# Pre-Season Run Size Forecast for Fraser River Sockeye & Pink Salmon in 2025


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**Presented to the JTWG**

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Fisheries and Oceans Canada | Pêches et Océans Canada

# Outline

- Summary of 2024 Forecast
- Biological and environmental data
- 2025 SK & PK Run Size Forecast
- Highlights for 2025: Stocks of interest
- Key messages & uncertainties

# 2024 Forecast Summary

| | Area | Pre-season Forecast | Run Size Estimate | Return Relative to Forecast | Date of Last Update |
|---|---|---|---|---|---|
| Alaska | Bristol Bay | 37.9 million | 51.6 million | +36% | Sept 17 |
| British Columbia | Nass River (TRTC) | 440,000 | 524,000 | +19% | Sept 4 |
| | Skeena River | 1.5 million | 2.0 million | +33% | Aug 27 |
| | Barkley Sound | 500,000 | 678,000 | +36% | Oct 3 |
| | **Fraser River** | **567,000** | **474,000** | **-16%** | **Sep 23** |
| Washington | Baker Lake | 56,750 | 48,000 | -15% | Sept 23 |
| | Lake Washington | 19,574 | 23,000 | 18% | Sept 23 |
| | Columbia River | 401,700 | 756,000 | 88% | Sept 23 |

# 2024 Fo

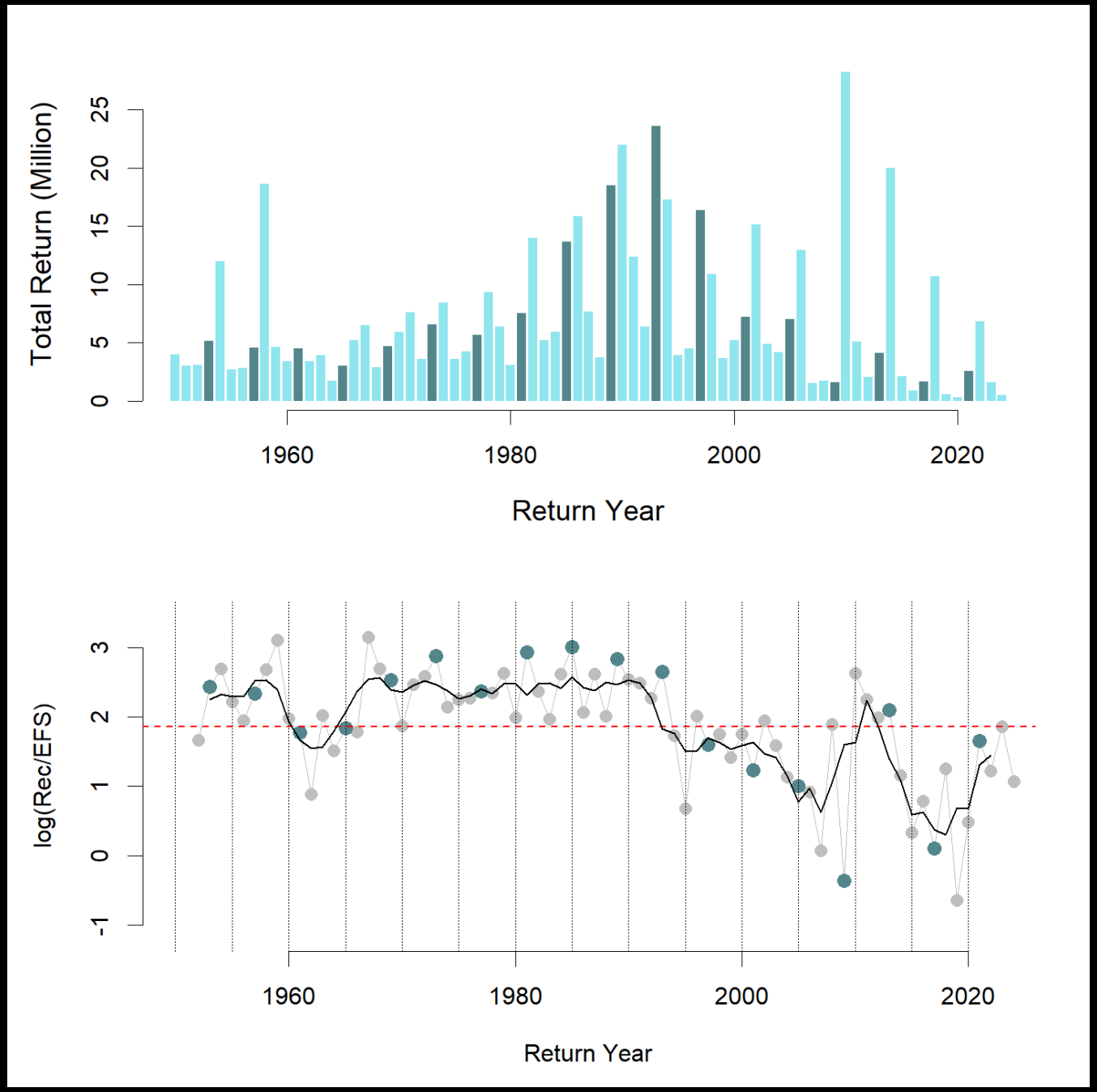
| Return Year | Forecast Probability Level | | | | | | Actual Returns |
|---|---|---|---|---|---|---|---|
| | <10% | 10% | 25% | 50% | 75% | 90% | |
| 1998 | NA | 4,391,000 | 6,040,000 | 6,822,000 | 11,218,000 | 18,801,000 | 10,870,000 |
| 1999 | NA | 3,067,000 | 4,267,000 | 4,843,000 | 8,248,000 | 14,587,000 | 3,640,000 |
| 2000 | NA | 1,487,000 | 2,449,000 | 4,304,000 | 7,752,000 | NA | 5,200,000 |
| 2001 | NA | 3,869,000 | 6,797,000 | 12,864,000 | 24,660,000 | NA | 7,190,000 |
| 2002 | NA | 4,859,000 | 7,694,400 | 12,915,900 | 22,308,500 | NA | 15,130,000 |
| 2003 | NA | 1,908,000 | 2,742,000 | 3,141,000 | 5,502,000 | 9,744,000 | 4,890,000 |
| 2004 | NA | 1,858,000 | 2,615,000 | 2,980,000 | 5,139,000 | 9,107,000 | 4,180,000 |
| 2005 | NA | 5,149,000 | 8,734,000 | 16,160,000 | 30,085,000 | 53,191,000 | 7,020,000 |
| 2006 | NA | 5,683,000 | 9,530,000 | 17,357,000 | 31,902,000 | 56,546,000 | 12,980,000 |
| 2007 | NA | 2,242,500 | 3,602,000 | 6,247,000 | 11,257,000 | 19,706,000 | 1,510,000 |
| 2008 | NA | 1,258,000 | 1,854,000 | 2,899,000 | 4,480,000 | 7,057,000 | 1,740,000 |
| 2009 | NA | 3,556,000 | 6,039,000 | 10,578,000 | 19,451,000 | 37,617,000 | 1,590,000 |
| 2010 | NA | 5,360,000 | 8,351,000 | 13,989,000 | 23,541,000 | 40,924,000 | 28,250,000 |
| 2011 | NA | 1,700,000 | 2,693,000 | 4,627,000 | 9,074,000 | 15,086,000 | 5,110,000 |
| 2012 | NA | 743,000 | 1,203,000 | 2,119,000 | 3,763,000 | 6,634,000 | 2,050,000 |
| 2013 | NA | 1,554,000 | 2,655,000 | 4,765,000 | 8,595,000 | 15,608,000 | 4,130,000 |
| 2014 | NA | 7,237,000 | 12,788,000 | 22,854,000 | 41,121,000 | 72,014,000 | 20,000,000 |
| 2015 | NA | 2,364,000 | 3,824,000 | 6,778,000 | 12,635,000 | 23,580,000 | 2,120,000 |
| 2016 | NA | 814,000 | 1,296,000 | 2,271,000 | 4,227,000 | 8,181,000 | 853,000 |
| 2017 | NA | 1,315,000[R] | 2,338,000 | 4,432,000 | 8,873,000 | 17,633,000 | 1,641,000 |
| 2018 | NA | 5,265,000 | 8,423,000 | 13,981,000 | 22,937,000 | 36,893,000 | 10,675,000 |
| 2019 | NA | 1,832,000 | 2,979,000 | 5,056,000 | 9,133,000 | 15,313,000 | 564,000 |
| 2020 | NA | 275,000 | 486,000 | 924,000 | 1,834,000 | 3,573,000 | 288,000 |
| 2021 | NA | 313,000 | 624,000 | 1,330,000 | 2,775,000 | 5,496,000 | 2,549,000 |
| 2022 | NA | 2,374,000 | 4,662,000 | 9,775,000 | 20,395,000 | 41,707,000 | 6,886,000 |
| 2023 | NA | 453,000 | 800,000 | 1,564,000 | 3,185,000 | 5,952,000 | 1,653,000* |
| 2024 | NA | 167,000 | 299,000 | 567,000 | 1,121,000 | 2,173,000 | 474,000 |

