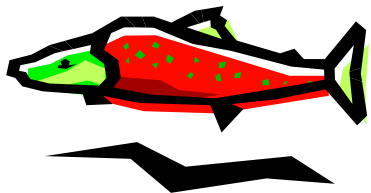
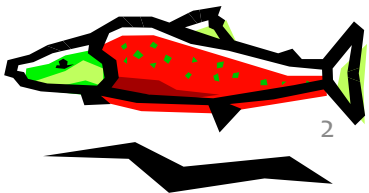
# Fraser Sockeye & Pink
# 2016 escapement options

presented to: First Nations JTWG & Forum
by: A. Huang
7 & 8 -March-2016

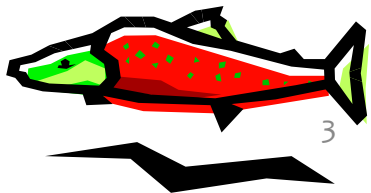


# outline

- how to read FR SK escapement options tables
- 2016 escapement table options
  - FR SK escapement options & "expected" aggregate outcomes
    - option 1
    - option 2
  - comparison of options by run timing group
- 2016 "expected" outcomes by stock



# HOW TO READ FR SK TABLES



# 2016 Fraser sockeye escapement options evaluations
## using adjusted 2012 TAMs

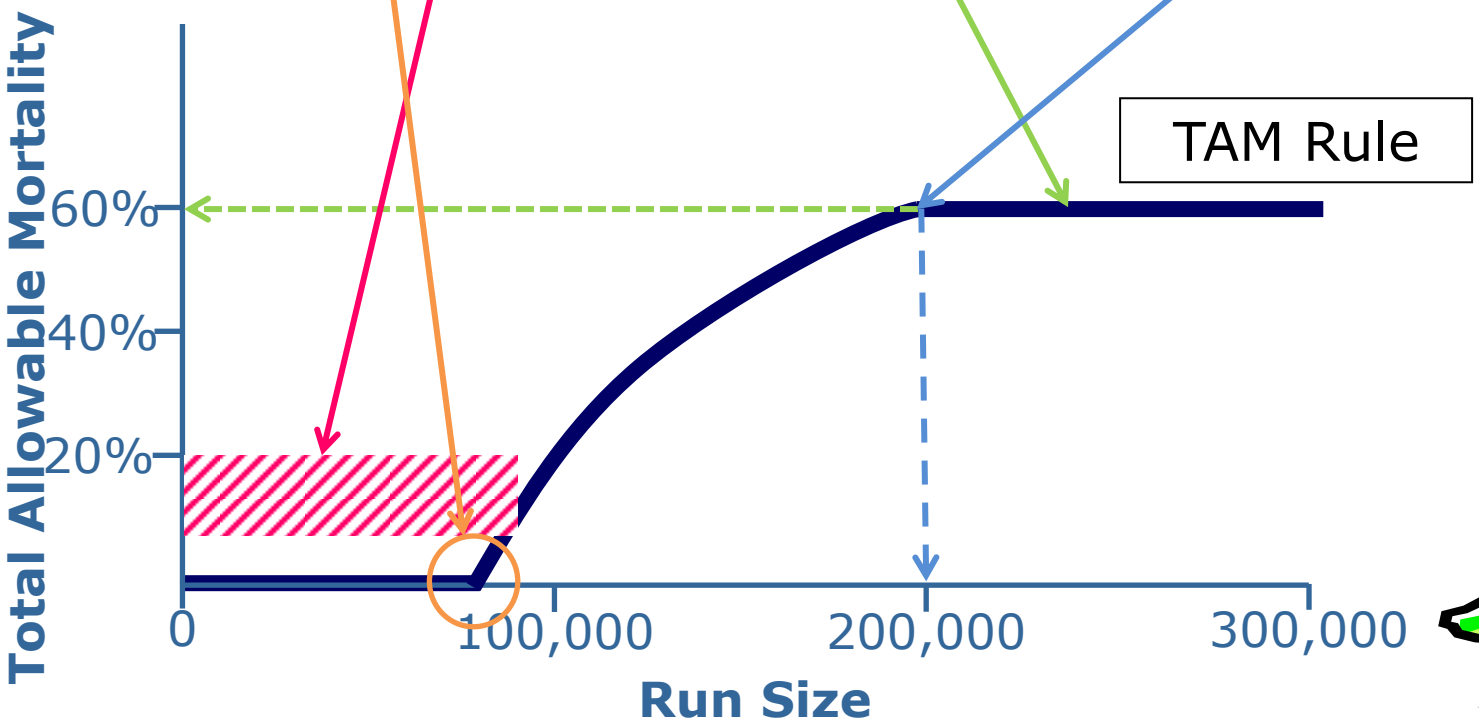
**Raft North Thompson & Harrison in Summer Run.**

