

**NOAA
FISHERIES**

**Northwest
Fisheries
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

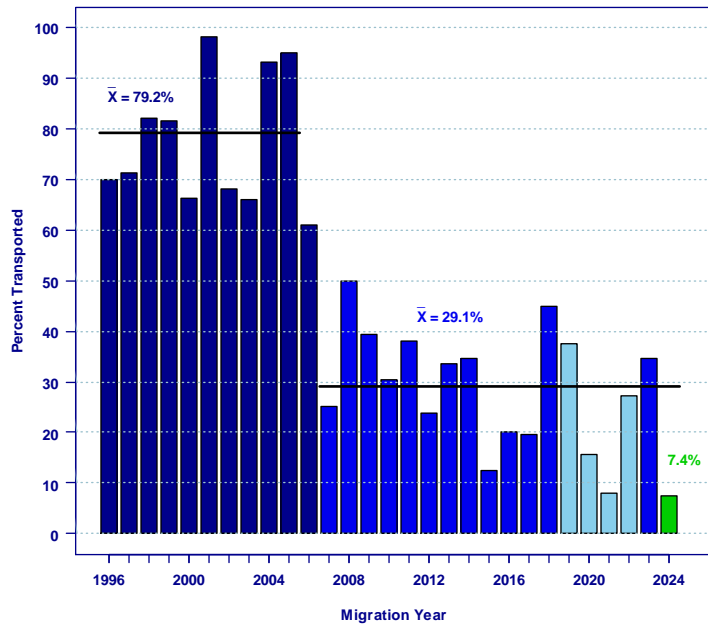
Measurements

- 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

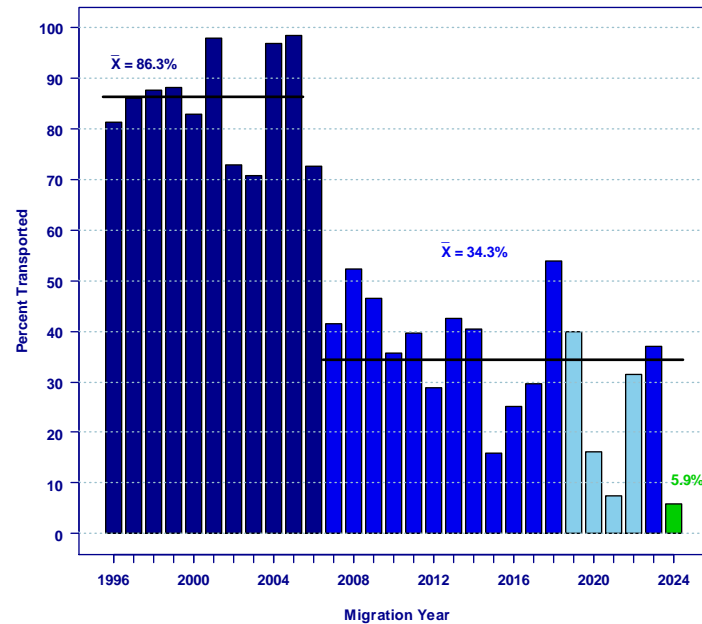
Annual Estimated Percent Transported of Smolts Reaching LGR

