



**NOAA
FISHERIES**

Review of Chinook Salmon Enhancement and Relevant Issues in Southeast Alaska, 1970-2012

By

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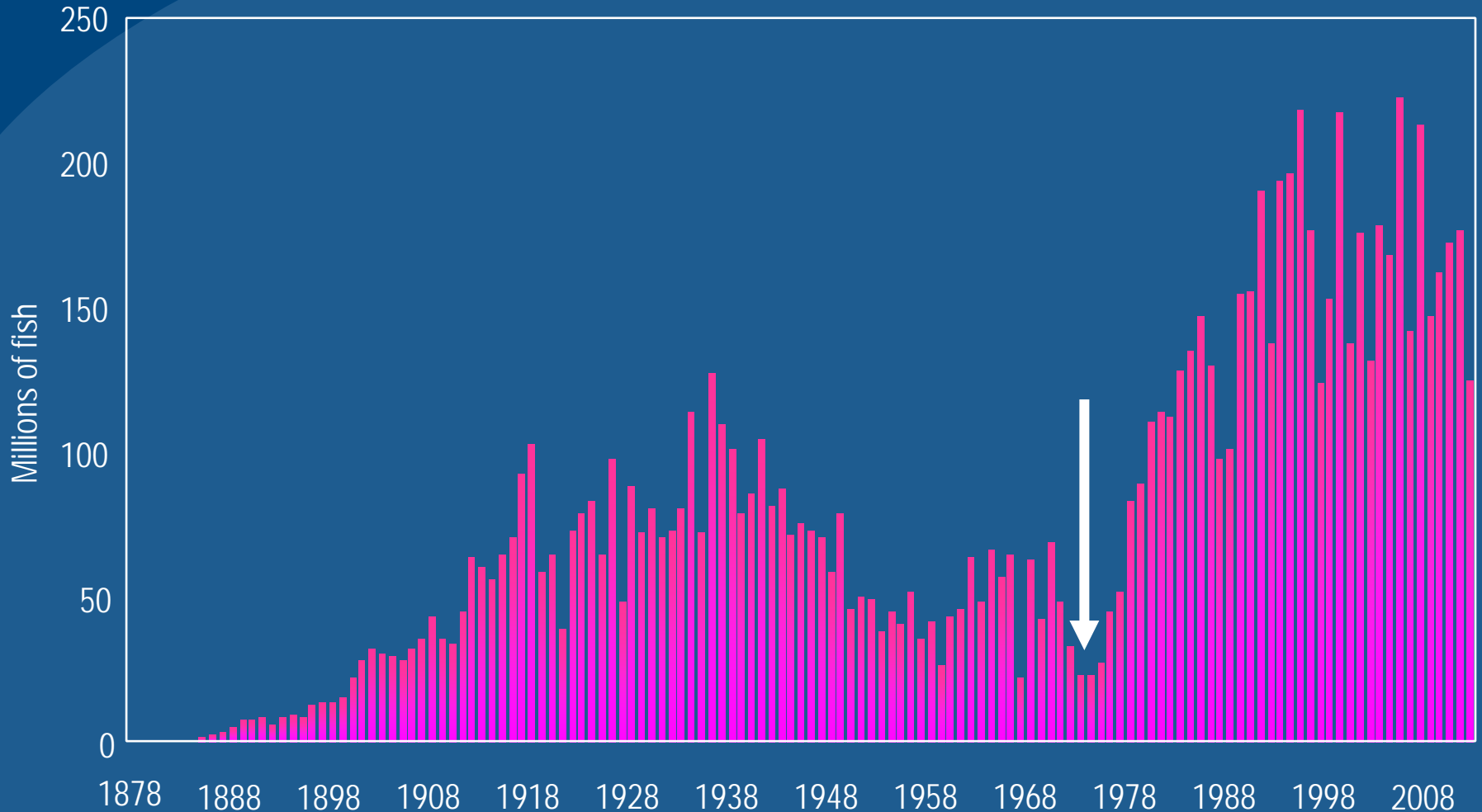
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**Alaska Chinook Salmon Symposium
Anchorage, October 22-23, 2012**

Alaska Commercial Salmon Harvest, 1880-2012



Development of SEAK Chinook Enhancement

Alaska's Legislative Time Line

- 1971 FRED Created Within ADF&G
- 1974 Private Nonprofit (PNP) Hatcheries
- 1976 Regional Aquaculture Associations
- 1988 State Hatcheries Contracted to PNPs
- 1992 FRED Merged into Commercial Fish Div.

