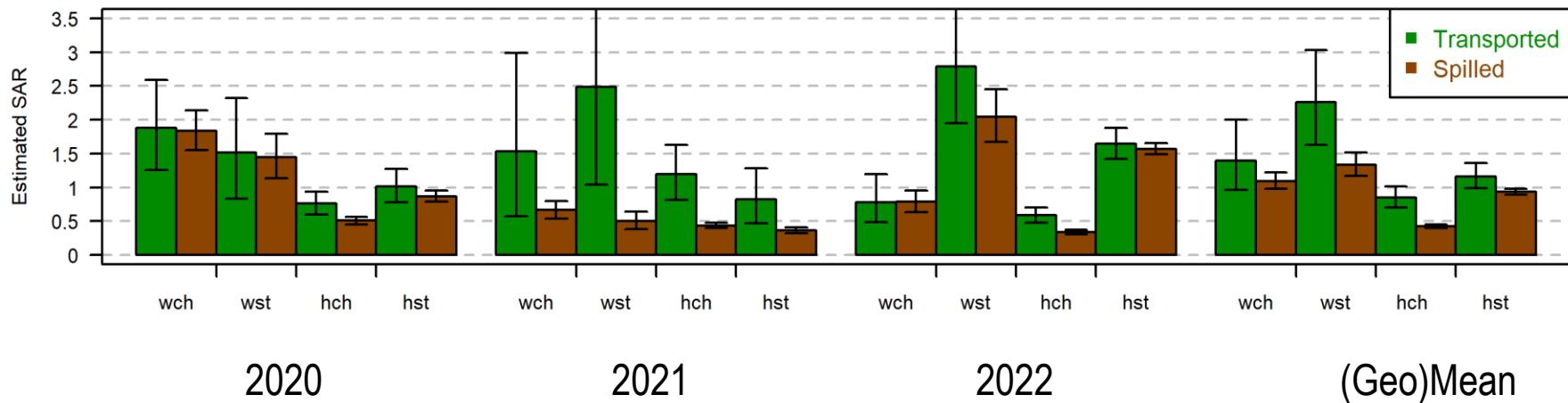


## Estimated S:B Ratio

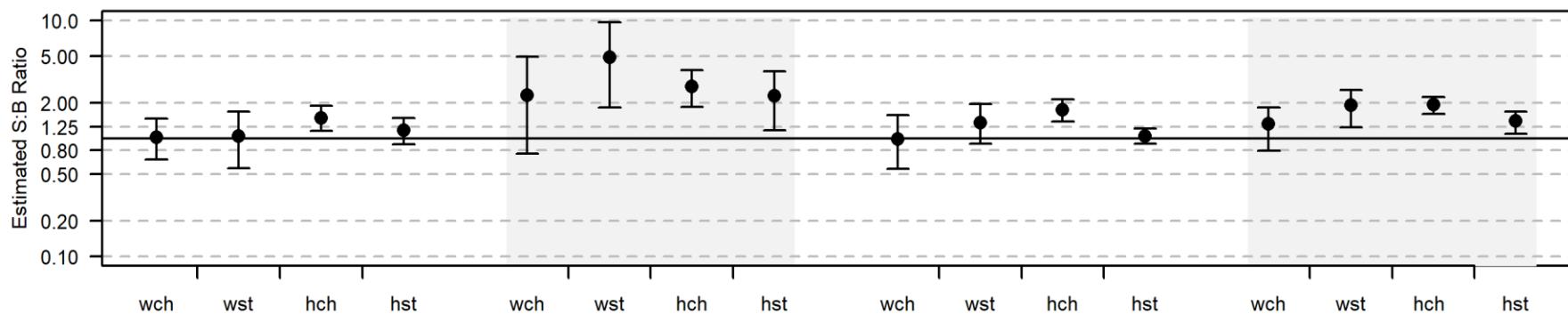


# Annual Estimated T:S – General Transport Period

## Transported and Spilled SAR%



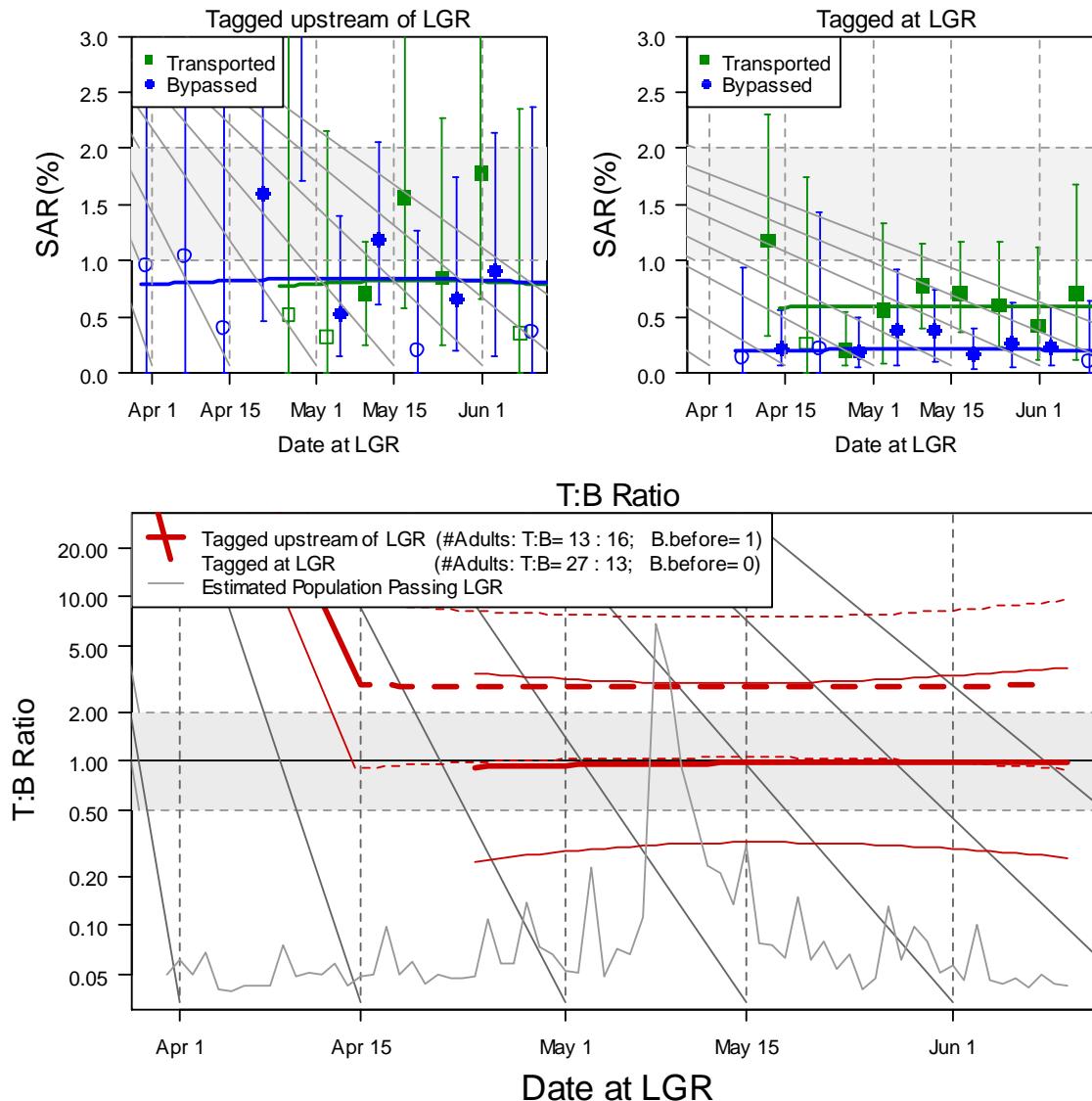
## Estimated T:S Ratio



# Some