Fish originating upstream of Lower Granite Dam

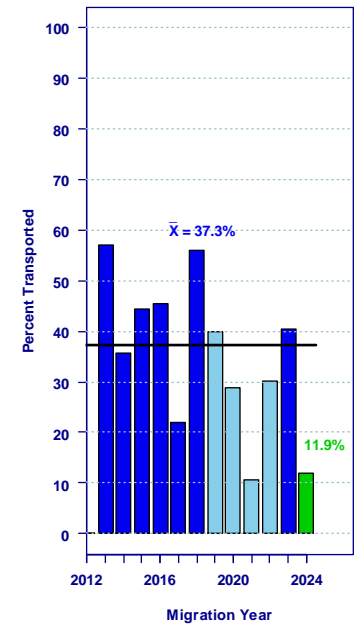
Yearling Chinook



Steelhead



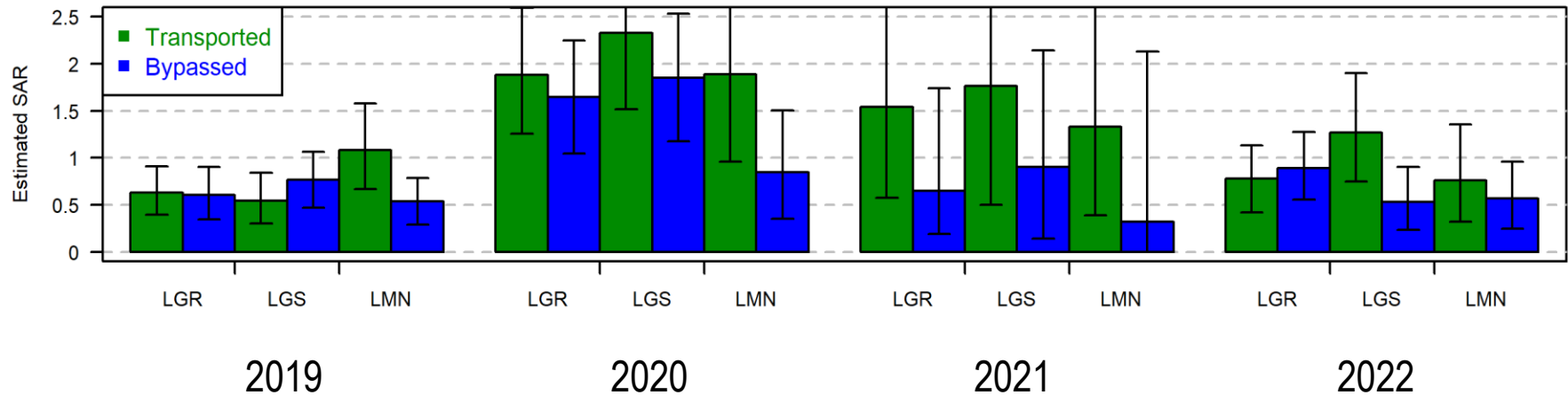
Sockeye



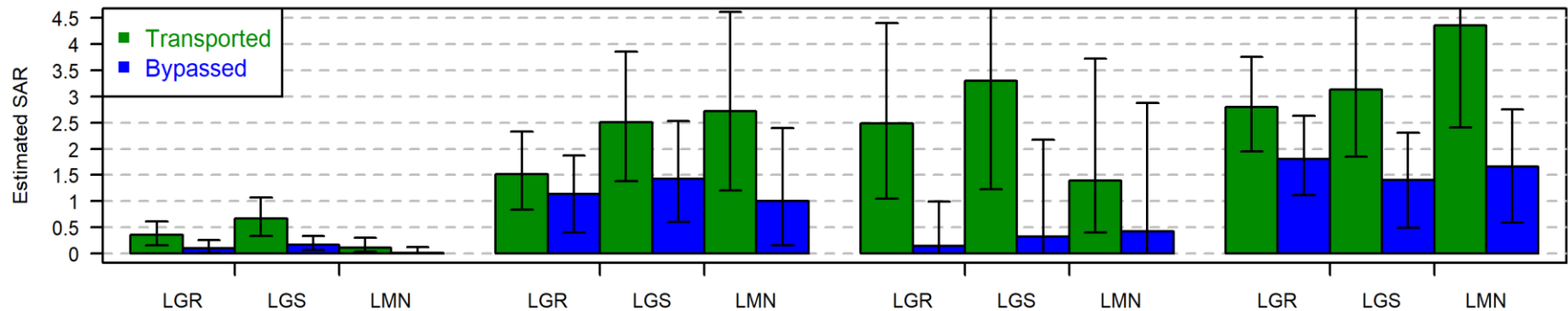
Annual Estimated SARs – T and B

General Transport Period

Wild Yearling Chinook