Relevant Chinook Issues

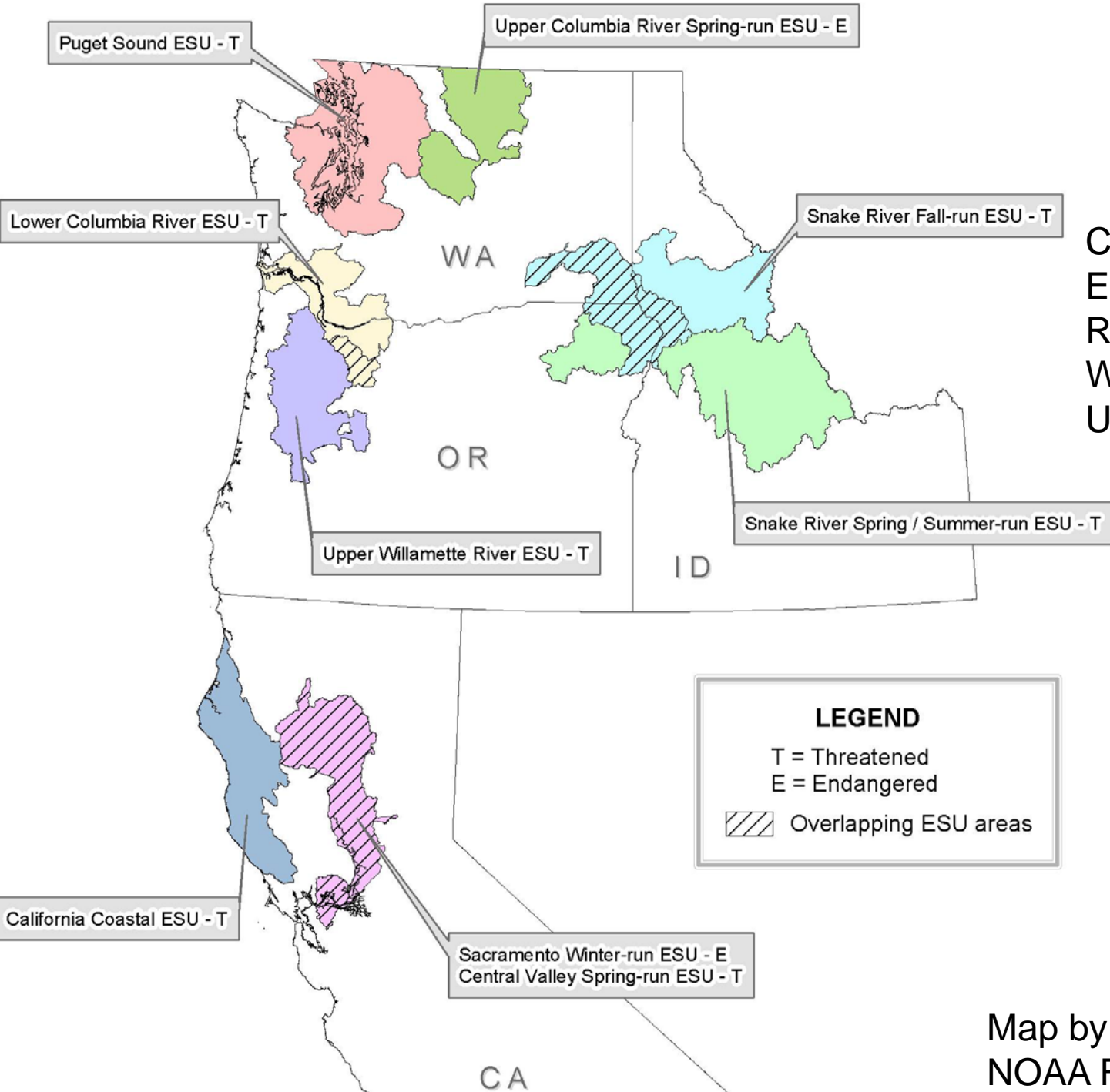
- 1960s-1970s Depressed Coastwide Socks
- 1976 Congress Passed MFCMA, Now Called MSA
- 1977 U.S. 200 Mile EEZ Established
- 1978 Federal FMP for Salmon Fisheries in SEAK
- 1985 U.S.- Canada Salmon Treaty
- 1990s Nine U.S. Chinook ESUs Listed under ESA



Chinook Salmon ESU geographic Regions along the West Coast of the United States



LEGEND
T = Threatened
E = Endangered
Overlapping ESU areas



Map by Barbara Seekins,
NOAA Fisheries

Alaska Hatchery Policies

- **Designed to favor wild stocks**
- **Mitigate poor fisheries not enhance wild stocks**
- **Hatcheries sited away from wild stocks**
- **Non-anadromous water sources**
- **No hatcheries on major wild-stock systems**
- **Strong Genetics and Fish Health Programs**
- **Conservative fish culture practices**
- **Innovative hatchery technologies**





Fresh and saltwater net pens



Hanging Lakes for rearing smolts



High density substrate incubators



Floating freshwater raceways in saltwater

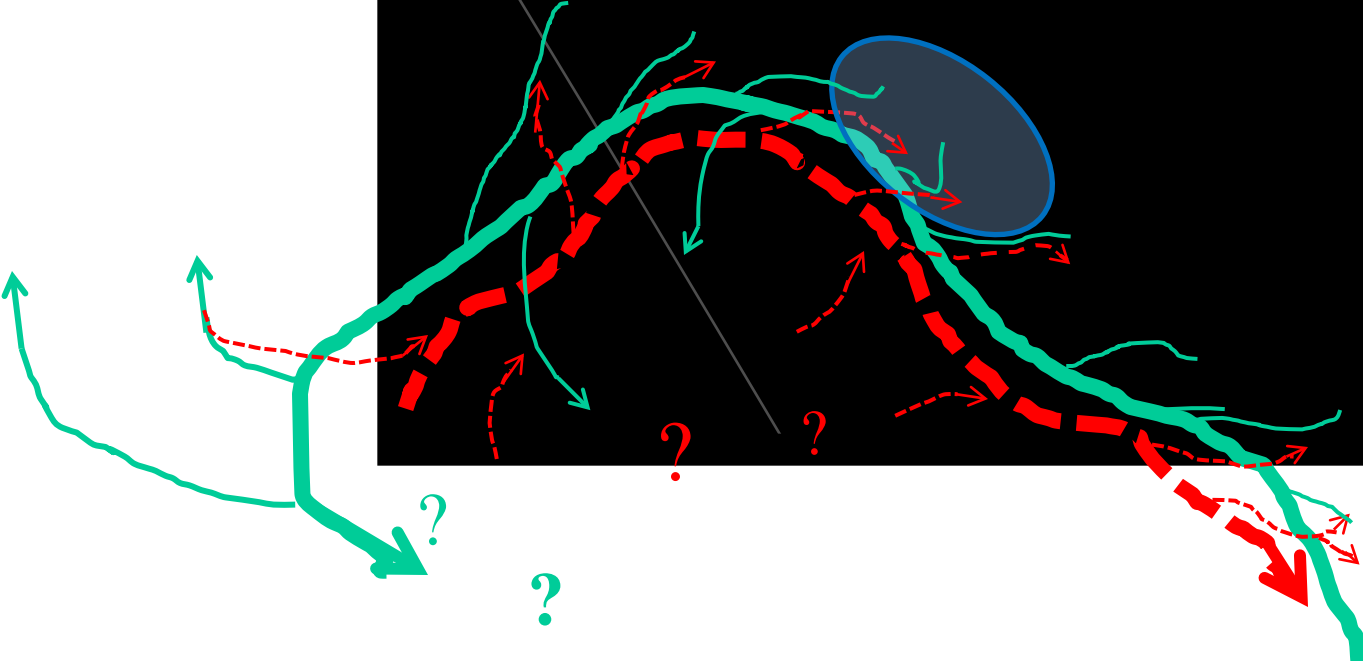
Examples of innovative fish culture in SEAK