Within-Season Patterns for MY 2022

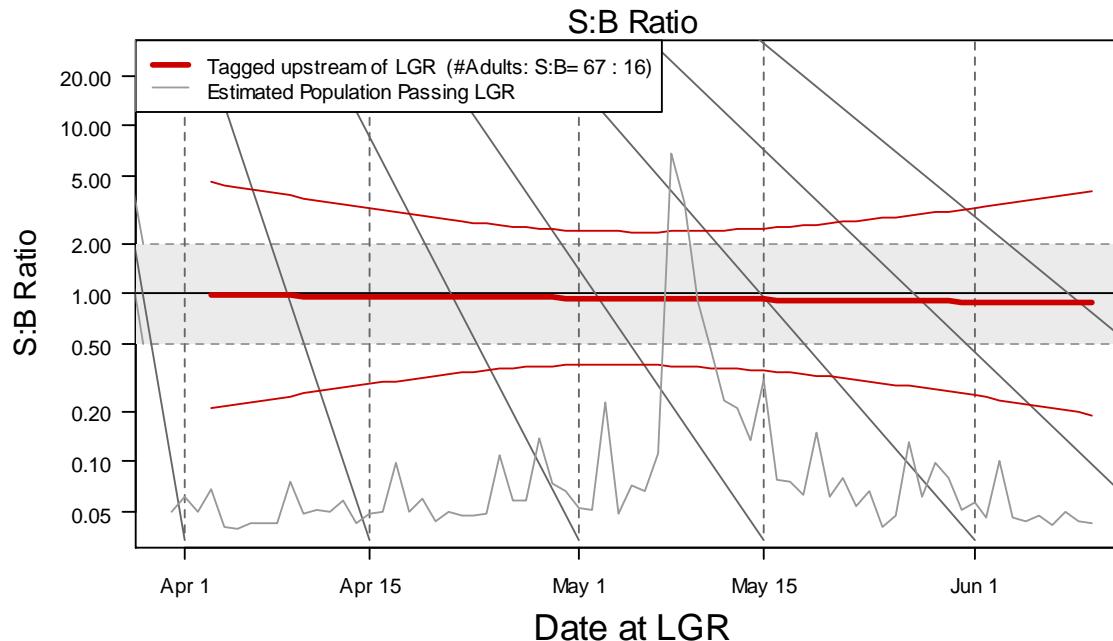
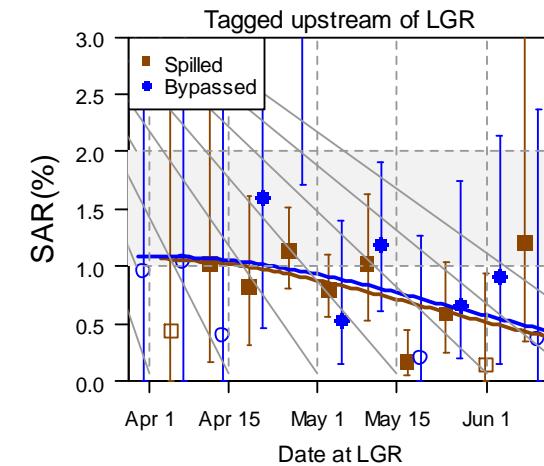
# Wild Chinook 2022