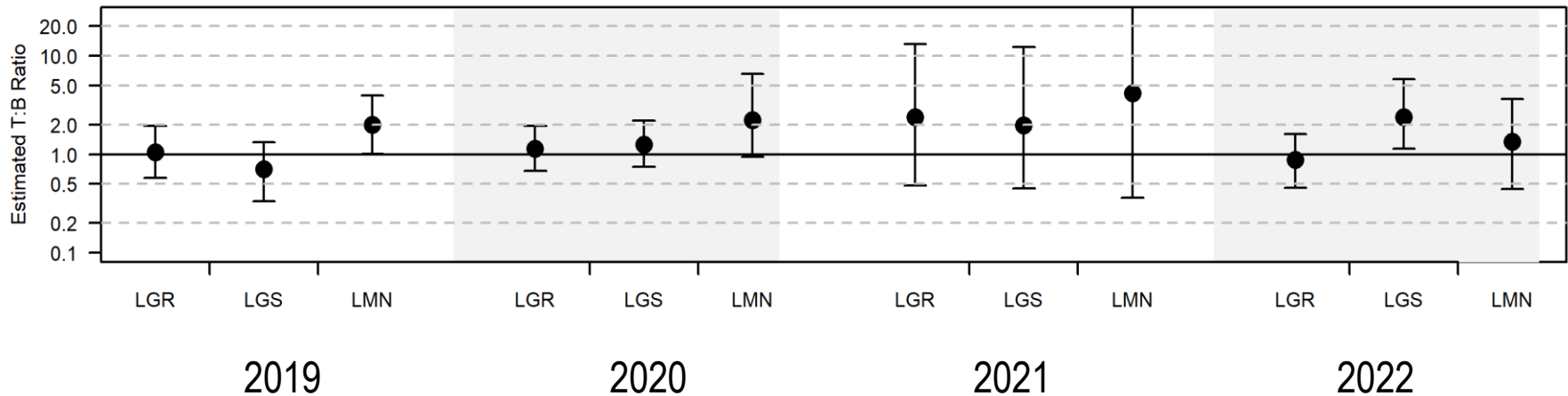


Wild Steelhead

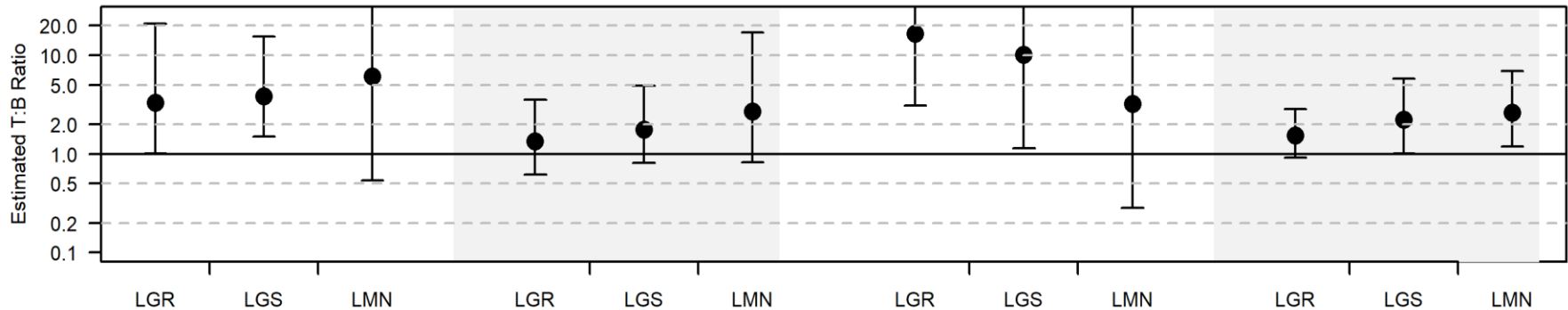


Annual Estimated T:B Ratio General Transport Period

Wild Yearling Chinook - T:B



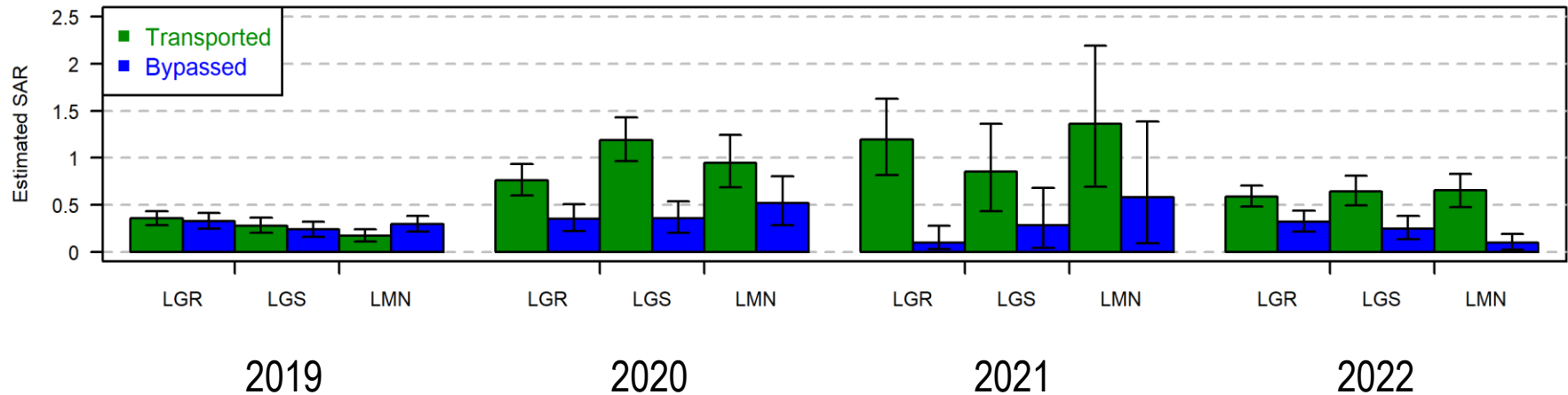
Wild Steelhead - T:B



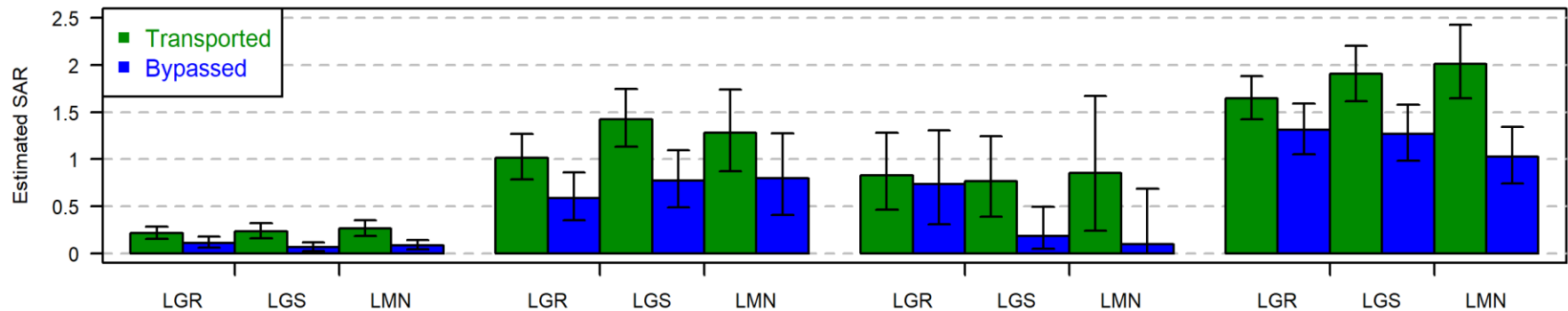
Annual Estimated SARs – T and B