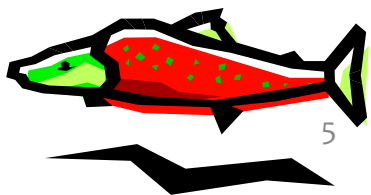
| | Harvest Rule Parameters | | | | |
|---|---|---|---|---|---|
| **Management Unit** | **Low Abundance ER (LAER)** | **TAM Cap** | **Lower Fishery Reference Point** | **Upper Fishery Reference Point** | **Pre-season pMA** |
| **Early Stuart** | 10% | 60% | 108,000 | 270,000 | 0.69 |
| **Early Summer (w/o misc)** | 10% | 60% | 100,000 | 250,000 | 0.60 |
| **Summer (w/o misc)** | 10% | 60% | 640,000 | 1,600,000 | 0.12 |
| **Late (w/o misc)** | 20-30% | 60% | 300,000 | 750,000 | 4.68 |

| **Management Unit** | | **Pre-season Forecast Return** | | | | |
|---|---|---|---|---|---|---|
| | | p10 | p25 | **p50** | p75 | p90 |
| **Early Stuart** | forecast | 13,000 | 22,000 | **36,000** | 59,000 | 89,000 |
| | TAM Rule (%) | 0% | 0% | **0%** | 0% | 0% |
| | Escapement Target | 13,000 | 22,000 | **36,000** | 59,000 | 89,000 |
| | MA | 9,000 | 15,200 | **24,800** | 40,700 | 61,400 |
| | Esc. Target + MA | 22,000 | 37,200 | **60,800** | 99,700 | 150,400 |
| | LAER | 10% | 10% | **10%** | 10% | 10% |
| | ER at Return | 0% | 0% | **0%** | 0% | 0% |
| | Allowable ER | 10% | 10% | **10%** | 10% | 10% |
| | available harvest | 1,300 | 2,200 | **3,600** | 5,900 | 8,900 |
| | 2016 Performance | | | | | |
| | Projected S (after MA | 7,000 | 12,000 | **19,000** | 31,000 | 47,000 |
| | BY Spawners | 26,233 | 26,233 | **26,233** | 26,233 | 26,233 |
| | Proj. S as % BY S | 27% | 46% | **72%** | 118% | 179% |
| | cycle avg S | 35,861 | 35,861 | **35,861** | 35,861 | 35,861 |
| | Proj. S as % cycle S | 20% | 33% | **53%** | 86% | 131% |

## Harvest Rule Parameters

| Management Unit | Low Abundance ER (LAER) | TAM Cap | Lower Fishery Reference Point | Upper Fishery Reference Point | Pre-season pMA |
|---|---|---|---|---|---|
| Early Stuart | 10% | 60% | 108,000 | 270,000 | 0.69 |
| Early Summer (w/o misc) | 10% | 60% | 100,000 | 250,000 | 0.60 |
| Summer (w/o misc) | 10% | 60% | 640,000 | 1,600,000 | 0.12 |
| Late (w/o misc) | 20-30% | 60% | 300,000 | 750,000 | 4.68 |