Chinook Salmon

Stream Life Biology and Ocean Distribution

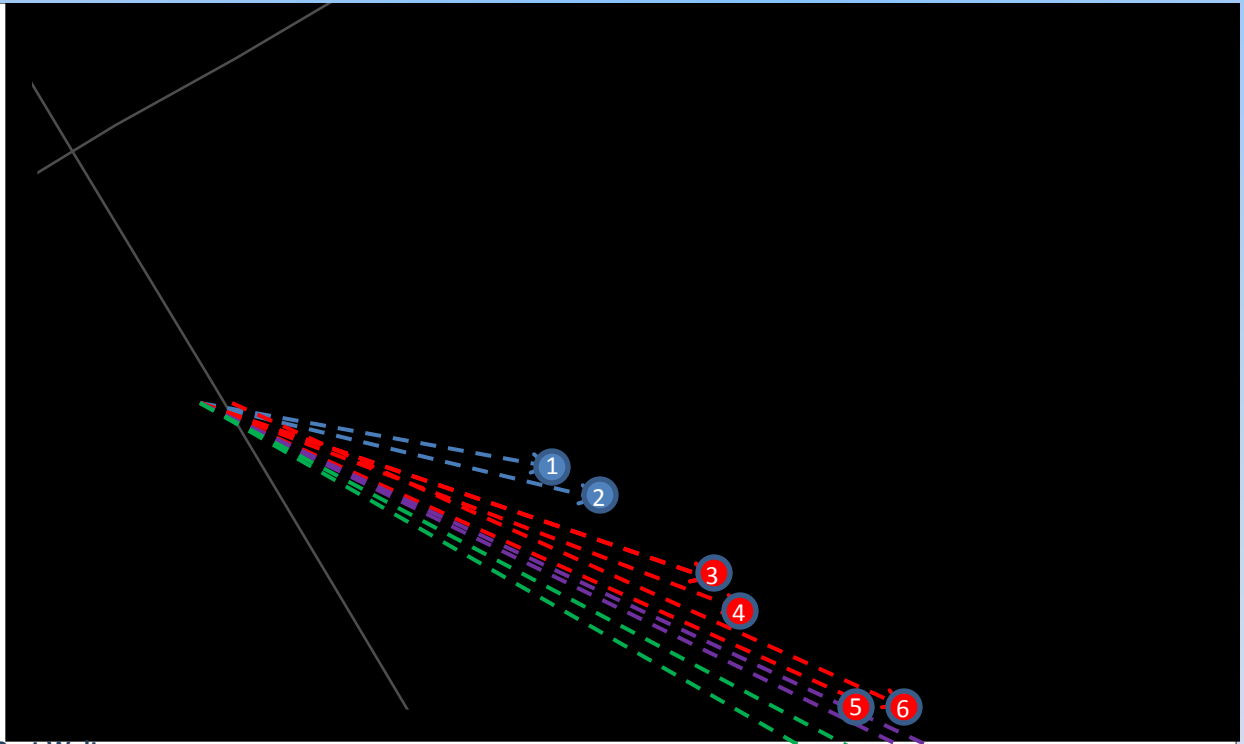
- “Stream Type” Juveniles Spend One or More Years in Freshwater Before Migrating to Sea , Make Extensive Offshore Ocean Migrations and Return to Natal Rivers Usually in Spring or Summer
- “Ocean Type” Juveniles Migrate to Sea During Their First Year of Life Usually Within 3 Months After Emergence, Make More Coastal Oriented Ocean Migrations and Return to Natal Rivers in Fall

Migration Pattern Affecting E



Juveniles ———

Adults - - -



Alaska

- 1. Little Port Walter
- 2. Crystal Lake

British Columbia

- 3. Atnarko (wild)
- 4. Puntledge
- 5. Robertson Creek
- 6. Nitnat (wild)