General Transport Period

Hatchery Yearling Chinook

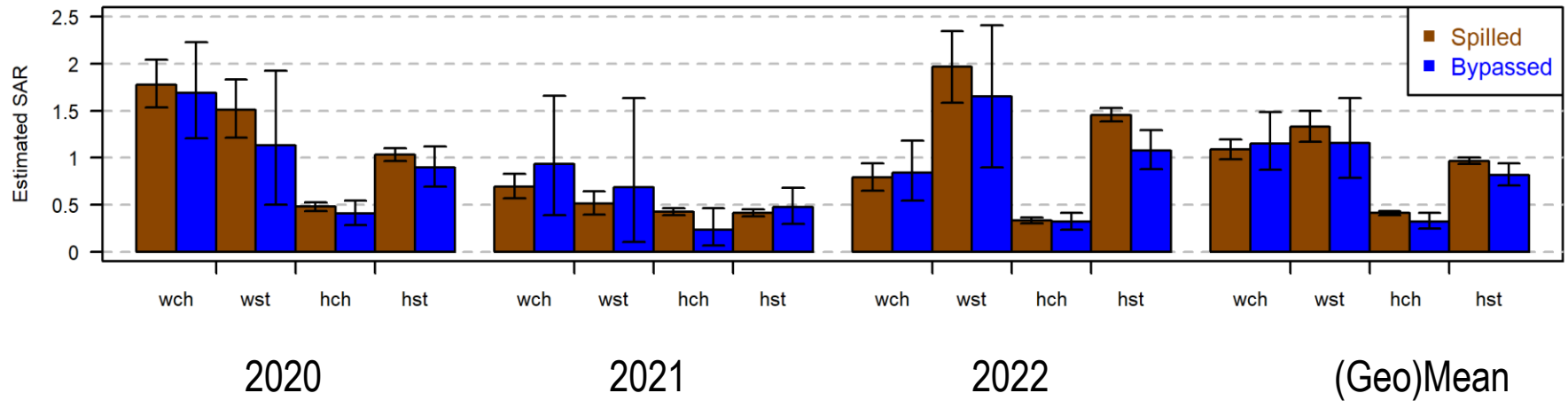


Hatchery Steelhead

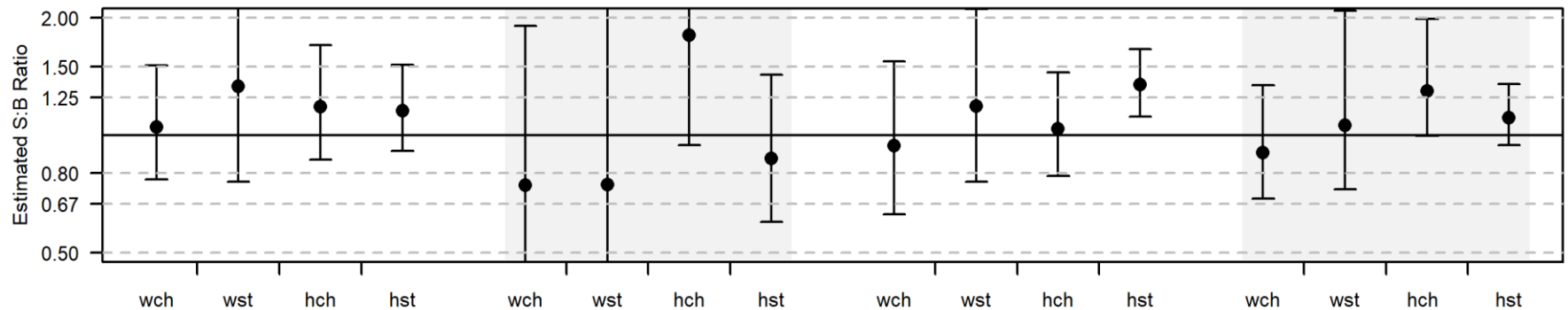


Annual Estimated S:B – Entire Year

Spilled and Bypassed SAR%

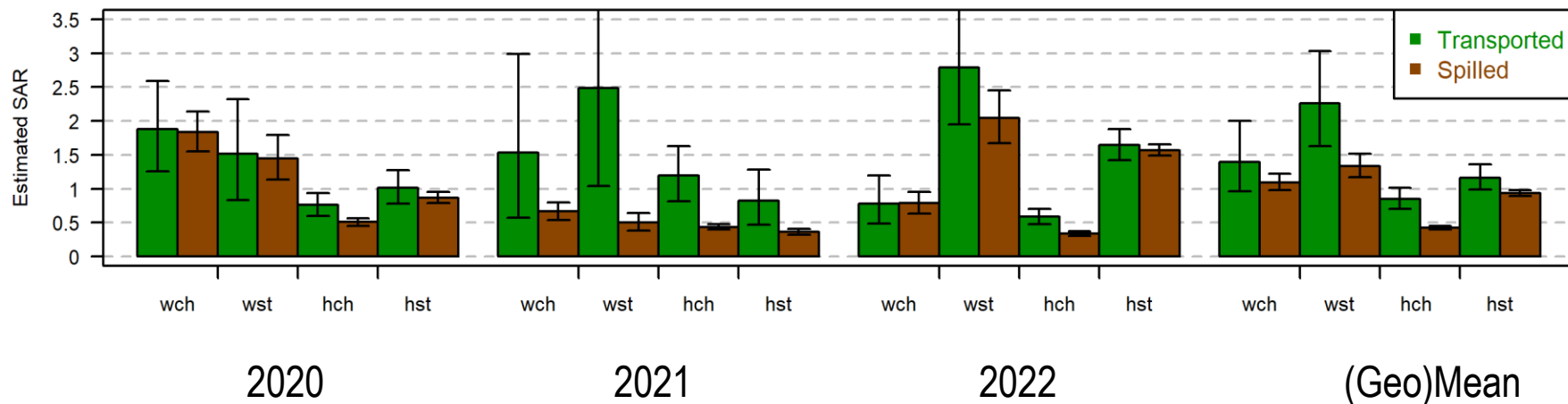


Estimated S:B Ratio