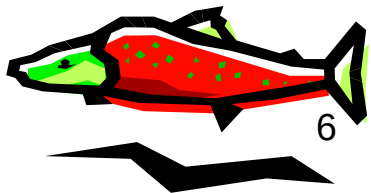
Run Size = 100K

Esc. Goal = 1-TAM = 40K fish

pMA = 30% = esc.goal*30% = 12K fish

TAM = 60% = 60K fish

ER = run size – (esc. goal + MA) = 48K fish = 48%



# 2016 Fraser sockeye escapement options evaluations
## using adjusted 2012 TAMs

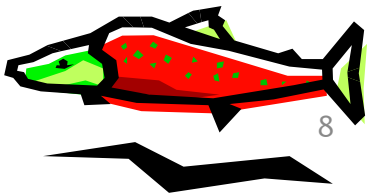
**Raft North Thompson & Harrison in Summer Run.**

| | Harvest Rule Parameters | | | | |
|---|---|---|---|---|---|
| **Management Unit** | **Low Abundance ER (LAER)** | **TAM Cap** | **Lower Fishery Reference Point** | **Upper Fishery Reference Point** | **Pre-season pMA** |
| **Early Stuart** | 10% | 60% | 108,000 | 270,000 | 0.69 |
| **Early Summer (w/o misc)** | 10% | 60% | 100,000 | 250,000 | 0.60 |
| **Summer (w/o misc)** | 10% | 60% | 640,000 | 1,600,000 | 0.12 |
| **Late (w/o misc)** | 20-30% | 60% | 300,000 | 750,000 | 4.68 |

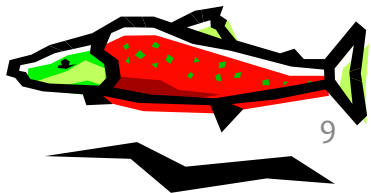
| **Management Unit** | | **Pre-season Forecast Return** | | | | |
|---|---|---|---|---|---|---|
| | | p10 | p25 | **p50** | p75 | p90 |
| **Early Stuart** | forecast | 13,000 | 22,000 | **36,000** | 59,000 | 89,000 |
| | TAM Rule (%) | 0% | 0% | **0%** | 0% | 0% |
| | Escapement Target | 13,000 | 22,000 | **36,000** | 59,000 | 89,000 |
| | MA | 9,000 | 15,200 | **24,800** | 40,700 | 61,400 |
| | Esc. Target + MA | 22,000 | 37,200 | **60,800** | 99,700 | 150,400 |
| | LAER | 10% | 10% | **10%** | 10% | 10% |
| | ER at Return | 0% | 0% | **0%** | 0% | 0% |
| | Allowable ER | 10% | 10% | **10%** | 10% | 10% |
| | available harvest | 1,300 | 2,200 | **3,600** | 5,900 | 8,900 |
| | 2016 Performance | | | | | |
| | Projected S (after MA | 7,000 | 12,000 | **19,000** | 31,000 | 47,000 |
| | BY Spawners | 26,233 | 26,233 | **26,233** | 26,233 | 26,233 |
| | Proj. S as % BY S | 27% | 46% | **72%** | 118% | 179% |
| | cycle avg S | 35,861 | 35,861 | **35,861** | 35,861 | 35,861 |
| | Proj. S as % cycle S | 20% | 33% | **53%** | 86% | 131% |

| | p10 |
|---|---|
| forecast | 13,000 |
| TAM Rule (%) | 0% |
| Escapement Target | 13,000 |
| MA | 9,000 |
| Esc. Target + MA | 22,000 |
| LAER | 10% |
| ER at Return | 0% |
| Allowable ER | 10% |
| available harvest | 1,300 |

| 2016 Performance | |
|---|---|
| Projected S (after MA | 7,000 |
| BY Spawners | 26,233 |
| Proj. S as % BY S | 27% |
| cycle avg S | 35,861 |
| Proj. S as % cycle S | 20% |