# 2024 Forecast Summary

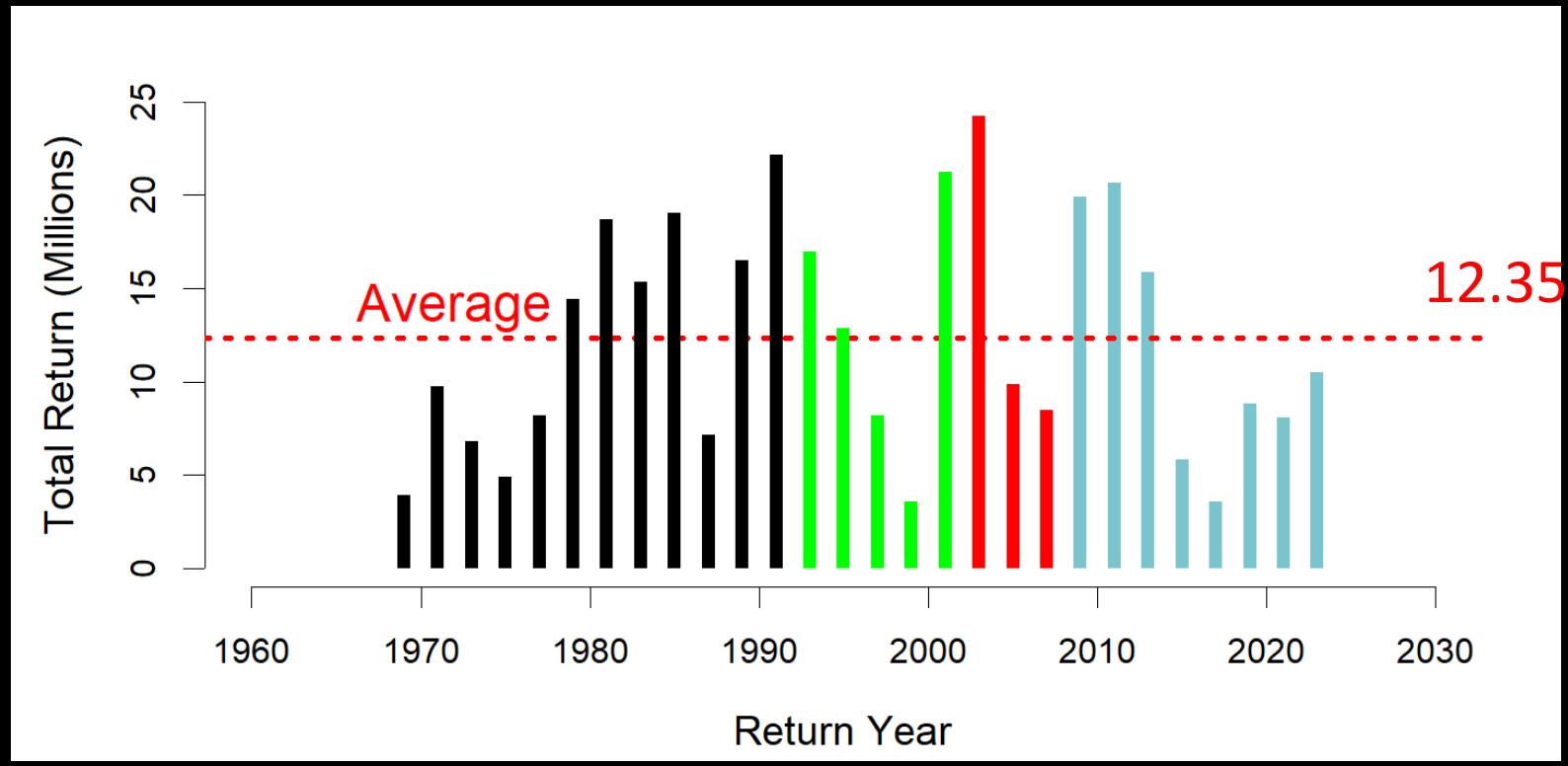
| Run timing group<br>Stocks | Forecast<br>Model | 2024 P50 FC | Preliminary Estimated Return | Return Relative to Forecast |
|---|---|---|---|---|
| **Early Stuart**<br>***Early Stuart Hatchery**** | *Ricker (Ei)* | 200<br>1,000 | 193<br>~0 | -3.6% |
| Bowron | *RickerCyc* | 1,000 | 575 | -74% |
| Upper Barriere (Fennell) | *PowerBasic4Sibling5* | 5,000 | 2,418 | -106% |
| Gates | *Ricker (Pi)* | 27,000 | 14,132 | -91% |
| Nadina | *RickerFrDpeak4, Sibling5* | 65,000 | 86,072 | +24% |
| Pitt | *LarkinBasicCyc* | 16,000 | 11,352 | -41% |
| Scotch | *Larkin* | 5,000 | 701 | -613% |
| Seymour | *Ricker (Pi)* | 2,000 | 773 | -157% |
| Misc (EShu) | *R/S* | 700 | 408 | -72% |
| Misc (Taseko) | *R/S* | 70 | 1,087 | +94% |
| Misc (Chilliwack) | *Ricker4Sibling5* | 34,000 | 19,616 | -73% |
| Misc (Nahatlatch) | *R/S* | 3,000 | .3,799 | +21% |
| Chilko | *RickerCyc4Sibling5* | 176,000 | 109,244 | -61% |
| Late Stuart | *R1C* | 12,000 | 41,004 | +71% |
| Quesnel | *R2C* | 3,000 | 5,243 | +43% |
| Stellako | *R2C4Sibling5* | 65,000 | 74,975 | +13% |
| Harrison | *TSA3Sibling4* | 106,000 | 51,347 | -106% |
| Raft | *PowerBasicCyc* | 17,000 | 13,119 | -30% |
| Misc (N. Thomp. Tribs) | *R/S* | 200 | 4,116 | +95 |
| Misc (N. Thomp River) | *R/S* | 200 | | |
| Misc (Widgeon) | *R/S* | 80 | | |
| Cultus | *PowerJuv(Pi)* | 100 | | |
| Late Shuswap | *Ricker(Pi)4Sibling5* | 2,000 | 780 | -156% |
| Portage | *Ricker (Pi)* | 200 | | |
| Weaver | *RickerCyc* | 2,000 | 1,602 | -25% |
| Birkenhead | *Ricker (Ei)* | 24,000 | 19,943 | -20% |
| Misc Harrison/Lillooet | *R/S* | 200 | | |