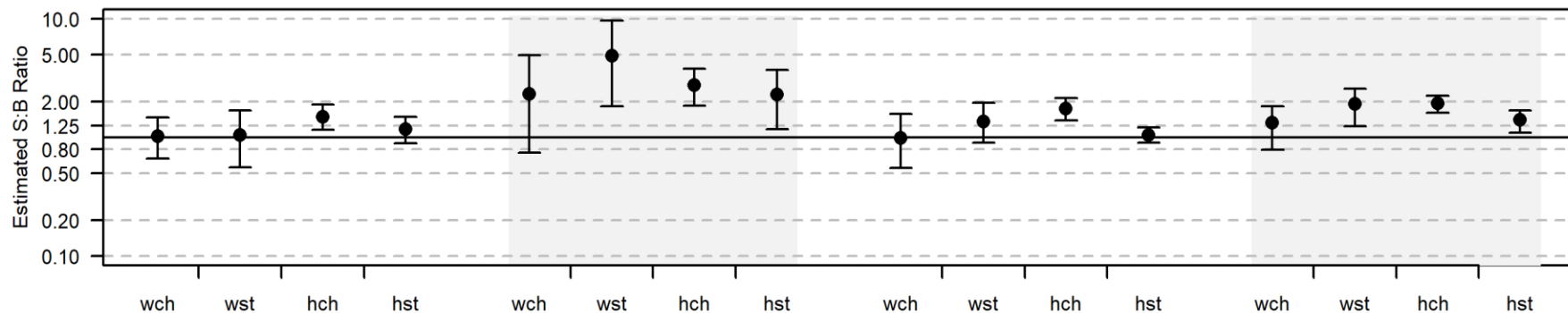


Annual Estimated T:S – General Transport Period

Transported and Spilled SAR%



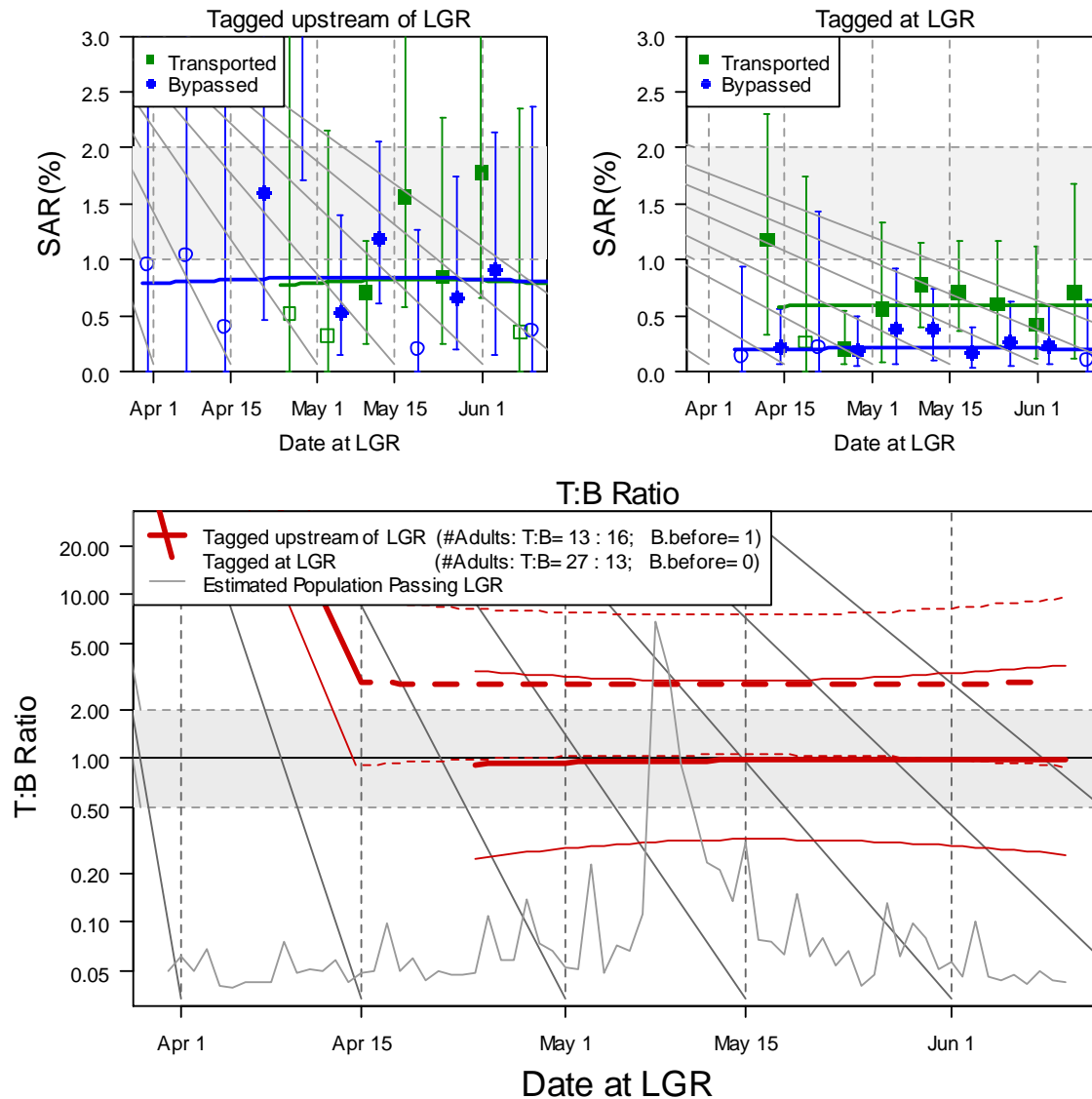
Estimated T:S Ratio



Some Within-Season Patterns for MY 2022

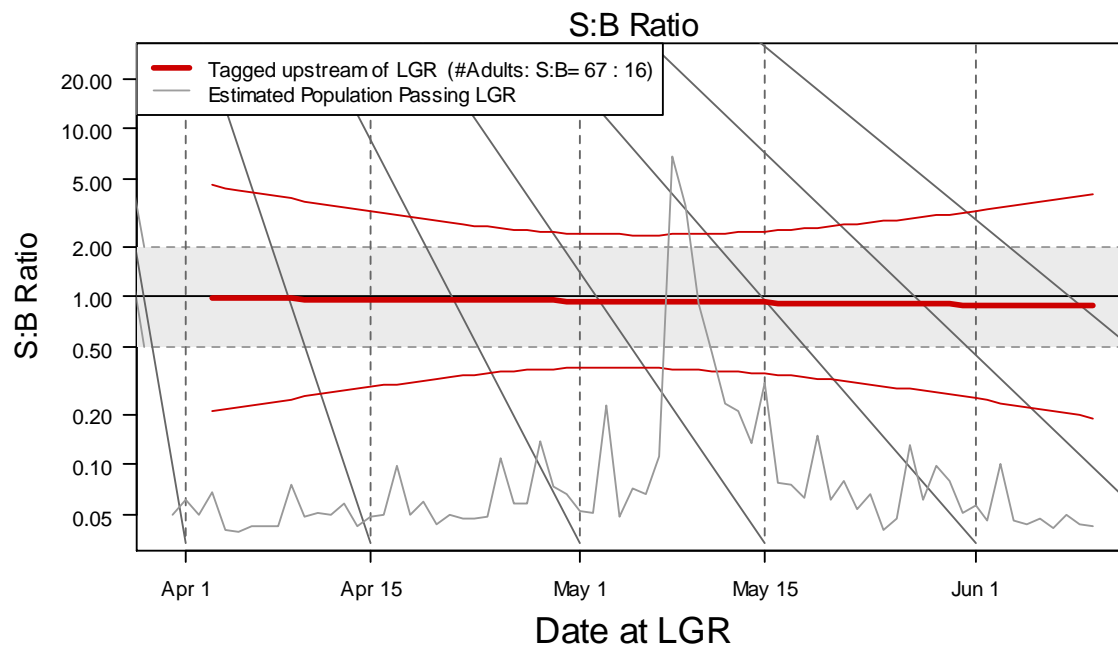
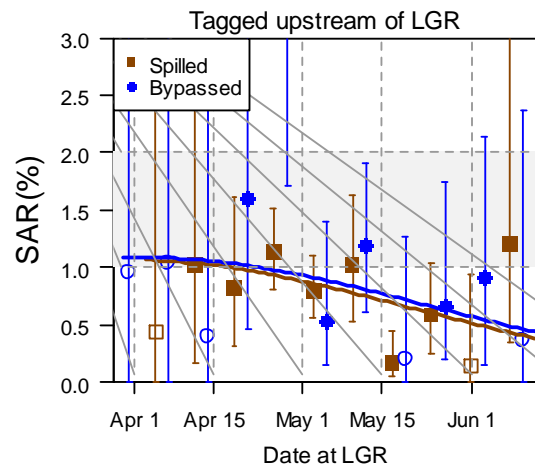
Wild Chinook 2022