## Transported or Bypassed at Lower Granite Dam



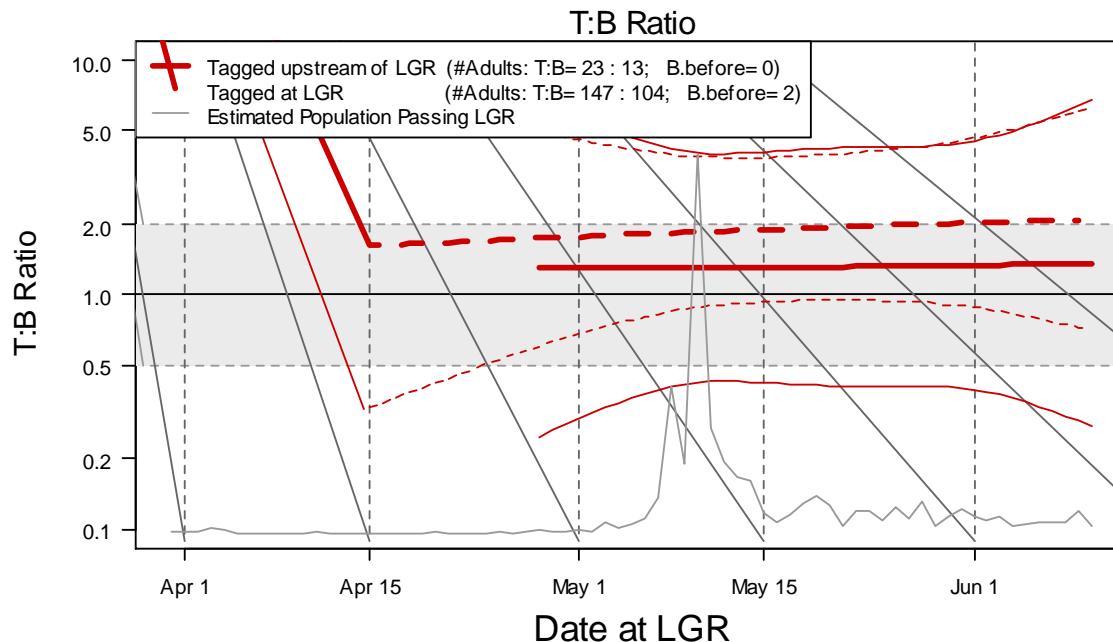
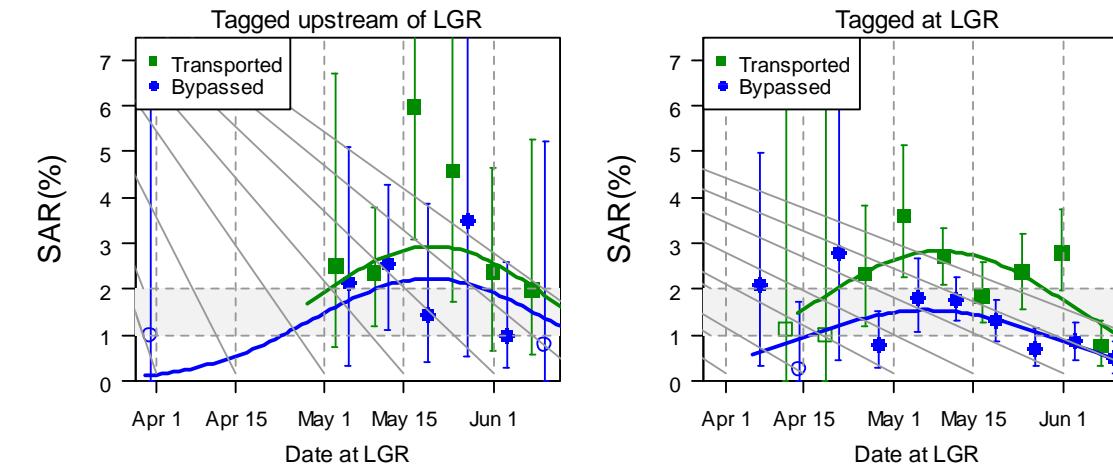