# Fraser Sockeye Returns and Productivity

- Unlike previous 2 years, this cycle line hasn't been on a consistent downward trend
- 2021 saw a return ~p75
- Productivity in 2021 ~ average



# Fraser Pink Returns




**Recruitment data uncertainties:**

1961-1991: Separate system-specific escapement estimates (DFO)

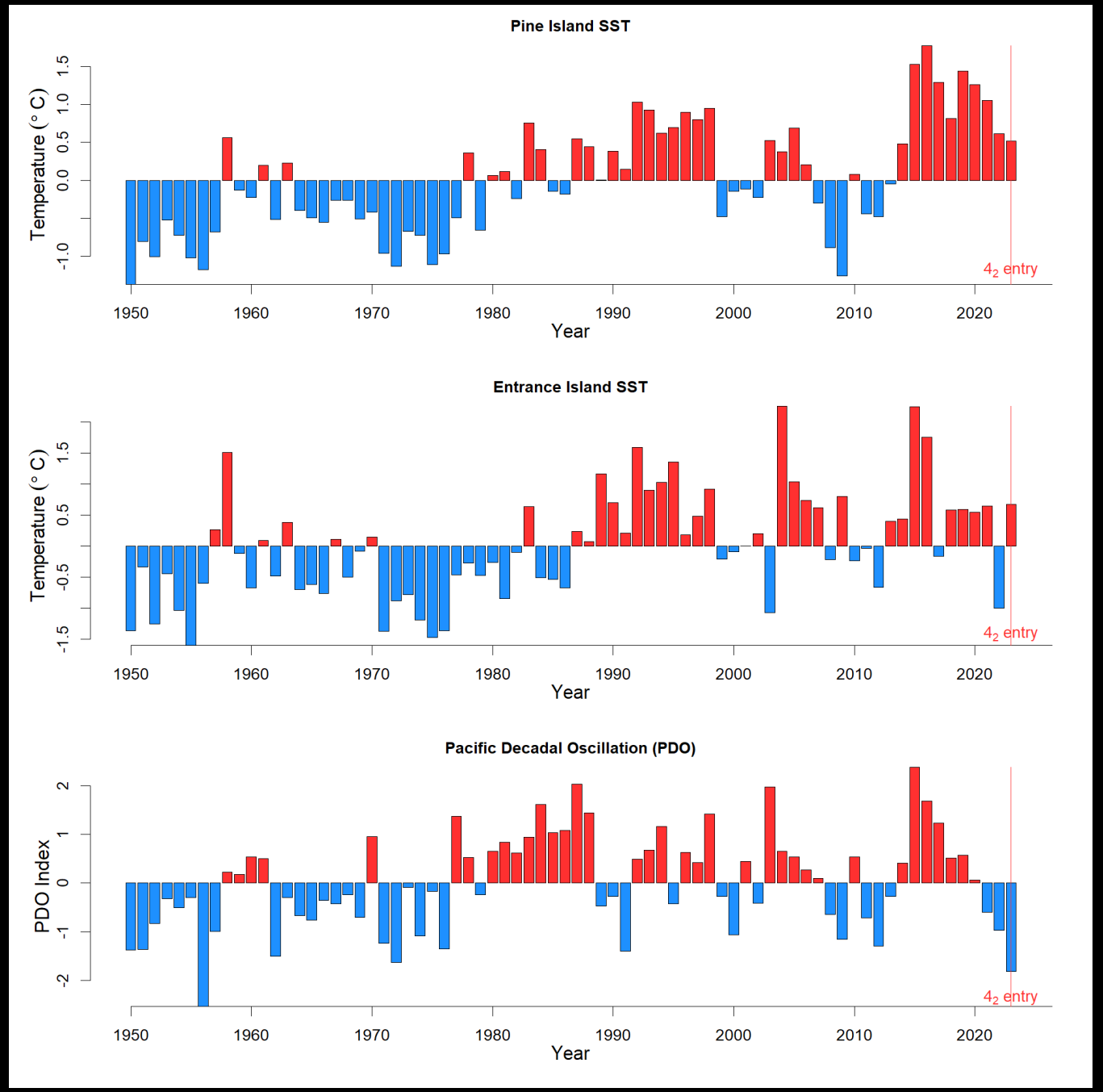
1993-2001: Single Fraser system Mark-Recaptures (DFO)