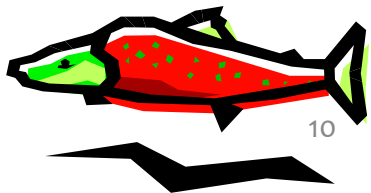


# 2016 ESCAPEMENT TABLES



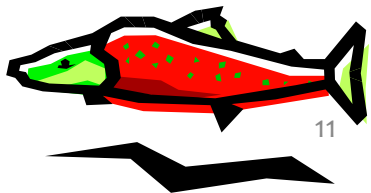
# FR SK: Option 1

| | Harvest Rule Parameters | | | | |
|---|---|---|---|---|---|
| Management Unit | Low Abundance ER (LAER) | TAM Cap | Lower Fishery Reference Point | Upper Fishery Reference Point | Pre-season pMA |
| Early Stuart | 10% | 60% | 108,000 | 270,000 | 0.69 |
| Early Summer (w/o misc) | 10% | 60% | 100,000 | 250,000 | 0.60 |
| Summer (w/o misc) | 10% | 60% | 640,000 | 1,600,000 | 0.12 |
| Late (w/o misc) | 20-30% | 60% | 300,000 | 750,000 | 4.68 |



# FR SK: Option 2

| | Harvest Rule Parameters | | | | |
|---|---|---|---|---|---|
| Management Unit | Low Abundance ER (LAER) | TAM Cap | Lower Fishery Reference Point | Upper Fishery Reference Point | Pre-season pMA |
| Early Stuart | 10% | 60% | 108,000 | 270,000 | 0.69 |
| Early Summer (w/o misc) | 10% | 60% | 150,000 | 375,000 | 0.60 |
| Summer (w/o misc) | 10% | 60% | 800,000 | 2,000,000 | 0.12 |
| Late (w/o misc) | 20% | 60% | 300,000 | 750,000 | 4.68 |



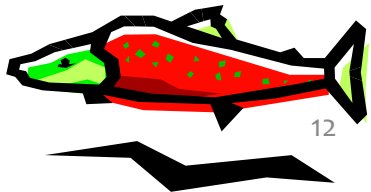
# Early Stuart Options Comparison

| Early Stuart | forecast | p10<br>8,000 | p25<br>16,000 | p50<br>30,000 | p75<br>58,000 | p90<br>108,000 |
|---|---|---|---|---|---|---|
| Option 1 | Allowable ER | 10% | 10% | 10% | 10% | 10% |
| | Projected S (after MA) | 7,000 | 12,000 | 19,000 | 31,000 | 47,000 |
| | Proj. S as % BY S | 27% | 46% | 72% | 118% | 179% |
| | Proj. S as % cycle S | 20% | 33% | 53% | 86% | 131% |
| Option 2 | *same as option 1* | | | | | |

forecast p-level is below lower fisheries reference point

forecast p-level is between lower & upper fisheries reference point

forecast p-level is above upper fisheries reference point



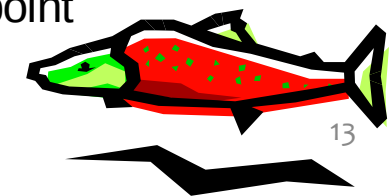
# Early Summer Options Comparison

| Early Summer | forecast (incl. misc) | p10<br>236,000 | p25<br>424,000 | p50<br>837,000 | p75<br>1,603,000 | p90<br>2,963,000 |
|---|---|---|---|---|---|---|
| Option 1 | Allowable ER | 10% | 10% | 36% | 36% | 36% |
| | Projected S (after MA) | 68,000 | 122,000 | 179,000 | 401,000 | 1,081,000 |
| | Proj. S as % BY S | 25% | 44% | 65% | 145% | 392% |
| | Proj. S as % cycle S | 51% | 92% | 135% | 303% | 818% |
| Option 2 | Allowable ER | 10% | 10% | 16% | 36% | 36% |
| | Projected S (after MA) | 68,000 | 122,000 | 234,000 | 401,000 | 1,081,000 |
| | Proj. S as % BY S | 25% | 44% | 85% | 145% | 392% |
| | Proj. S as % cycle S | 51% | 92% | 177% | 303% | 818% |