# Wild Chinook 2022

## Spilled or Bypassed at Lower Granite Dam



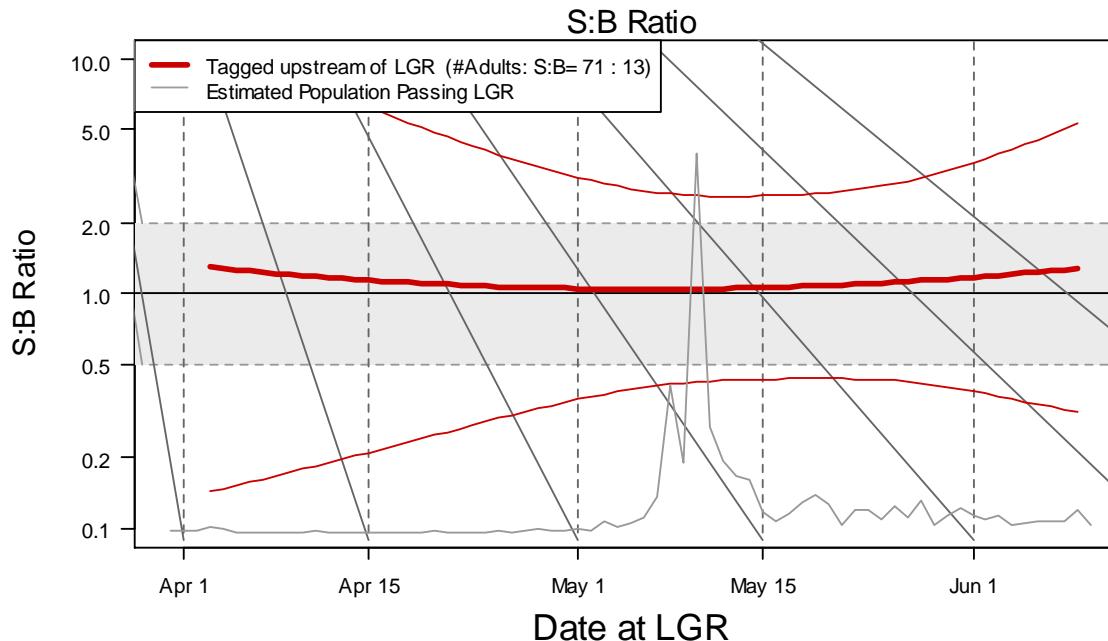
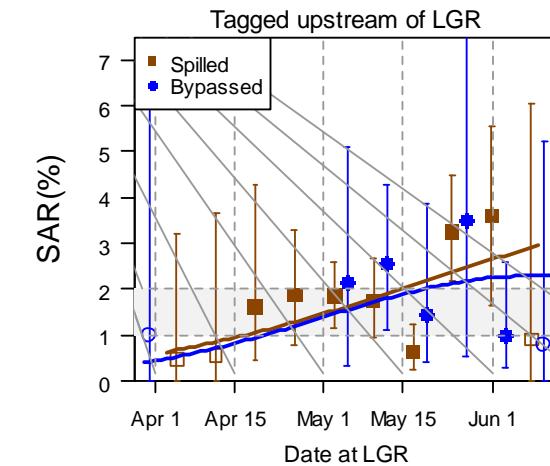
# Wild Steelhead 2022