2003-2007: Indirect system-wide marine test fisheries estimates (PSC)

2009-Now: System-wide Mission hydroacoustic estimate (PSC)

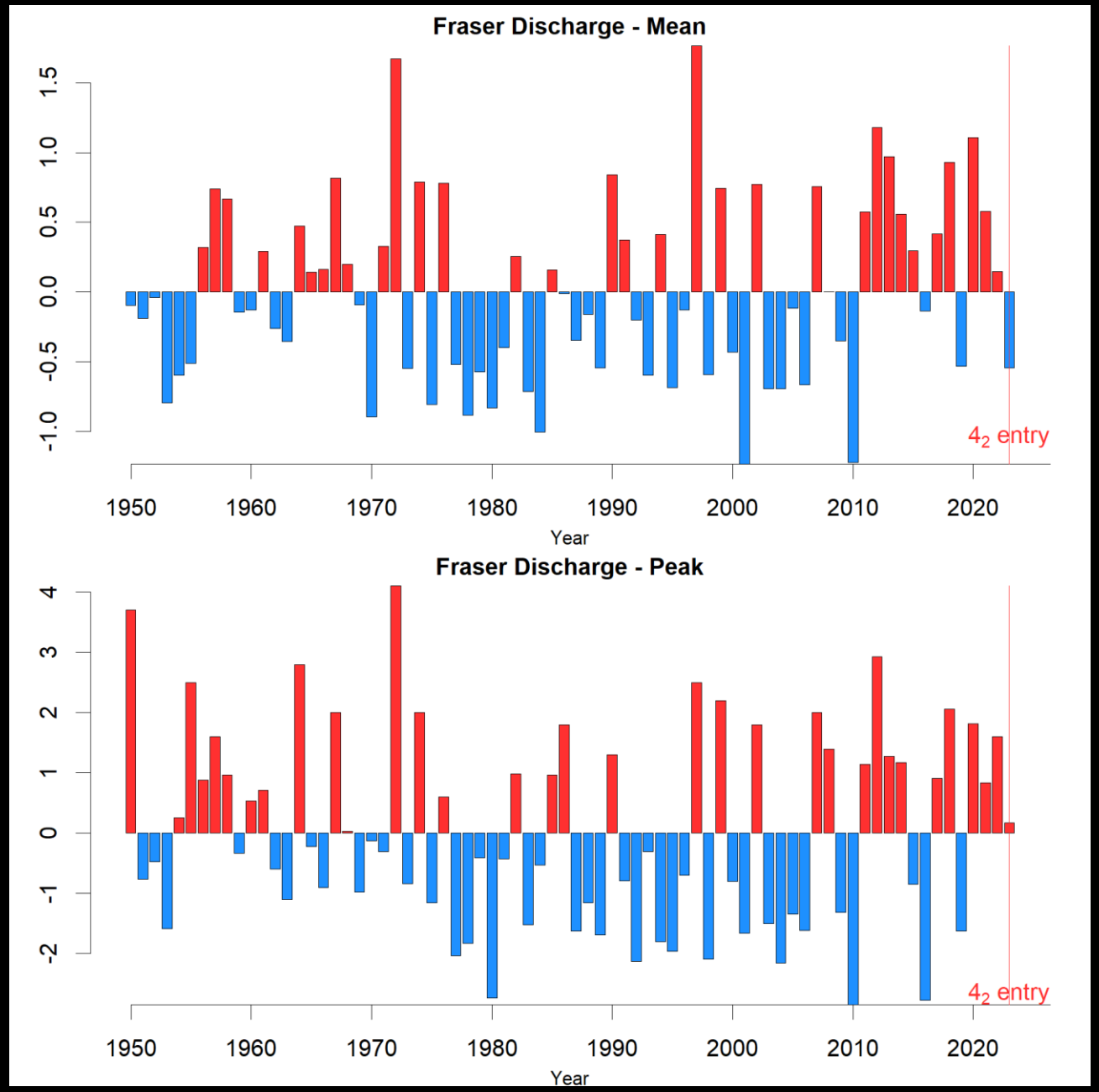
# Environmental Conditions

- Pine Island and Entrance Island SST
- PDO
- Nearshore stations similar while PDO is more negative than previous few years



# Environmental Conditions

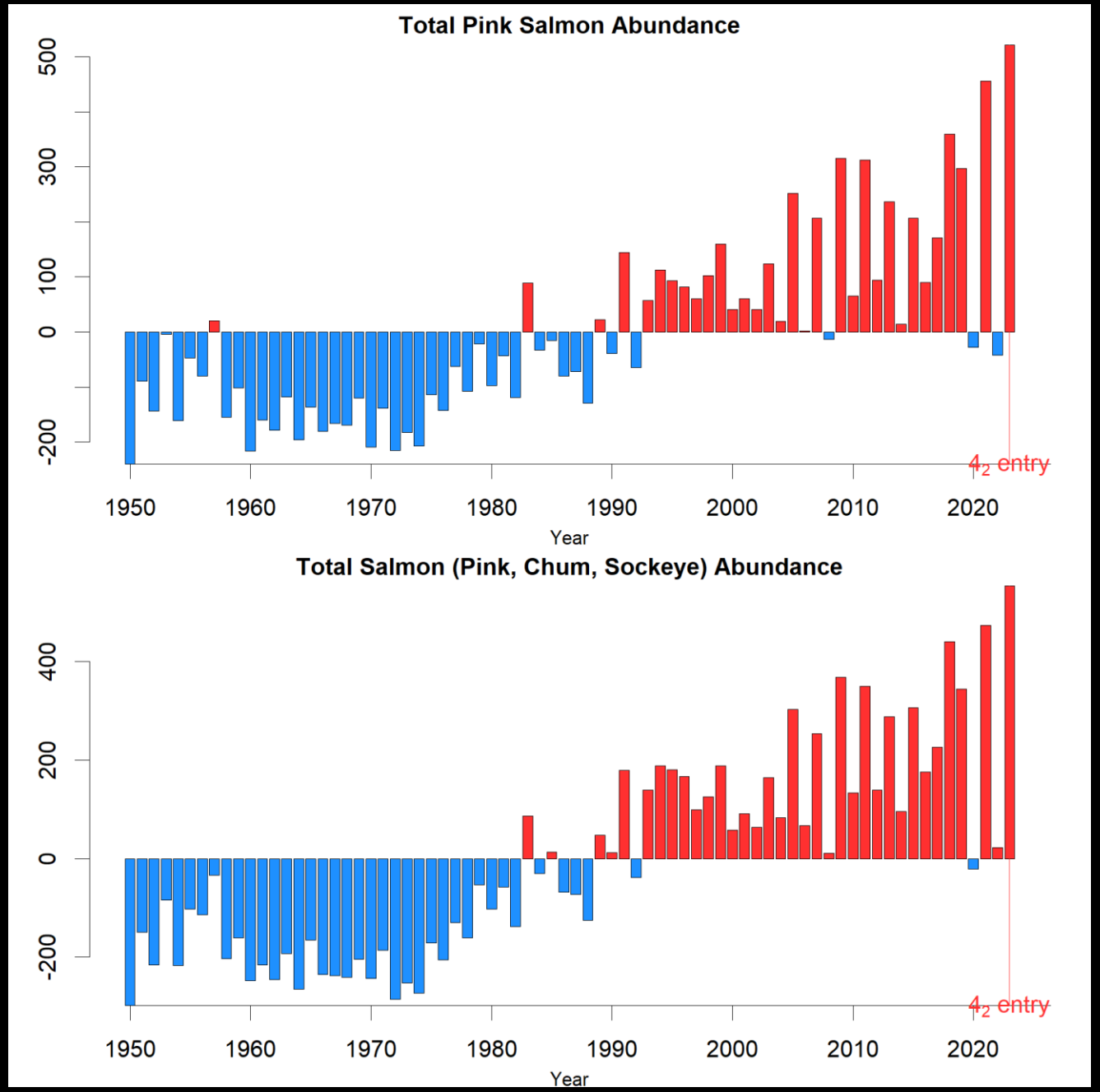
- Fraser Discharge Mean and Peak
- Mean was below average but the peak was slight above average