Washington

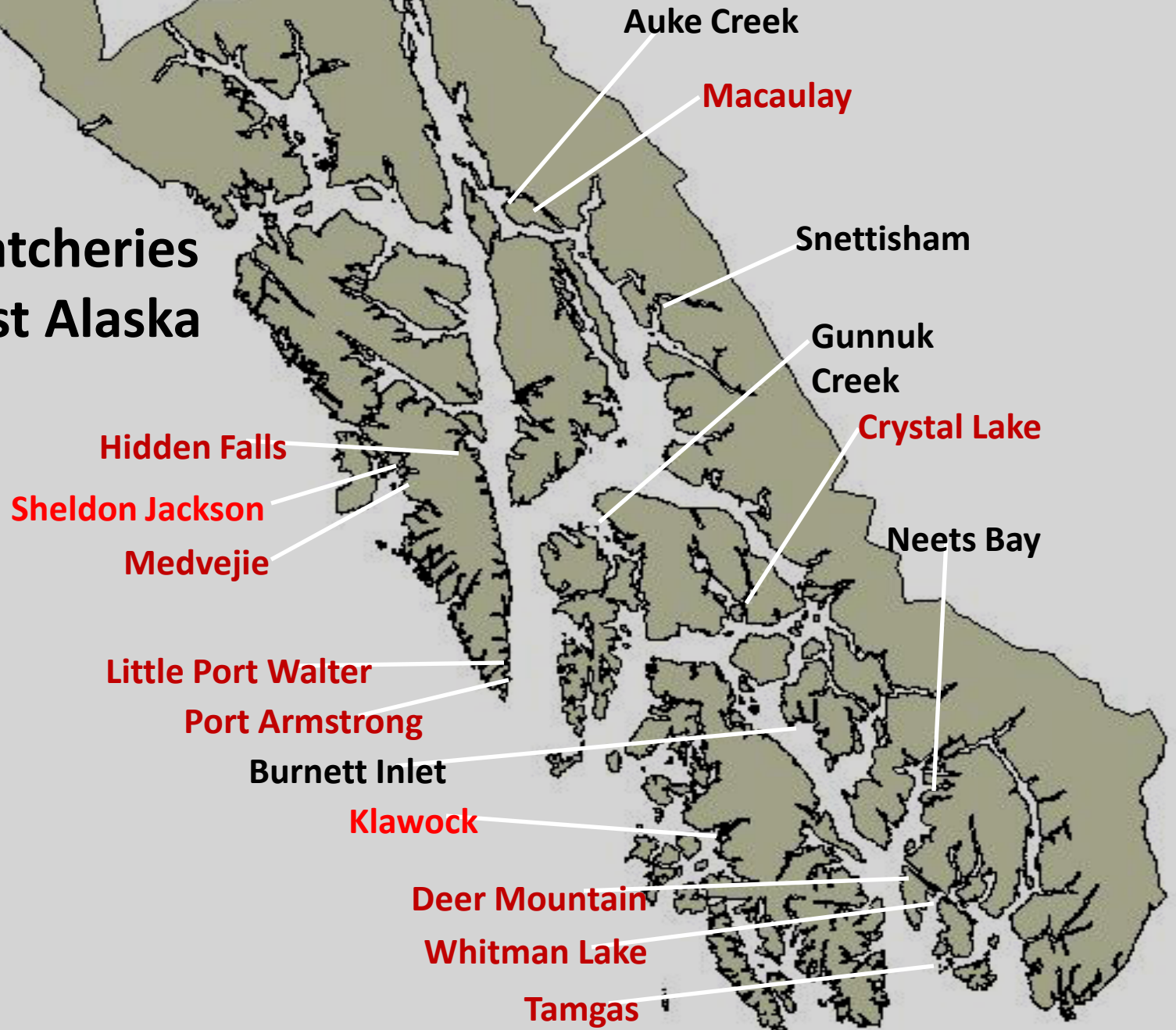
- 7. Skagit
- 8. Priest Rapids

Oregon

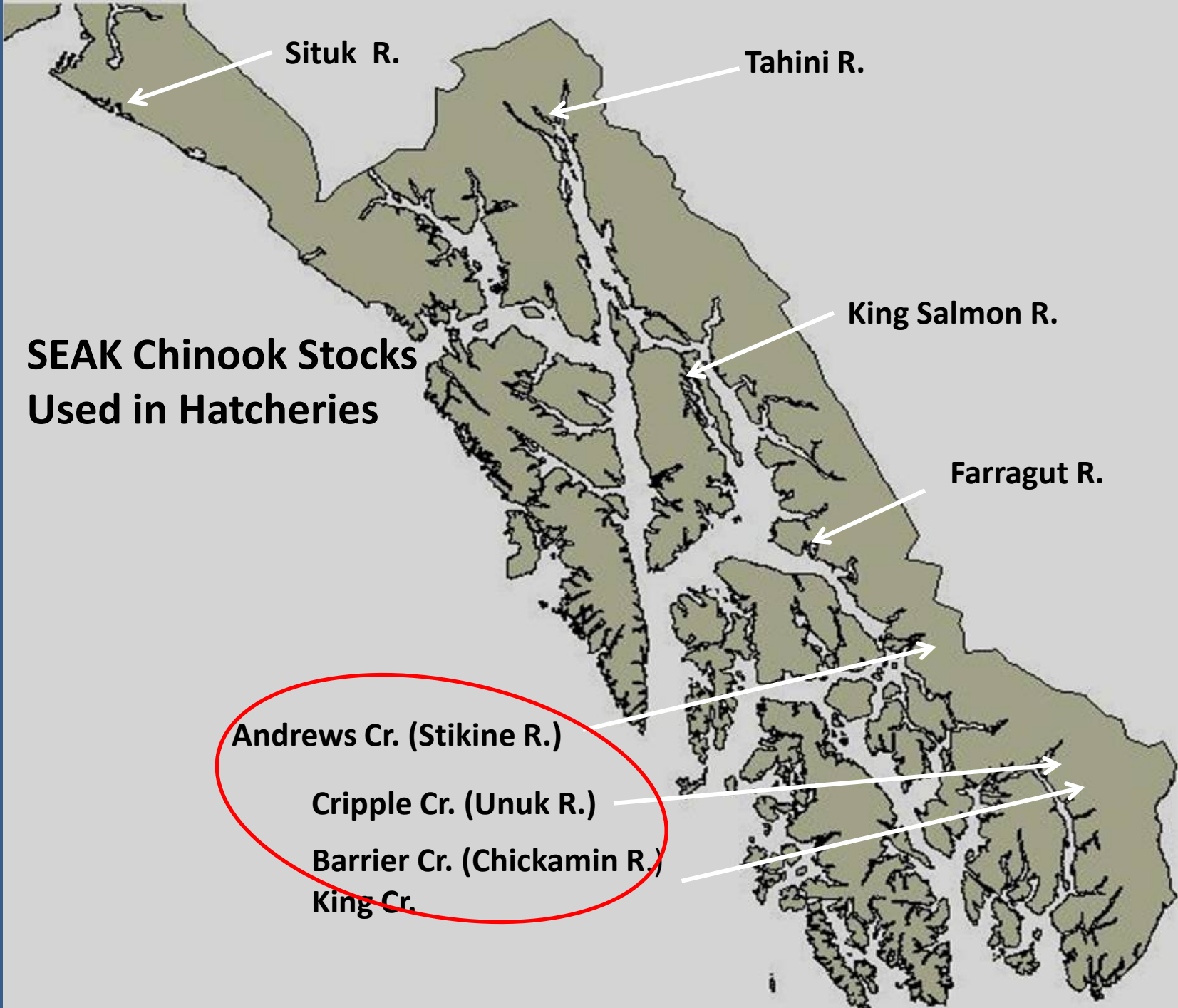
- 9. Marion Forks
- 10. South Santiam (5)

Modified after Wallis (1980)

Salmon Hatcheries Southeast Alaska



**SEAK Chinook Stocks
Used in Hatcheries**



Situk R.

Tahini R.

King Salmon R.

Farragut R.

Andrews Cr. (Stikine R.)

Cripple Cr. (Unuk R.)

Barrier Cr. (Chickamin R.)

King Cr.