forecast p-level is below lower fisheries reference point

forecast p-level is between lower & upper fisheries reference point

forecast p-level is above upper fisheries reference point



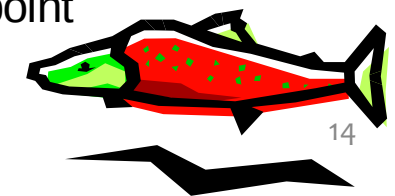
# Summers Options Comparison

| Summer | forecast (incl. misc) | p10<br>1,701,000 | p25<br>2,681,000 | p50<br>4,675,000 | p75<br>8,764,000 | p90<br>16,511,000 |
|---|---|---|---|---|---|---|
| Option 1 | Allowable ER | 10% | 19% | 52% | 55% | 55% |
| | Projected S (after MA) | 520,000 | 730,000 | 730,000 | 1,194,000 | 2,012,000 |
| | Proj. S as % BY S | 93% | 130% | 130% | 213% | 360% |
| | Proj. S as % cycle S | 79% | 111% | 111% | 182% | 306% |
| Option 2 | Allowable ER | 10% | 10% | 40% | 55% | 55% |
| | Projected S (after MA) | 520,000 | 807,000 | 912,000 | 1,194,000 | 2,012,000 |
| | Proj. S as % BY S | 93% | 144% | 163% | 213% | 360% |
| | Proj. S as % cycle S | 79% | 123% | 139% | 182% | 306% |

forecast p-level is below lower fisheries reference point

forecast p-level is between lower & upper fisheries reference point

forecast p-level is above upper fisheries reference point



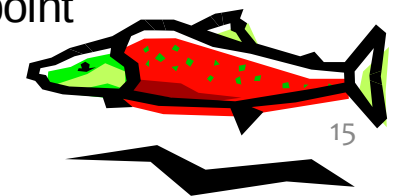
# Lates Options Comparison

| Lates | forecast (incl. misc) | p10<br>419,000 | p25<br>703,000 | p50<br>1,236,000 | p75<br>2,210,000 | p90<br>3,998,000 |
|---|---|---|---|---|---|---|
| Option 1 | Allowable ER | 20% | 20% | 20% | 30% | 30% |
| | Projected S (after MA) | 6,000 | 9,000 | 16,000 | 25,000 | 45,000 |
| | Proj. S as % BY S | 10% | 15% | 26% | 41% | 74% |
| | Proj. S as % cycle S | 4% | 7% | 12% | 19% | 34% |
| Option 2 | Allowable ER | 20% | 20% | 20% | 20% | 20% |
| | Projected S (after MA) | 6,000 | 9,000 | 16,000 | 29,000 | 52,000 |
| | Proj. S as % BY S | 10% | 15% | 26% | 47% | 85% |
| | Proj. S as % cycle S | 4% | 7% | 12% | 22% | 39% |

forecast p-level is below lower fisheries reference point

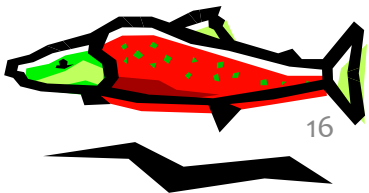
forecast p-level is between lower & upper fisheries reference point

forecast p-level is above upper fisheries reference point

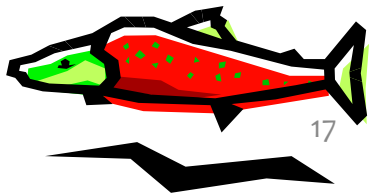


# Notes

- EStu & Lates are in LAER situation over (80%) forecast range, regardless of option
- at p50 forecast
  - option 1: only ESum is at TAM cap, but (with pre-season pMAs) Summers have highest allowable ER
  - option 2: no timing groups are at TAM cap
- at p25 forecast
  - no timing groups are at TAM cap
  - option 1: all groups in LAER situation due to pMA
  - option 2:

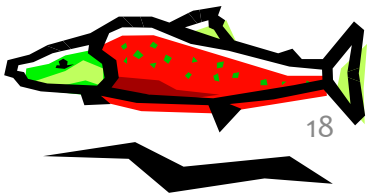


# FR SK “EXPECTED” OUTCOMES



# assumptions

- These are the "expected" spawners to the grounds assuming:
  - perfect implementation of the "allowable ER" in the options tables
  - all stocks within a management group:
    - return at the same p-level (or nearly)
    - are subject to the same ER
  - the pMA is as shown in options 1 & 2 *and* is applied to all stocks within an aggregate equally
- Note that pre-spawn mortality is *not* included



# FR SK: option 1

| Run timing group / Stocks | Total Escapement cycle yr | Total Escapement brood year | Projected esc. across range of run size forecasts at specified TAM + MA 10% | 25% | 50% | 75% | 90% | comparisons @p50 to cycle | to BY |
|---|---|---|---|---|---|---|---|---|---|
| **Early Stuart** | **35,861** | **26,233** | **7,000** | **12,000** | **19,000** | **31,000** | **47,000** | 53% | 72% |
| **Early Summer** | | | 68,000 | 122,000 | 179,000 | 401,000 | 1,081,000 | | |
| **(total excluding miscellaneo** | **97,883** | **145,016** | **55,000** | **88,800** | **114,500** | **233,900** | **610,700** | | |
| Bowron | 7,265 | 59 | 600 | 1,100 | 1,600 | 3,200 | 5,200 | 22% | 2712% |
| Fennell (cycle avg since 1959) | 8,565 | 1,967 | 3,400 | 5,100 | 5,600 | 9,200 | 15,600 | 65% | 285% |
| Gates | 24,662 | 31,179 | 13,600 | 22,500 | 30,400 | 55,200 | 92,400 | 123% | 98% |
| Nadina | 19,995 | 30,942 | 13,600 | 25,300 | 36,000 | 71,600 | 132,400 | 180% | 116% |
| Pitt | 28,024 | 78,038 | 23,800 | 33,700 | 36,000 | 58,800 | 84,800 | 128% | 46% |
| Scotch (cycle avg since 1983) | 2,096 | 2,007 | 200 | 1,100 | 4,800 | 35,600 | 279,200 | 229% | 239% |
| Seymour | 7,276 | 824 | 0 | 100 | 200 | 400 | 1,200 | 3% | 24% |
| **Summer** | | | 520,000 | 730,000 | 730,000 | 1,194,000 | 2,012,000 | | |
| **(tl excl. NThmisc, incl. Har)** | **656,591** | **559,387** | **517,600** | **725,600** | **725,700** | **1,186,000** | **1,996,000** | | |
| Chilko | 469,096 | 246,602 | 368,900 | 478,400 | 431,500 | 629,400 | 913,000 | 92% | 175% |
| Quesnel | 11,619 | 624 | 4,800 | 6,500 | 6,500 | 10,000 | 16,000 | 56% | 1042% |
| Late Stuart | 44,993 | 93,159 | 33,800 | 62,500 | 82,700 | 170,900 | 351,900 | 184% | 89% |
| Stellako | 108,204 | 137,992 | 69,100 | 104,700 | 110,300 | 181,700 | 304,300 | 102% | 80% |
| Harrison | 7,504 | 71,002 | 32,100 | 61,800 | 83,600 | 178,900 | 385,900 | 1114% | 118% |
| Raft | 15,175 | 10,008 | 8,800 | 11,600 | 11,200 | 15,200 | 24,800 | 74% | 112% |
| **Late** | | | 6,000 | 9,000 | 16,000 | 25,000 | 45,000 | | |
| **(total excluding miscellane** | **128,672** | **57,395** | **4,800** | **7,100** | **12,100** | **19,100** | **34,700** | | |
| Cultus (high hatchery contribut | 11,822 | 892 | 100 | 300 | 600 | 1,100 | 2,100 | 5% | 67% |
| Late Shuswap | 5,733 | 12 | 0 | 0 | 600 | 3,000 | 9,300 | 10% | 5000% |
| Portage | 1,382 | 25 | 0 | 0 | 100 | 100 | 200 | 7% | 400% |
| Weaver | 29,941 | 924 | 300 | 600 | 1,200 | 2,100 | 3,800 | 4% | 130% |
| Birkenhead | 79,794 | 55,542 | 4,400 | 6,300 | 9,800 | 12,800 | 19,300 | 12% | 18% |