# Environmental Conditions

Pacific Salmon abundance:

- Highest on record
- Total salmon driven by high pink abundance



# Environmental Conditions

- Ocean Conditions in 2023:
  - Similar to last year
  - Best ranked PDO in the time series

## 2023 OCEAN CONDITION INDICATORS TREND

good fair poor

| | ECOSYSTEM INDICATORS | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CLIMATE & ATMOSPHERIC | PDO (Sum Dec-March) | 23 | 9 | 5 | 17 | 10 | 25 | 16 | 21 | 18 | 13 | 7 | 2 | 20 | 6 | 4 | 11 | 14 | 26 | 24 | 22 | 15 | 19 | 12 | 8 | 3 | 1 |
| | PDO (Sum May-Sept) | 14 | 5 | 11 | 8 | 13 | 23 | 18 | 21 | 17 | 19 | 7 | 16 | 9 | 4 | 3 | 10 | 24 | 26 | 25 | 20 | 15 | 22 | 12 | 6 | 2 | 1 |
| | ONI (Average Jan-June) | 25 | 1 | 1 | 9 | 17 | 19 | 18 | 21 | 10 | 15 | 3 | 13 | 22 | 6 | 8 | 10 | 12 | 23 | 26 | 16 | 7 | 24 | 20 | 5 | 4 | 14 |
| LOCAL PHYSICAL | SST NDBC buoys (°C; May-Sept) | 21 | 7 | 9 | 5 | 6 | 13 | 26 | 14 | 2 | 17 | 1 | 12 | 3 | 8 | 10 | 19 | 24 | 23 | 22 | 15 | 18 | 25 | 11 | 4 | 20 | 16 |
| | Upper 20 m T (°C; Nov-Mar) | 25 | 14 | 11 | 13 | 8 | 19 | 20 | 16 | 17 | 7 | 1 | 12 | 22 | 6 | 4 | 9 | 3 | 26 | 24 | 23 | 18 | 21 | 2 | 10 | 15 | 5 |
| | Upper 20 m T (°C; May-Sept) | 18 | 12 | 14 | 5 | 1 | 3 | 26 | 21 | 10 | 11 | 2 | 7 | 19 | 9 | 8 | 20 | 24 | 15 | 16 | 13 | 17 | 25 | 23 | 4 | 22 | 6 |
| | Deep Temp (°C; May-Sept) | 25 | 7 | 10 | 5 | 1 | 12 | 15 | 17 | 13 | 6 | 2 | 9 | 8 | 11 | 4 | 16 | 24 | 21 | 14 | 19 | 20 | 18 | 26 | 3 | 23 | 22 |
| | Deep Salinity (May-Sept) | 25 | 4 | 12 | 5 | 7 | 21 | 22 | 13 | 8 | 2 | 3 | 18 | 17 | 15 | 16 | 14 | 26 | 20 | 10 | 9 | 6 | 11 | 24 | 1 | 23 | 19 |
| LOCAL BIOLOGICAL | Copepod richness (May-Sept anom) | 24 | 3 | 1 | 11 | 10 | 19 | 18 | 23 | 20 | 14 | 12 | 13 | 22 | 6 | 9 | 4 | 15 | 25 | 26 | 21 | 17 | 16 | 7 | 5 | 2 | 8 |
| | N copepod biomass (May-Sept anom) | 24 | 19 | 14 | 15 | 6 | 21 | 18 | 25 | 20 | 16 | 9 | 13 | 11 | 3 | 5 | 7 | 8 | 22 | 26 | 23 | 10 | 4 | 2 | 1 | 17 | 12 |
| | S copepod biomass (May-Sept anom) | 26 | 2 | 7 | 4 | 3 | 18 | 20 | 25 | 17 | 14 | 1 | 9 | 21 | 13 | 10 | 8 | 15 | 23 | 24 | 22 | 16 | 19 | 12 | 5 | 6 | 11 |
| | Biological transition | 24 | 13 | 9 | 8 | 11 | 19 | 15 | 23 | 18 | 5 | 1 | 2 | 21 | 3 | 12 | 6 | 6 | 24 | 24 | 22 | 17 | 19 | 14 | 10 | 4 | 16 |
| | Nearshore Ichthyoplankton (Jan-Mar) | 21 | 4 | 14 | 8 | 1 | 25 | 26 | 20 | 11 | 22 | 3 | 17 | 2 | 10 | 5 | 13 | 23 | 18 | 19 | 16 | 12 | 24 | 9 | 6 | 15 | 7 |
| | Near & offshore Ichthyoplankton (community index Jan-Mar) | 11 | 6 | 4 | 8 | 10 | 13 | 20 | 24 | 1 | 16 | 3 | 12 | 18 | 5 | 2 | 7 | 9 | 22 | 25 | 26 | 21 | 23 | 19 | 15 | 14 | 17 |
| | Chinook salmon juvenile catch | 23 | 2 | 7 | 20 | 6 | 10 | 18 | 25 | 14 | 12 | 1 | 8 | 5 | 16 | 3 | 4 | 9 | 17 | 22 | 26 | 21 | 15 | 24 | 13 | 11 | 19 |
| | Coho salmon juvenile catch | 24 | 13 | 21 | 5 | 7 | 6 | 23 | 25 | 19 | 2 | 4 | 10 | 11 | 20 | 15 | 1 | 12 | 18 | 17 | 26 | 3 | 16 | 22 | 14 | 9 | 8 |
| MEANS & RANKS | Mean of ranks | 22.1 | 7.6 | 9.4 | 9.1 | 7.3 | 16.6 | 19.9 | 20.9 | 13.4 | 11.9 | 3.8 | 10.8 | 14.4 | 8.8 | 7.4 | 9.9 | 15.5 | 21.8 | 21.5 | 19.9 | 14.6 | 18.8 | 14.9 | 6.9 | 11.9 | 11.4 |
| | Rank of the mean rank | 26 | 5 | 8 | 7 | 3 | 19 | 21 | 23 | 14 | 13 | 1 | 10 | 15 | 6 | 4 | 9 | 18 | 25 | 24 | 21 | 16 | 20 | 17 | 2 | 12 | 11 |
| NOT INCLUDED IN THE MEAN OF RANKS OR STATISTICAL ANALYSES | Physical Spring Trans (UI based) | 4 | 8 | 24 | 21 | 5 | 15 | 18 | 25 | 15 | 1 | 7 | 3 | 10 | 13 | 22 | 11 | 23 | 12 | 6 | 20 | 13 | 15 | 9 | 2 | 26 | 19 |
| | Physical Spring Trans. Hydrographic | 25 | 4 | 14 | 9 | 6 | 13 | 17 | 26 | 7 | 10 | 1 | 10 | 21 | 4 | 12 | 2 | 19 | 8 | 20 | 24 | 17 | 16 | 22 | 2 | 22 | 15 |
| | Upwelling Anomaly (sum April-May) | 12 | 4 | 21 | 8 | 11 | 18 | 16 | 25 | 12 | 6 | 9 | 10 | 19 | 21 | 19 | 14 | 23 | 1 | 3 | 24 | 7 | 5 | 16 | 2 | 26 | 15 |
| | Length of Upwelling Season (UI based) | 6 | 2 | 22 | 14 | 1 | 16 | 12 | 26 | 5 | 3 | 9 | 3 | 18 | 21 | 18 | 17 | 24 | 13 | 8 | 15 | 7 | 10 | 20 | 10 | 24 | 23 |
| | Copepod Community Index (May-Sept) | 25 | 5 | 7 | 10 | 4 | 20 | 18 | 24 | 21 | 13 | 1 | 9 | 17 | 12 | 8 | 6 | 15 | 23 | 26 | 22 | 16 | 19 | 14 | 3 | 2 | 11 |