Southeast Alaska

2012 Treaty Chinook Salmon Allocations

All-gear treaty quota 266,800

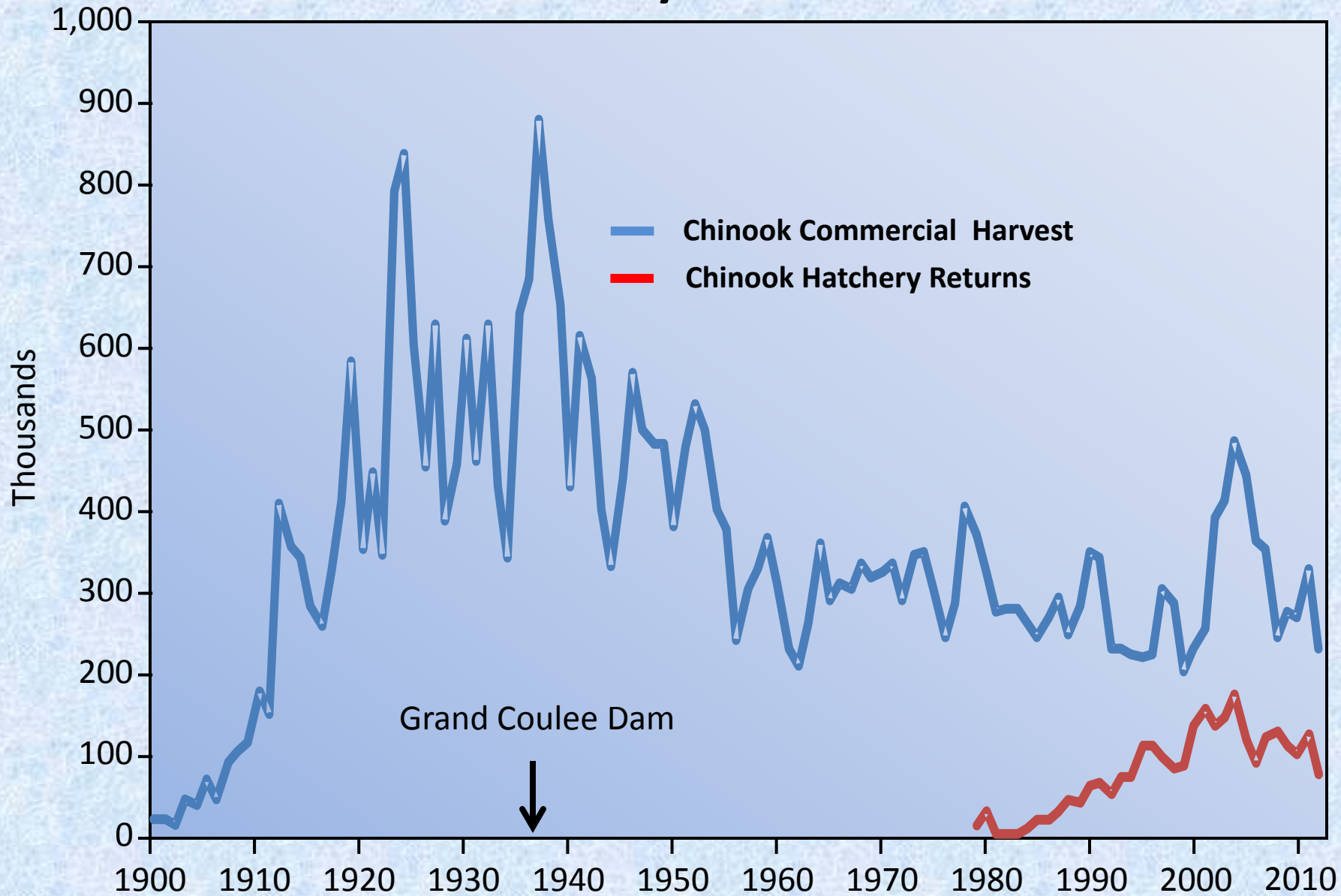
| | |
|--|----------------|
| Purse seine (4.3% of all-gear) | 11,472 |
| Drift gillnet (2.9% of all-gear) | 7,737 |
| Set gillnet (1,000) | 1,000 |
| Troll (80% after net gear subtracted) | 197,272 |
| Sport (20% after net gear subtracted) | 49,318 |
| | 266,800 |