## Transported or Bypassed at Lower Granite Dam



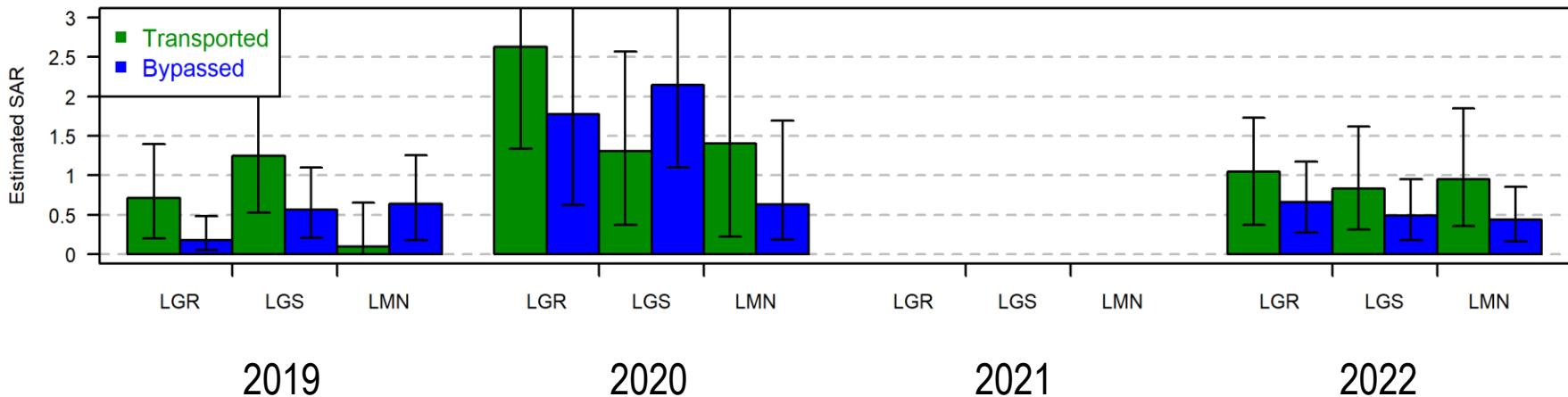
# Wild Steelhead 2022

## Spilled or Bypassed at Lower Granite Dam

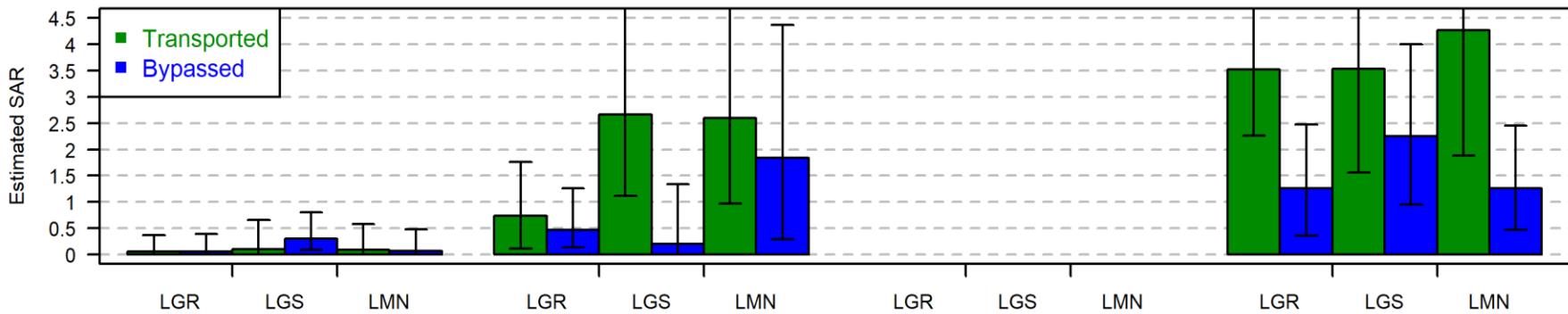


# Annual Estimated SARs – May 15-June 15

## Wild Yearling Chinook

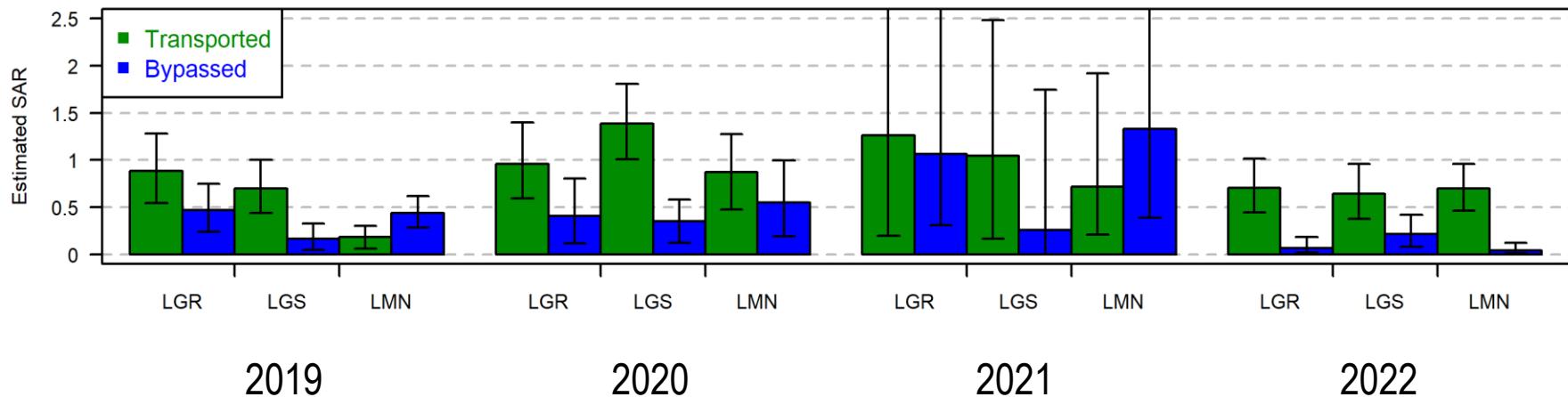


## Wild Steelhead

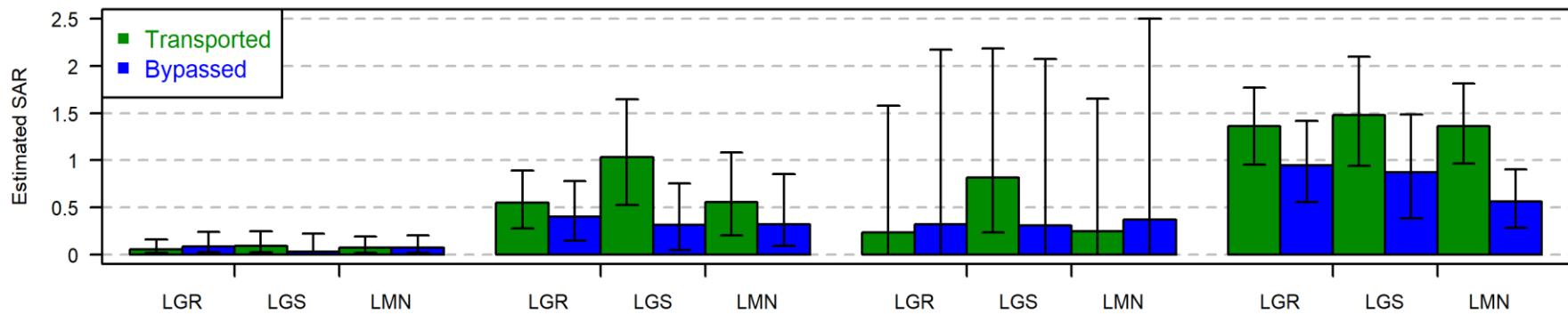


# Annual Estimated SARs – May 15-June 15

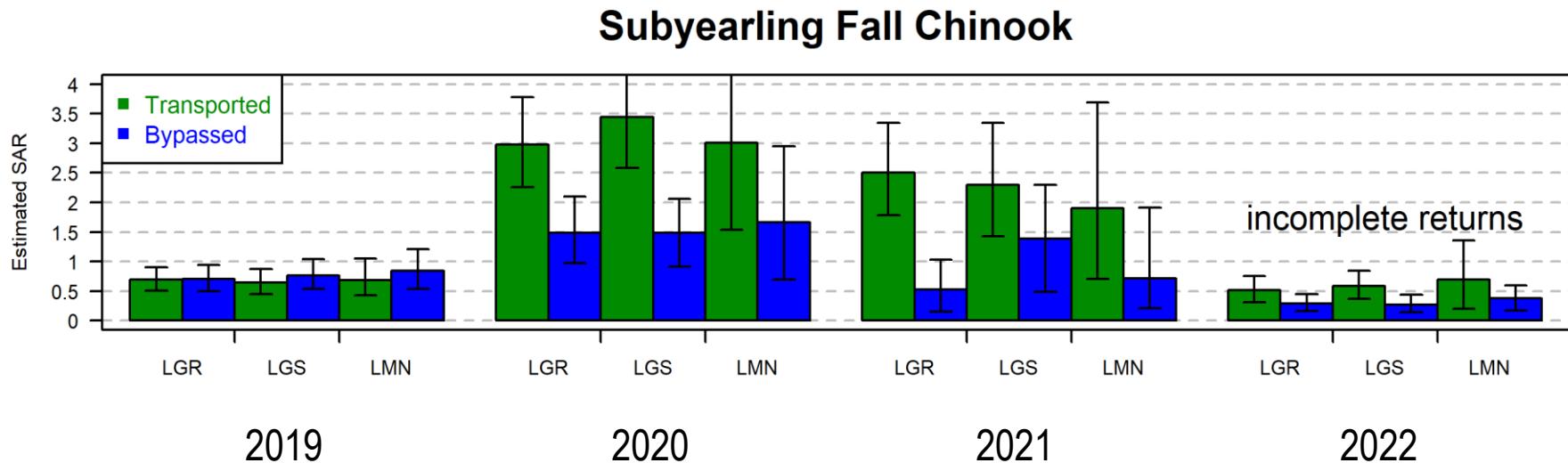
## Hatchery Yearling Chinook



## Hatchery Steelhead



# Annual Estimated SARs – May 15-June 15



# Annual Sockeye Data – Lower Granite Dam

	Transported			Bypassed			Spilled		
	Smolt	Adult	SAR*	Smolt	Adult	SAR*	Smolt	Adult	SAR*
2020	620	4	0.67	321	0	0.11	10385	23	0.22
2021	114	0	--	50	0	--	19771	31	0.16
2022	1463	3	0.22	643	2	0.34	10826	13	0.12
<b>Sum</b>	<b>2197</b>	<b>7</b>	<b>0.33</b>	<b>1014</b>	<b>2</b>	<b>0.22</b>	<b>40982</b>	<b>67</b>	<b>0.16</b>

Based on Sums: T:B = 1.52 (0.46-9.55)