Transported or Bypassed at Lower Granite Dam



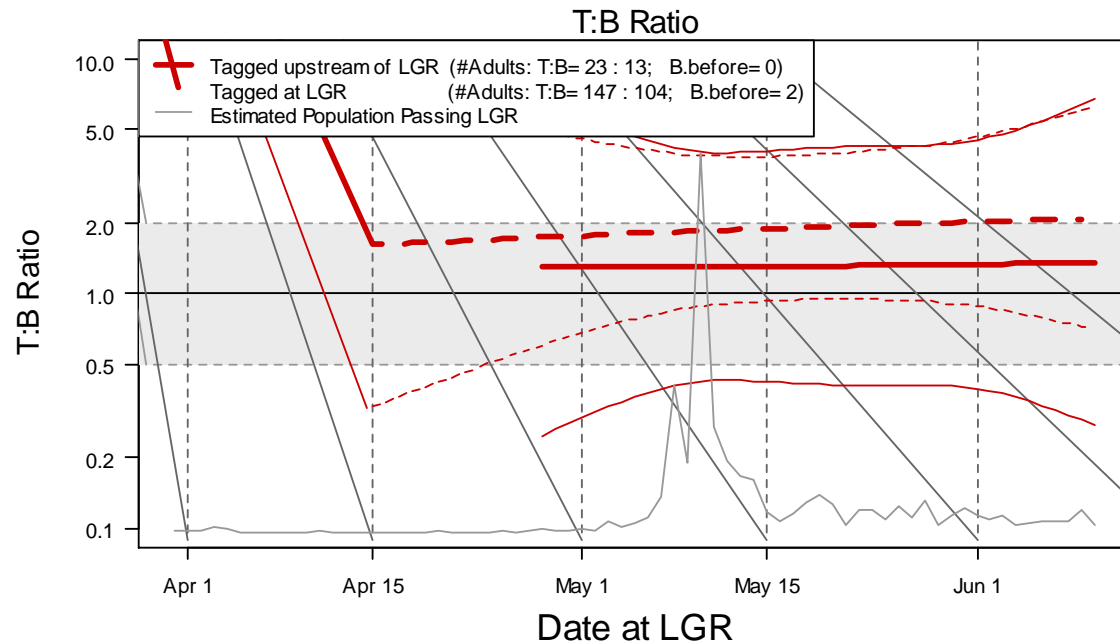
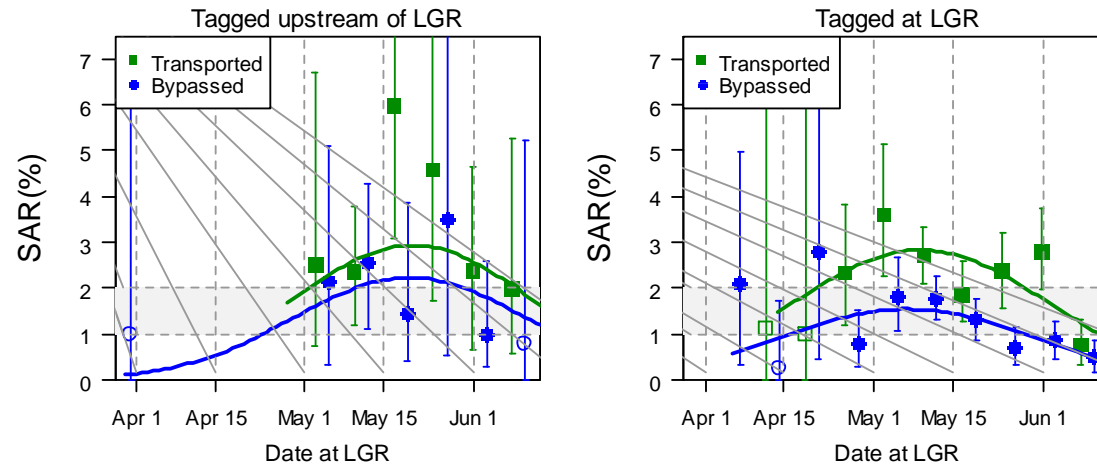
Wild Chinook 2022