2012 AI was 1.52; as of Oct. 1 all gear treaty harvest was 229,000



Southeast Alaska Chinook Harvest 1900-2012

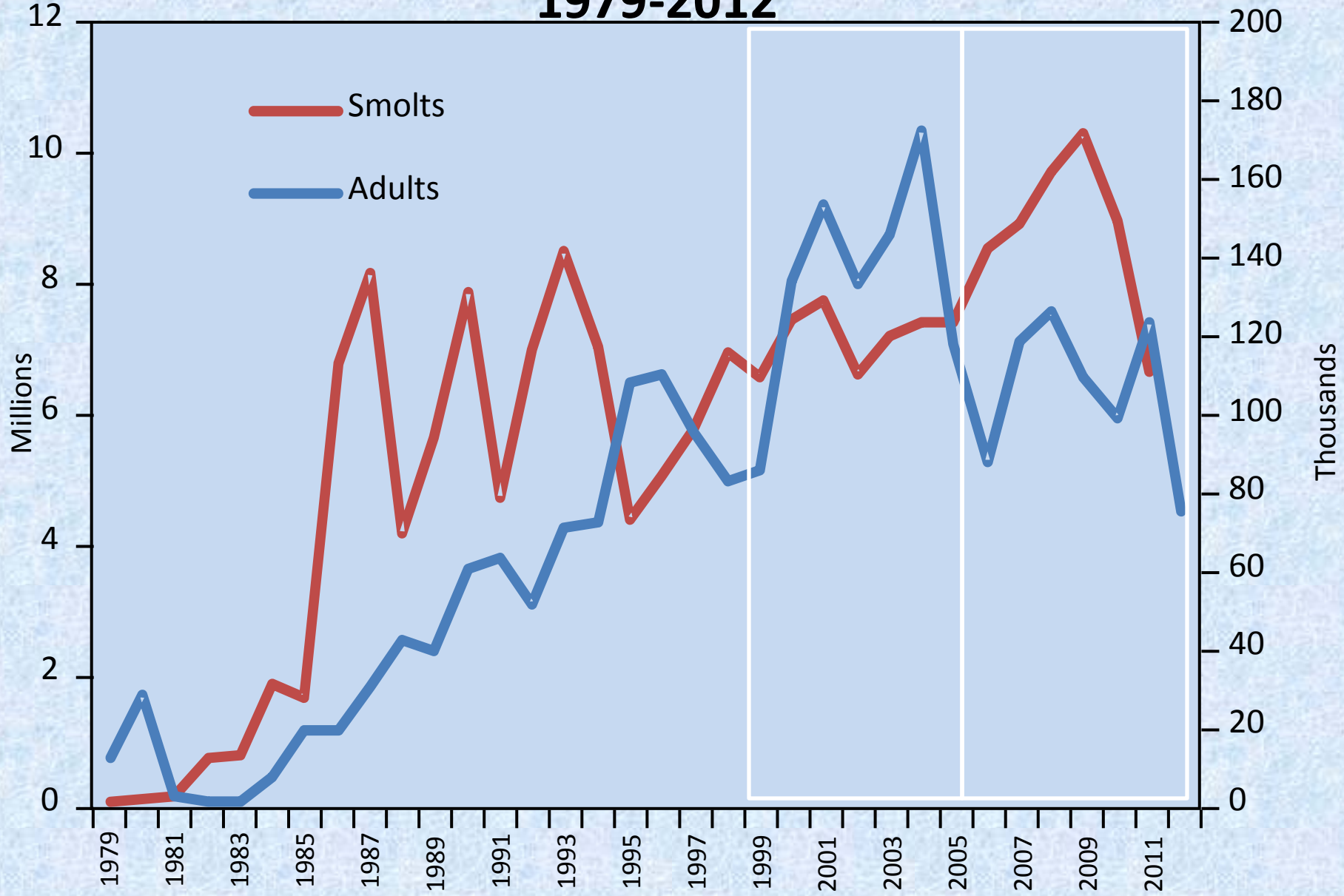
Southeast Hatchery Returns 1979-2012



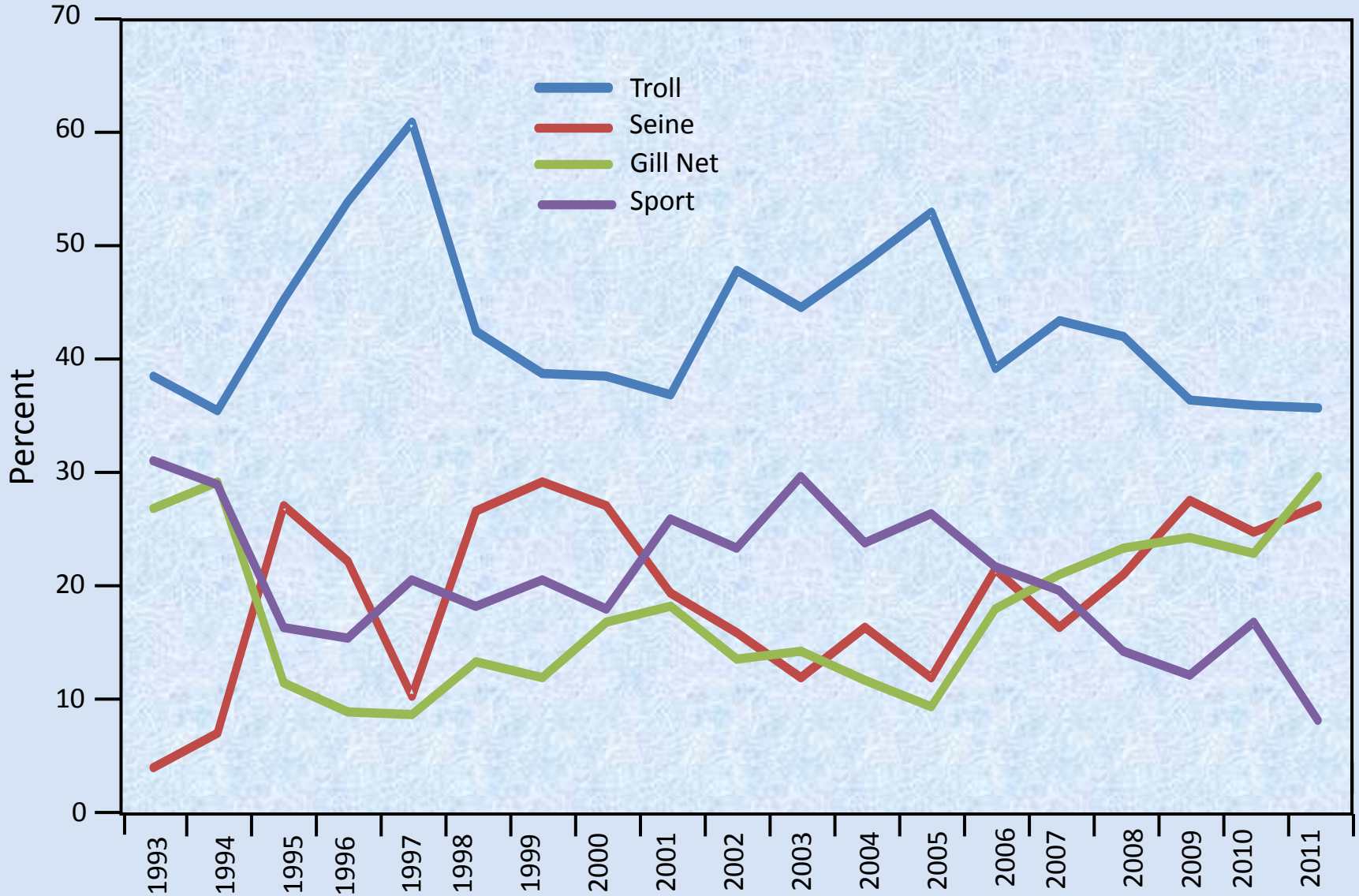


Southeast Alaska Chinook Smolt Releases and Adult Returns

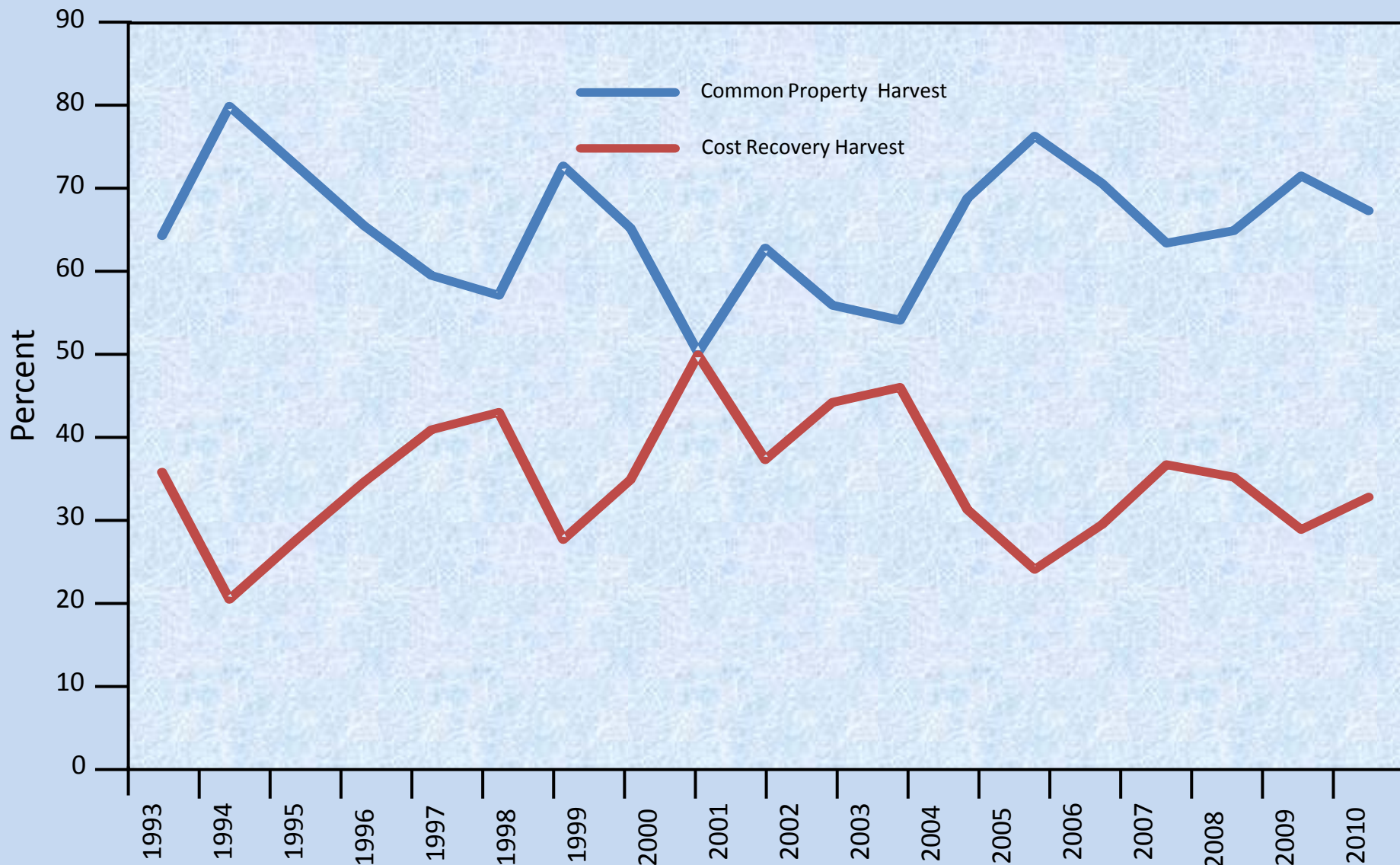
1979-2012



Annual Percent of SEAK Hatchery Chinook Caught in Common Property Fisheries by User Groups, 1993-2011



Annual Percent of SEAK Hatchery Chinook Caught By Common Property and Cost Recovery Harvest, 1993-2010



Incidence of hatchery Chinook salmon strays in ten wild stock streams in Southeast Alaska

| Stream | Years Examined (not continuous) | Total Number of Years | Number Examined | Hatchery Tags Recovered | Hatchery Fish | Percent from Hatchery |
|----------------------|------------------------------------|--------------------------|--------------------|-------------------------------|------------------|-----------------------------|
| Chickamin | 1985-2007 | 22 | 11,204 | 17 | 154 | 1.37% |
| Chilkat | 1983-2007 | 24 | 15,576 | 7 | 7 | 0.04% |
| Farragut | 1983-2007 | 8 | 647 | 38 | 55 | 8.50% |
| Harding | 1986-1993 | 6 | 363 | 2 | 4 | 1.10% |
| King Salmon | 1979-2007 | 21 | 885 | 1 | 1 | 0.11% |
| Stikine ¹ | 1979-2007 | 25 | 52,692 | 20 | 121 | 0.23% |
| Taku | 1979-2007 | 26 | 69,994 | 2 | 8 | 0.01% |
| Unuk | 1985-2007 | 23 | 24,588 | 9 | 43 | 0.17% |
| Keta | 1998-2007 | 10 | 2,409 | 3 | 64 | 2.66% |
| Blossom | 1998-2007 | 10 | 1,902 | 4 | 36 | 1.89% |
| Total | | | 180,260 | 103 | 493 | 0.27% |