# 2025 Fraser Sockeye Forecast Table

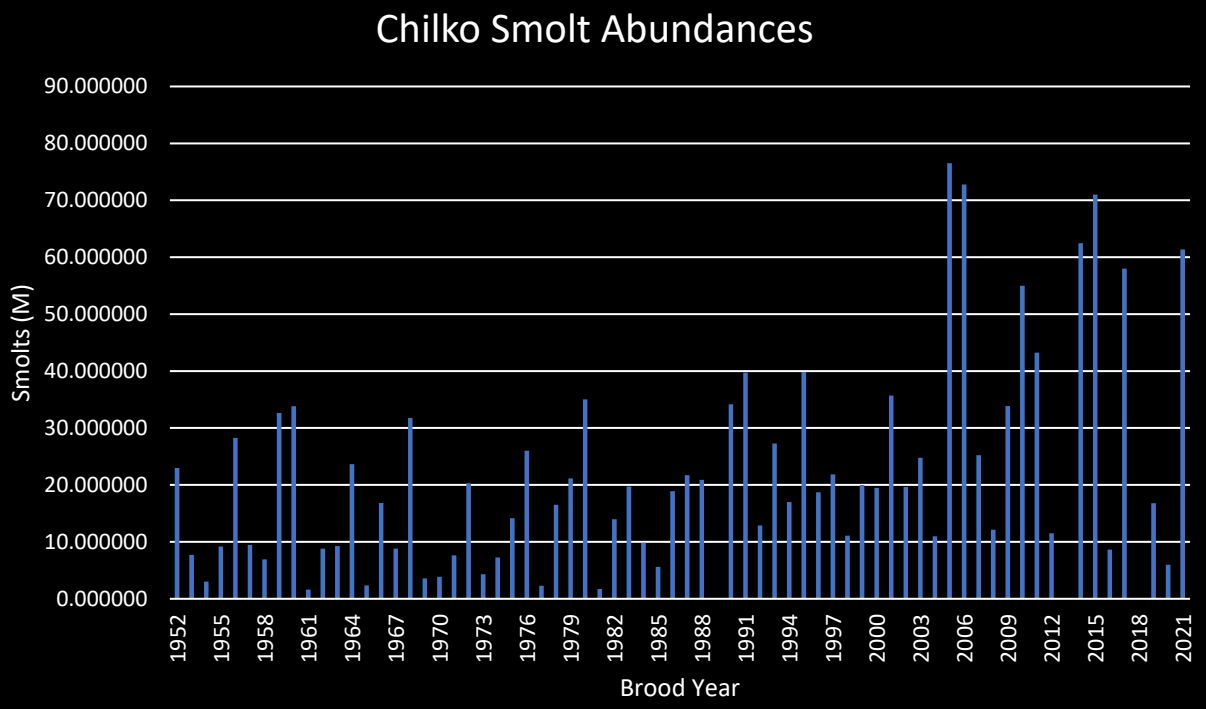
- Total Sockeye: 2.95M [736K, 13.1M]
  - Early Stuart: 116K[42K 319K]
  - Early Summer: 220K [54K, 820K]
  - Summer: 2.14M [522K, 10M]
  - Late: 474K [118K, 2M]
  - Pink: 27 M[12.6M, 57.9M]