Spilled or Bypassed at Lower Granite Dam



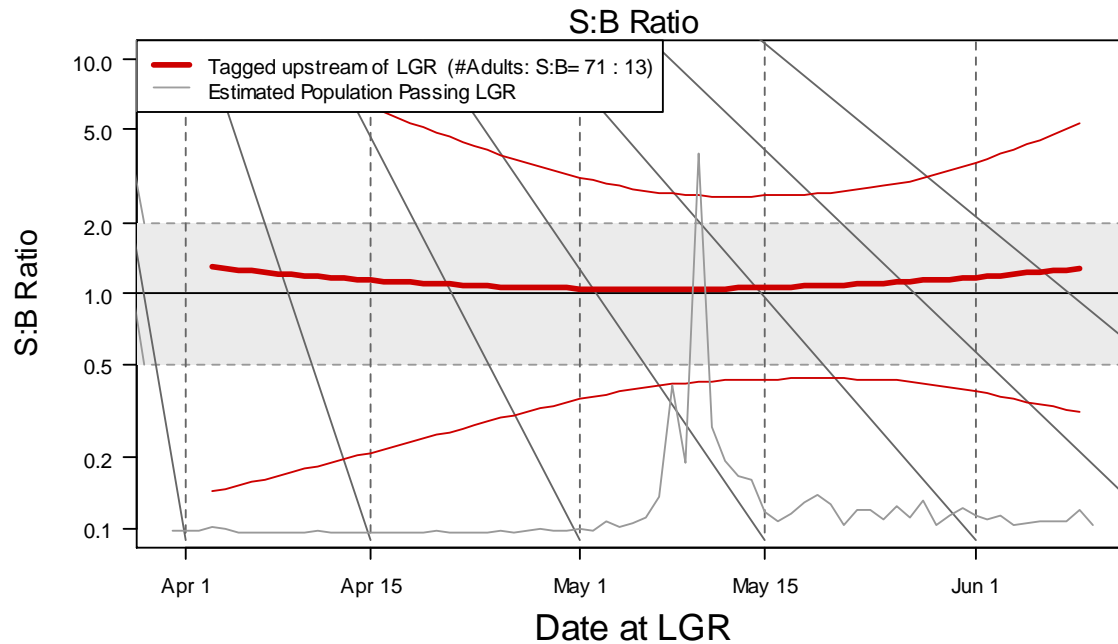
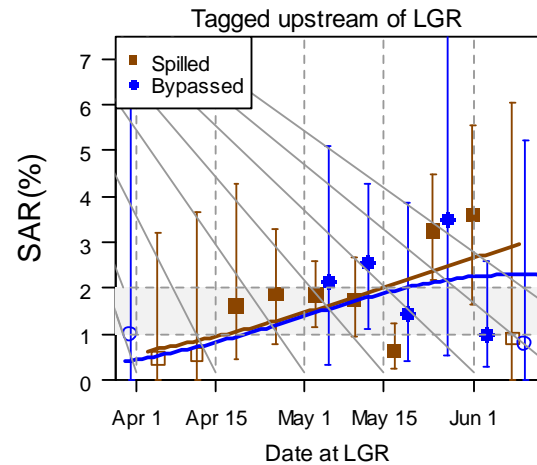
Wild Steelhead 2022