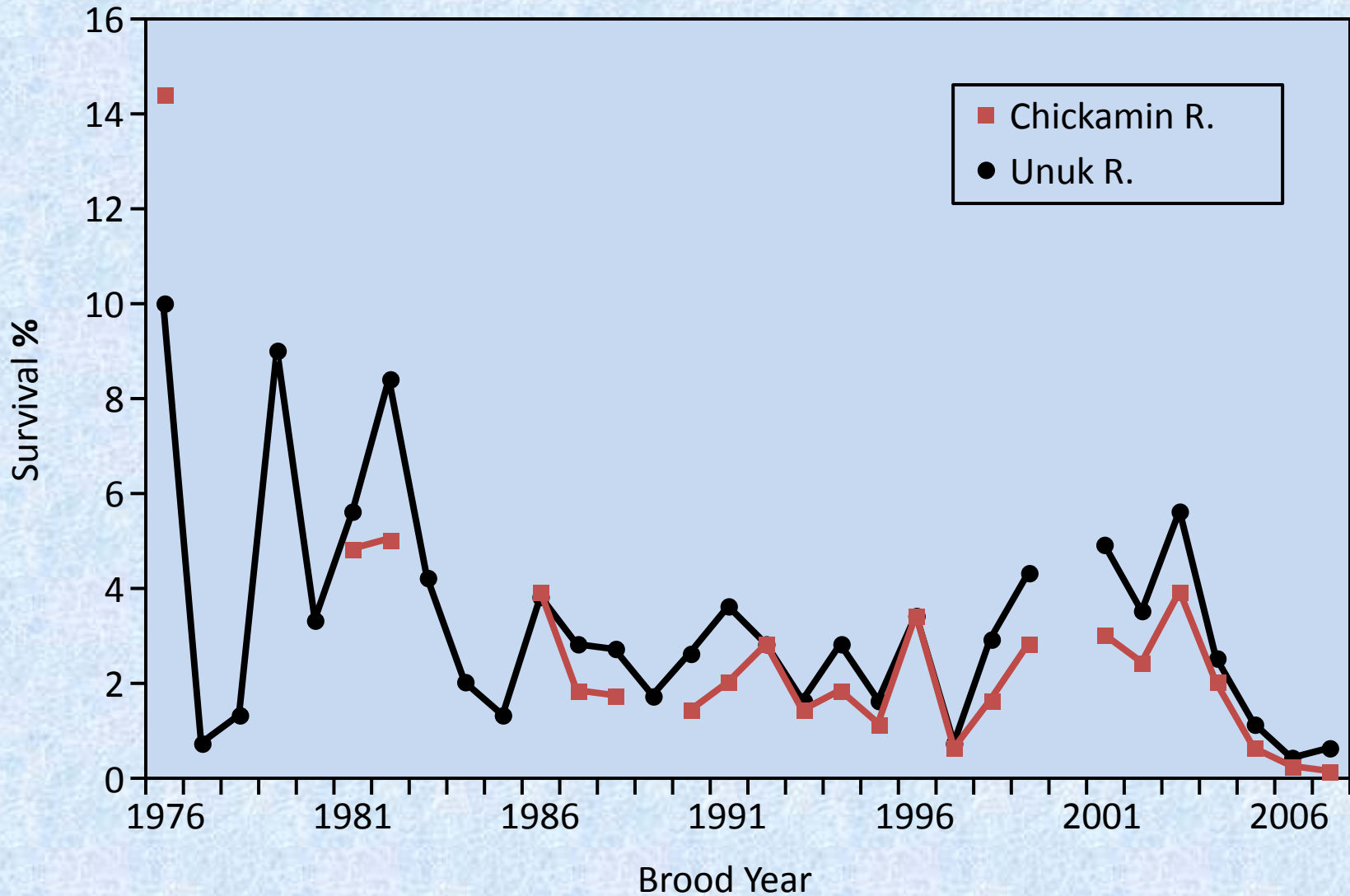
¹ includes Andrews Creek

Data source: ADF&G (Keith Pahlke and Bob Zorich)

Marine Survivals of Age-1 Smolts from Southeast Alaska Hatchery Chinook Salmon, 1977-2006

| Hatchery | Stock | Broods | Numbers (M) | Release Dates | Weights (g) | Marine Survivals (%) | |
|--------------------|----------------|-----------|-------------|---------------|-------------|----------------------|------|
| | | | | | | Range | Mean |
| Medvejie | Andrews Creek | 1982-1984 | 0.04-1.8 | 5/13-6/9 | 17-72 | 0.1- 4.0 | 2.2 |
| Medvejie | Andrews Creek | 1995-2002 | 1.1-2.1 | 3/26-5/29 | 23-92 | 0.5 -3.3 | 2.0 |
| Hidden Falls | Andrews Creek | 1981-2002 | 0.5-1.7 | 4/18-6/8 | 13-43 | 0.1- 4.5 | 1.6 |
| Hidden Falls | Tahini River | 1983-1987 | 0.5- 0.6 | 5/21-5/28 | 17-23 | 0.2 -0.7 | 0.4 |
| Little Port Walter | Chickamin R. | 1976-2006 | 0.1- 0.2 | 5/10-5/20 | 9-85 | 0.1- 14.4 | 2.7 |
| Little Port Walter | Unuk R. | 1976-2006 | 0.1- 0.2 | 5/10-5/20 | 8-44 | 0.4- 10.0 | 3.2 |
| Little Port Walter | King Salmon R. | 1988-1995 | 0.03-0.1 | 5/14-5/18 | 18- 79 | 0.2 -3.2 | 0.1 |

Marine Survivals for Mid-May Yearling Chinook Smolts Releases from NOAA Fisheries LPW Marine Station; 1976-2006 Broods



Marine Survivals of Age-0 Smolts from Southeast Alaska Hatchery Chinook Salmon 1977 - 2006

| Hatchery | Stock | Broods | Numbers (M) | Release Dates | Weights (g) | Marine Survivals (%) | |
|--------------------|---------------|-----------|-------------|---------------|-------------|----------------------|------|
| | | | | | | Range | Mean |
| Medvejie | Andrews Creek | 1999-2002 | 0.21-0.31 | 7/16-7/17 | 8.5-21.1 | 0.02-3.0 | 1.0 |
| Hidden Falls | Andrews Creek | 2002-2006 | 0.24-0.25 | 7/17-8/3 | 8.9-10.1 | 0.0-0.0 | 0.0 |
| Little Port Walter | Chickamin R. | 1976-1986 | 0.005-0.04 | 6/15-8.21 | 9.1-36.0 | 0.05-1.1 | 0.3 |
| Little Port Walter | Unuk R. | 1977-1985 | 0.06-0.09 | 5/9-10/4 | 2.7-78.0 | 0.02-1.1 | 0.4 |

So what's the verdict on the SEAK Chinook salmon hatchery program?

- Does it produce more Alaska-origin fish for fisheries?
- Can SE Chinook hatcheries be improved?
- Should Chinook enhancement be expanded in this region?
- Can SEAK Chinook enhancement tools and policies be used elsewhere?



Summary

- > Rigorous AK hatchery policies developed to protect wild stocks
- > Hatcheries designed to support depressed fisheries
- > Not to supplement wild stock populations
- > SE Chinook hatcheries help replace treaty driven harvest reductions
- > Marine survivals Age 1 hatchery smolts vary wildly, average 1.7%
- > Minimal threats SE Chinook hatcheries to wild stocks in the region

In addition SE Chinook hatcheries become important research tools to;

- > Measure contributions to various fisheries
- > Document life history details by brood and age of maturation
- > Provide accurate marine survival data by brood year
- > Meet obligations to provide more Alaska-origin fish to fishermen
- > Provide detailed ocean distribution and migratory patterns
- > Release smolts of consistent quality to evaluate marine environments
- > Become useful indexes of ocean conditions or climatic changes
- > Provide effective platforms for full parental genotype research



Thanks for your attention



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Quote from Alaska's Genetics Policy

“Off-site releases for terminal harvest, whether for the commercial fishery or for a put and take sport fishery should have no adverse genetic effect if they are released at sites selected so that they do not impact significant wild stocks, wild stock sanctuaries or other hatchery stocks. The success of this type of release from a genetic standpoint depends on the ability to manage and harvest the return. If returns can not be harvested, increased straying may result which might lead to an impact on wild stocks at a greater than expected distance from the release site”.