# FR SK: option 2

| Run timing group / Stocks | Total Escapement cycle yr | Total Escapement brood year | Projected esc. across range of run size forecasts at specified TAM + MA 10% | 25% | 50% | 75% | 90% | comparisons @p50 to cycle | to BY |
|---|---|---|---|---|---|---|---|---|---|
| **Early Stuart** | **35,861** | **26,233** | **7,000** | **12,000** | **19,000** | **31,000** | **47,000** | 53% | 72% |
| **Early Summer** | | | 68,000 | 122,000 | 234,000 | 401,000 | 1,081,000 | | |
| **(total excluding miscellaneo** | **97,883** | **145,016** | **55,000** | **88,800** | **149,700** | **233,900** | **610,700** | | |
| Bowron | 7,265 | 59 | 600 | 1,100 | 2,100 | 3,200 | 5,200 | 29% | 3559% |
| Fennell (cycle avg since 1959) | 8,565 | 1,967 | 3,400 | 5,100 | 7,300 | 9,200 | 15,600 | 85% | 371% |
| Gates | 24,662 | 31,179 | 13,600 | 22,500 | 39,800 | 55,200 | 92,400 | 161% | 128% |
| Nadina | 19,995 | 30,942 | 13,600 | 25,300 | 47,100 | 71,600 | 132,400 | 236% | 152% |
| Pitt | 28,024 | 78,038 | 23,800 | 33,700 | 47,100 | 58,800 | 84,800 | 168% | 60% |
| Scotch (cycle avg since 1983) | 2,096 | 2,007 | 200 | 1,100 | 6,300 | 35,600 | 279,200 | 301% | 314% |
| Seymour | 7,276 | 824 | 0 | 100 | 200 | 400 | 1,200 | 3% | 24% |
| **Summer** | | | 520,000 | 807,000 | 912,000 | 1,194,000 | 2,012,000 | | |
| **(tl excl. NThmisc, incl. Har)** | **656,591** | **559,387** | **517,600** | **802,200** | **906,600** | **1,186,000** | **1,996,000** | | |
| Chilko | 469,096 | 246,602 | 368,900 | 528,900 | 539,100 | 629,400 | 913,000 | 115% | 219% |
| Quesnel | 11,619 | 624 | 4,800 | 7,200 | 8,100 | 10,000 | 16,000 | 70% | 1298% |
| Late Stuart | 44,993 | 93,159 | 33,800 | 69,100 | 103,300 | 170,900 | 351,900 | 230% | 111% |
| Stellako | 108,204 | 137,992 | 69,100 | 115,700 | 137,700 | 181,700 | 304,300 | 127% | 100% |
| Harrison | 7,504 | 71,002 | 32,100 | 68,300 | 104,400 | 178,900 | 385,900 | 1391% | 147% |
| Raft | 15,175 | 10,008 | 8,800 | 12,900 | 14,000 | 15,200 | 24,800 | 92% | 140% |
| **Late** | | | 6,000 | 9,000 | 16,000 | 29,000 | 52,000 | | |
| **(total excluding miscellane** | **128,672** | **57,395** | **4,800** | **7,100** | **12,100** | **22,200** | **40,100** | | |
| Cultus (high hatchery contribut | 11,822 | 892 | 100 | 300 | 600 | 1,300 | 2,400 | 5% | 67% |
| Late Shuswap | 5,733 | 12 | 0 | 0 | 600 | 3,500 | 10,700 | 10% | 5000% |
| Portage | 1,382 | 25 | 0 | 0 | 100 | 100 | 300 | 7% | 400% |
| Weaver | 29,941 | 924 | 300 | 600 | 1,200 | 2,400 | 4,400 | 4% | 130% |
| Birkenhead | 79,794 | 55,542 | 4,400 | 6,300 | 9,800 | 14,800 | 22,300 | 12% | 18% |