| Run timing group / Stocks | Forecast Model | Probability that Return will be at/or Below Specified Run Size | | | | |
|---|---|---|---|---|---|---|
| | | 10% | 25% | 50% | 75% | 90% |
| Early Stuart | *Ricker (Ei)* | 42,000 | 72,000 | 116,000 | 202,000 | 319,000 |
| Early Summer Total | | 54,000 | 103,000 | 220,000 | 449,000 | 820,000 |
| *Total excluding misc. stocks* | | 49,000 | 95,000 | 187,000 | 368,000 | 684,000 |
| Bowron | *R1C4Sibling5* | 1,000 | 2,000 | 5,000 | 10,000 | 20,000 |
| Upper Barriere (Fennell) | *LLY* | 300 | 800 | 2,000 | 6,000 | 13,000 |
| Gates | *R2C* | 8,000 | 15,000 | 29,000 | 59,000 | 111,000 |
| Nadina | *RickerCyc4Sibling5* | 10,000 | 19,000 | 37,000 | 74,000 | 134,000 |
| Pitt | *Larkin4Sibling4* | 14,000 | 25,000 | 46,000 | 84,000 | 142,000 |
| Scotch | *Larkin4Sibling5* | 10,000 | 22,000 | 47,000 | 97,000 | 192,000 |
| Seymour | *Ricker (Pi)* | 6,000 | 11,000 | 21,000 | 38,000 | 72,000 |
| Misc (EShu) | *R/S* | 1,000 | 2,000 | 10,000 | 18,000 | 22,000 |
| Misc (Taseko) | *R/S* | 300 | 400 | 1,000 | 3,000 | 3,000 |
| Misc (Chilliwack) | *R/S* | 2,000 | 4,000 | 15,000 | 41,000 | 76,000 |
| Misc (Nahatlatch) | *R/S* | 1,000 | 2,000 | 7,000 | 19,000 | 35,000 |
| Summer Total | | 522,000 | 992,000 | 2,137,000 | 4,748,000 | 10,004,000 |
| *Total excluding misc. stocks* | | 522,000 | 992,000 | 2,136,000 | 4,744,000 | 9,995,000 |
| Chilko | *RickerCyc4Sibling5* | 250,000 | 455,000 | 928,000 | 1,984,000 | 4,153,000 |
| Late Stuart | *RS14Sibling5* | 107,000 | 244,000 | 608,000 | 1,519,000 | 3,466,000 |
| Quesnel | *Ricker(Ei)* | 55,000 | 107,000 | 260,000 | 576,000 | 1,200,000 |
| Stellako | *Larkin4Sibling5* | 100,000 | 163,000 | 281,000 | 514,000 | 810,000 |
| Harrison | *LLY3Sibling4* | 7,000 | 17,000 | 46,000 | 124,000 | 307,000 |
| Raft | *LLY4Sibling5* | 3,000 | 6,000 | 13,000 | 27,000 | 59,000 |
| Misc (N. Thomp. Tribs) | *R/S* | 200 | 300 | 800 | 2,000 | 4,000 |
| Misc (N. Thomp River) | *R/S* | 100 | 100 | 400 | 1,000 | 2,000 |
| Misc (Widgeon) | *R/S* | 20 | 50 | 70 | 1,000 | 3,000 |
| Late Total | | 118,000 | 237,000 | 474,000 | 993,000 | 1,997,000 |
| *Total excluding misc. stocks* | | 117,000 | 236,000 | 473,000 | 967,000 | 1,945,000 |
| Cultus | *PowerJuv(Pi)* | 200 | 300 | 700 | 1,000 | 3,000 |
| Late Shuswap | *Ricker(Pi)4Sibling5* | 6,000 | 21,000 | 60,000 | 143,000 | 300,000 |
| Portage | *Ricker (Ei)* | 3,000 | 6,000 | 13,000 | 34,000 | 80,000 |
| Weaver | *RickerCyc4Sibling5* | 88,000 | 167,000 | 297,000 | 575,000 | 1,119,000 |
| Birkenhead | *Ricker(Pi)Sibling5* | 20,000 | 42,000 | 96,000 | 214,000 | 443,000 |
| Misc Harrison/Lillooet | *R/S* | 300 | 1,000 | 1,000 | 26,000 | 52,000 |
| TOTAL SOCKEYE SALMON | | 736,000 | 1,404,000 | 2,947,000 | 6,392,000 | 13,140,000 |
| *Total Sockeye excluding misc. stocks* | | 730,000 | 1,395,000 | 2,912,000 | 6,281,000 | 12,943,000 |
| TOTAL PINK SALMON | | 12,585,000 | 17,738,000 | 26,965,000 | 39,168,000 | 57,854,000 |
| *Power Fry* | | | | | | |

# Highlights for 2025: Chilko

- Higher escapement in 2021 than on dominant cycle line in 2022
- High smolt abundance in 2023 61M
- High variability in forecasts for Chilko among top models