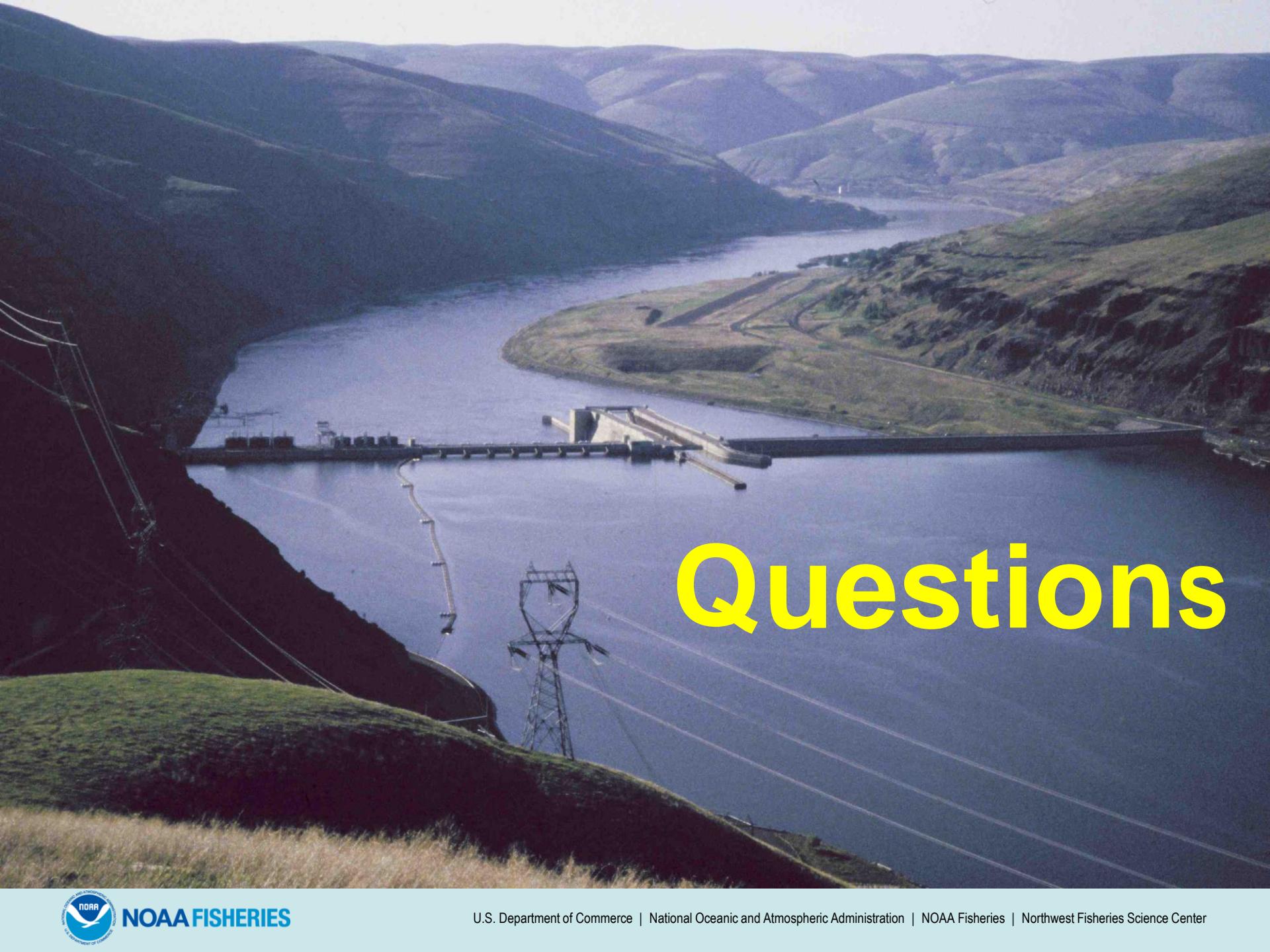
S:B = 0.76 (0.31-4.87)

T:S = 1.99 (0.88-3.59)

\* All SAR estimates are “Median Unbiased Estimates”  
(are non-zero when number of adults is zero; omitted here when number of smolts is too low)

# Transportated/Bypassed/Spilled 2019-2022

- Transported fish returned at higher rates than bypassed or spilled
  - Biggest difference was for low-flow migration year 2021
- Spilled fish generally returned at higher rates than bypassed
  - Difference varied by year and stock
  - Mean difference across years and stocks: spilled 8% higher than bypassed
- Seasonal patterns continued to be “flat” – ratios steady through season
- Transport returns generally remained higher in late season (mid-May through mid-June)
  - including Lower Monumental Dam
  - subyearling fall chinook present and had higher returns when transported



# Questions



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