Transported or Bypassed at Lower Granite Dam



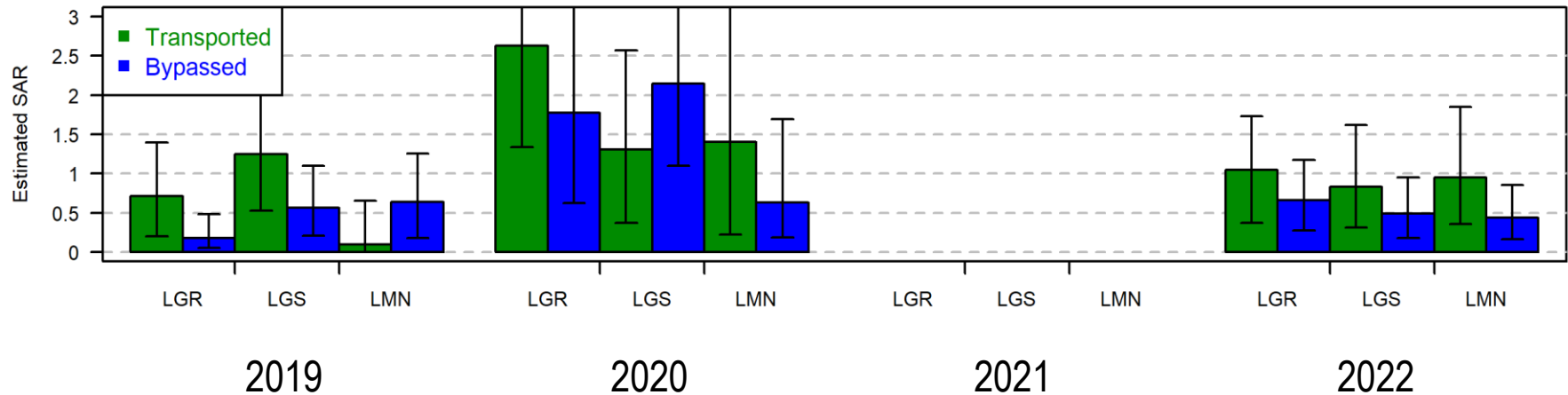
Wild Steelhead 2022

Spilled or Bypassed at Lower Granite Dam

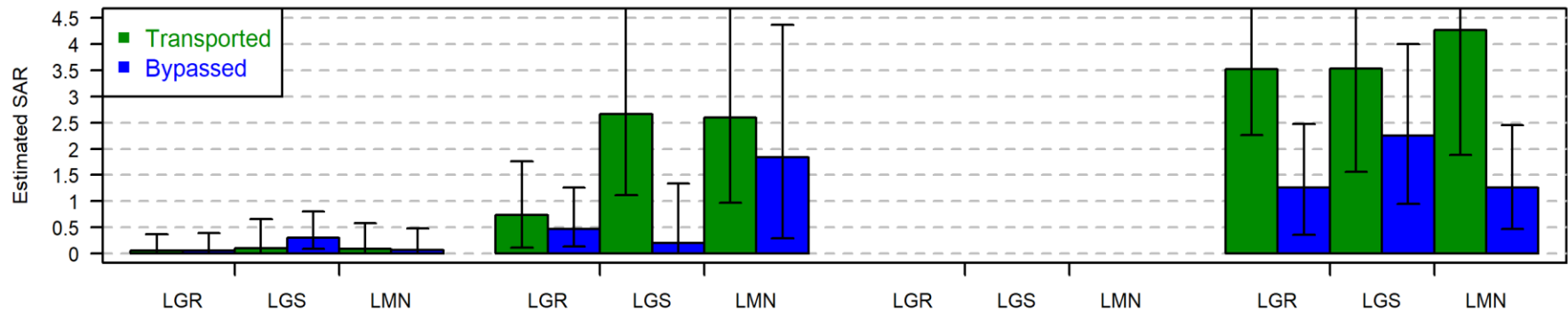


Annual Estimated SARs – May 15-June 15

Wild Yearling Chinook

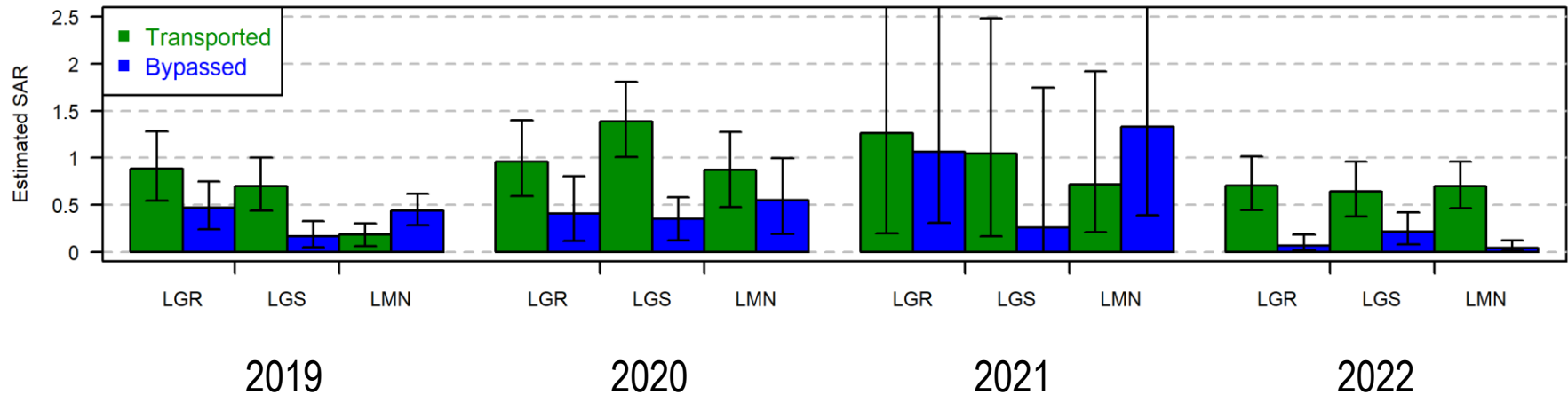


Wild Steelhead

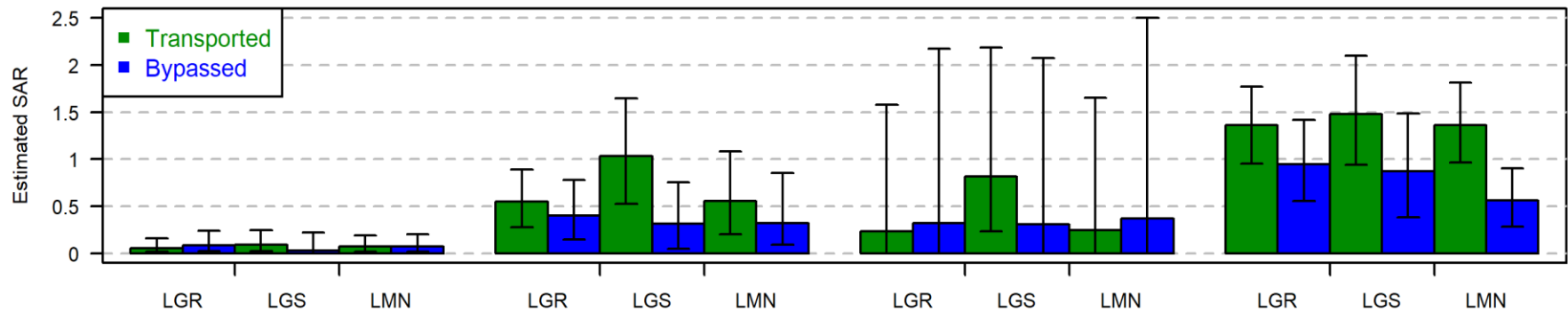


Annual Estimated SARs – May 15-June 15

Hatchery Yearling Chinook

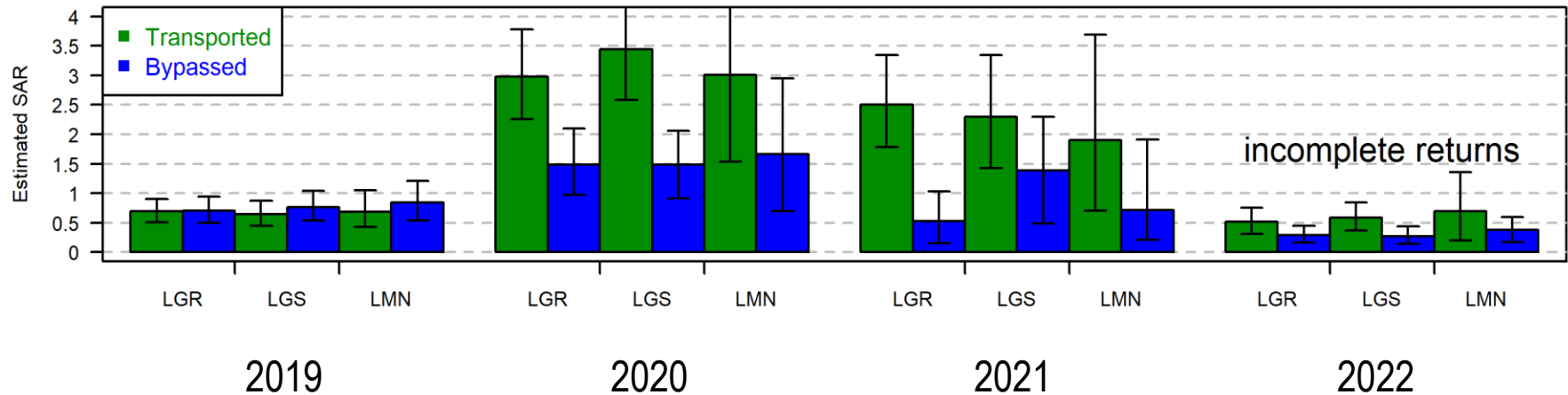


Hatchery Steelhead



Annual Estimated SARs – May 15-June 15

Subyearling Fall Chinook



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 |
| | | | | | | | | | | | |
| Sum | 2197 | 7 | 0.33 | | 1014 | 2 | 0.22 | | 40982 | 67 | 0.16 |
| | | | | | | | | | | | |

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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