# Highlights for 2025: Chilko



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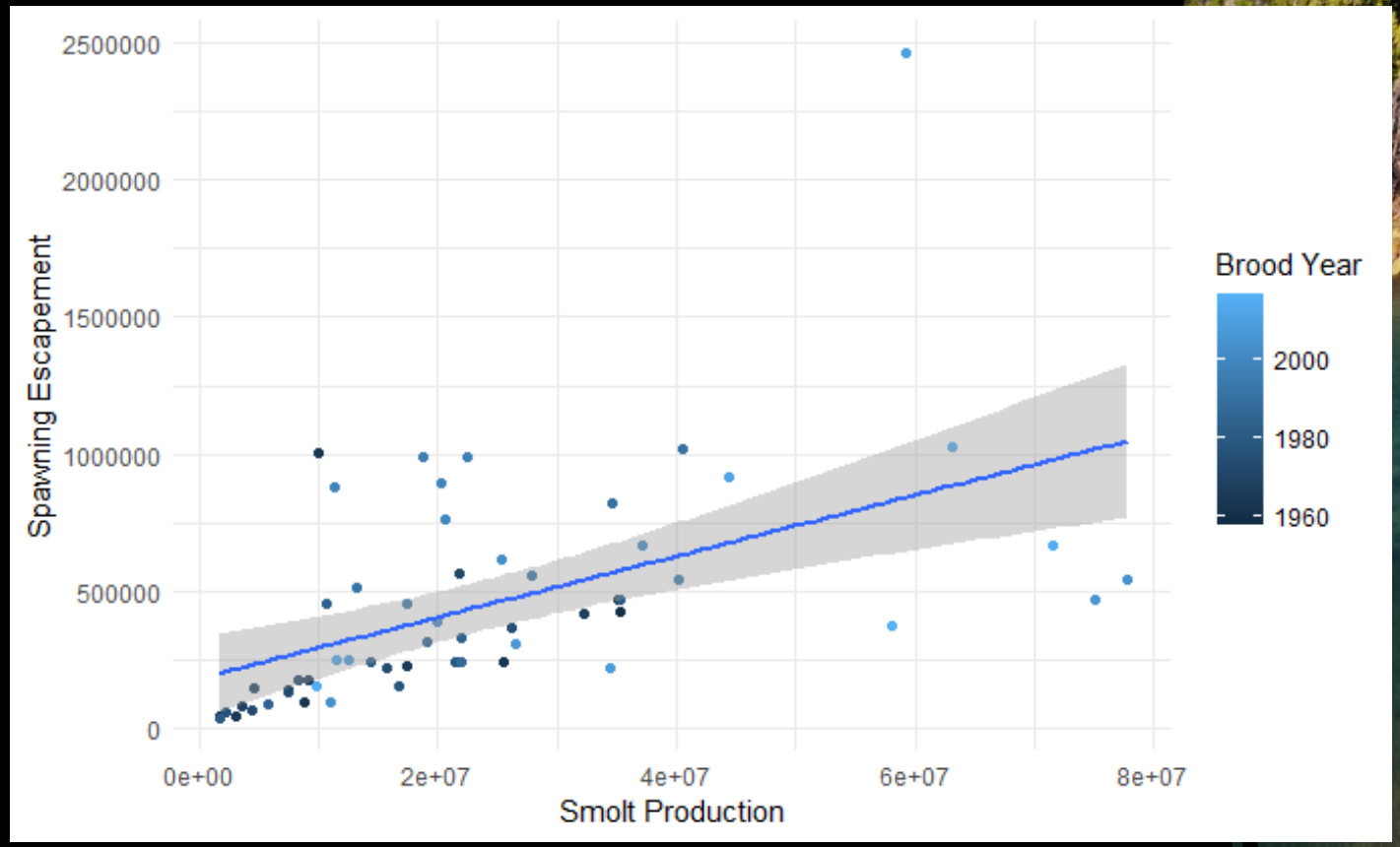

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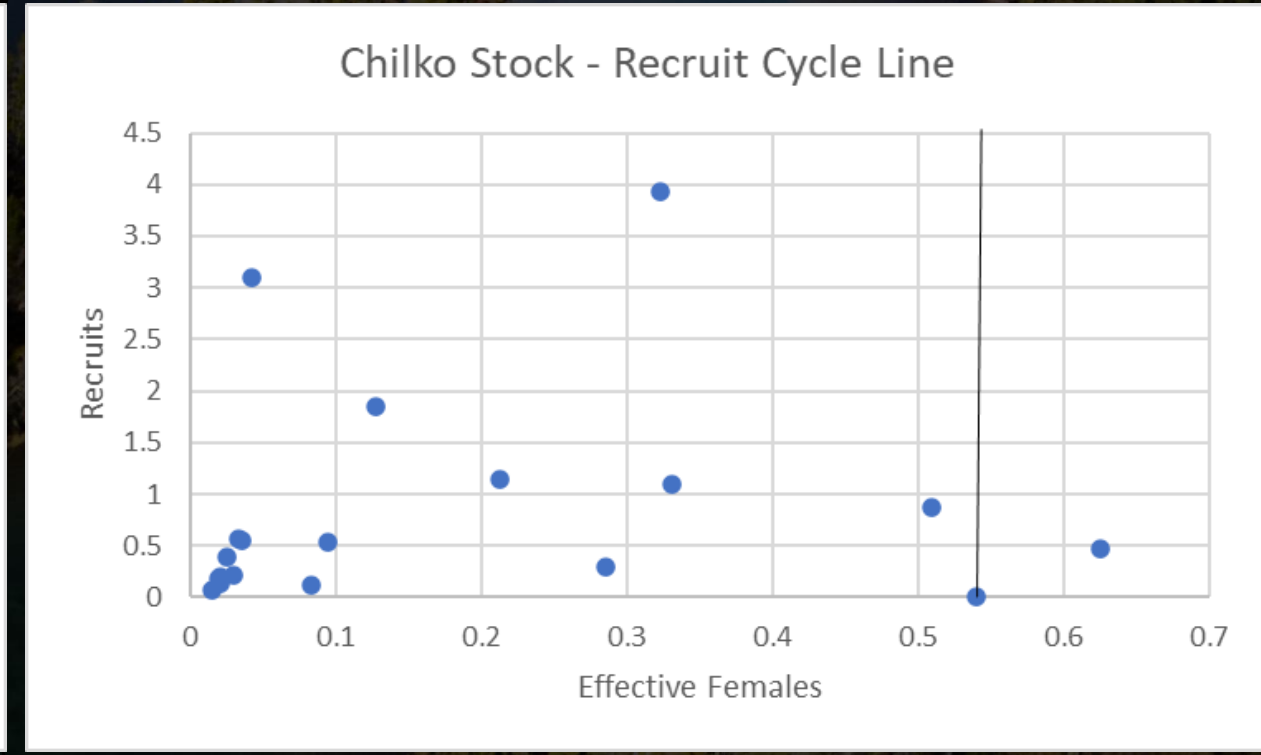

# Highlights for 2025: Early Stuart

- 2024 escapement suggests that hatchery contribution to spawning escapements was ~0
- Hatchery releases for the 2021 brood year were 460,000 (~5x that for the 2020 BY; 313,000 fed fry and 147,000 smolts)
- Waiting on more data before we try to forecast expected hatchery contributions for Early Stuart

# Highlights for 2025: Weaver

- Expected to contribute over half of the Late return
- 2021 EFS was 36,453
- Channel fry highest number since 1983

# Key Messages

- Bulk of return expected from Summer MU driven by Chilko & Late Stuart.
- Brood for the 2025 return comes from an unexpectedly strong return in 2021.
- Marine conditions nearshore are in an unfavourable state, but offshore (PDO) are most favourable since 1998.
- The pink salmon forecast will be the highest return on record if it materializes.

# Key Uncertainties

- Chilko forecast was highly variable among top models. Historically selected Larkin model forecast was for 2.3M (p50).

- Although there is a hatchery component of the Early Stuart return expected, no hatchery forecast will be presented this year until we have data to make predictions. Preliminary results suggest ~0 hatchery contribution to the 2024 Early Stuart return.

- Pink salmon forecast uses a fry abundance covariate and the fry outmigration in 2024 was the highest on record.  However, the discharge at freshet was the lowest on record which may affect catchability.

# 2024 Pink Fry Outmigration

- 2024 estimate was 1.35 billion

- Previous max was 1.06 billion in 2010 → resulting return in 2011 was 16 million