# Alaska's Fishery Enhancement Program: Planning efforts and production trends

A Presentation to the Alaska Board of Fisheries Per the Joint Protocol on Salmon Enhancement #2002-FB-215

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Alaska Board of Fisheries Hatchery Committee Meeting
October 14, 2023
Anchorage Egan Civic & Convention Center

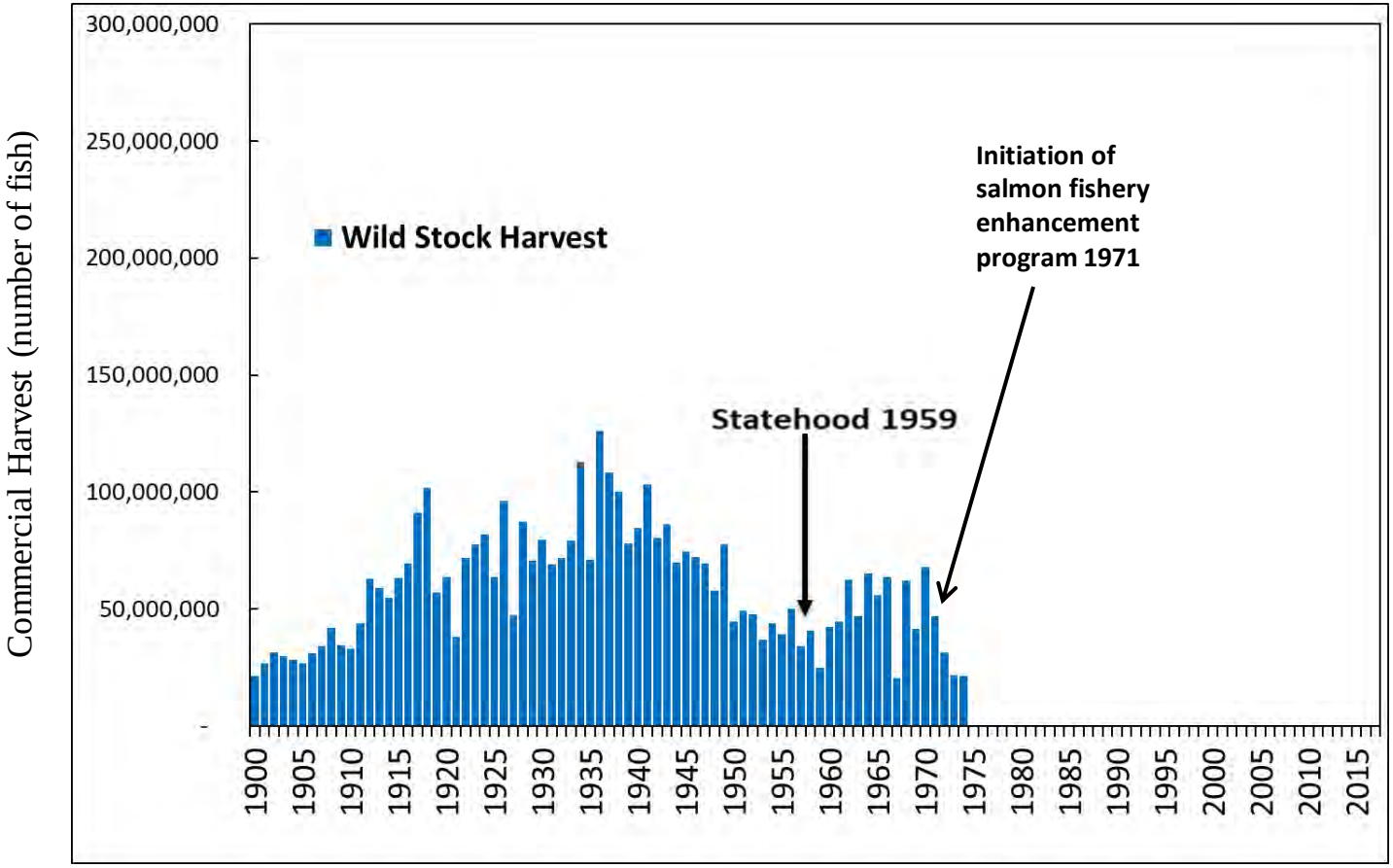
# ADF&G Mission Statement

To protect, maintain, and improve the fish, game, and aquatic plant resources of the state, and manage their use and development in the best interest of the economy and the well-being of the people of the state, consistent with the sustained yield principle.

Past Fisheries Enhancement Presentations

October 2018 RC040: Legal guidance, production trends, previous program reviews, and results of program to date
March 2019: Production trends, management issues, planning efforts
March 2020 Tab 1: Production trends and planning efforts
March 2022: Production trends and planning efforts
March 2023: Meeting cancelled.

# Why do we have a hatchery program?




In 1972, Article 8, section 15 of the constitution on fishery rights was amended, allowing “for the efficient development of aquaculture”

# Private Nonprofit Salmon Hatcheries Join The Effort in 1974

CHAPTER 11

AN ACT Authorizing the Operation of Private Nonprofit Salmon Hatcheries

Be it enacted by the Legislature of the State of Alaska:

Section 1. INTENT. *It is the intent of this Act to authorize the private ownership of salmon hatcheries by qualified nonprofit corporations for the purpose of contributing, by artificial means, to the rehabilitation of the state's depleted and depressed salmon fishery.*

*The program shall be operated without adversely affecting natural stocks of fish in the state and under a policy of management which allows reasonable segregation of returning hatchery-reared salmon from naturally occurring stocks.*

Approved May 16, 1974

Effective August 14, 1974

This is in contrast to hatcheries that propagate salmon to replace salmon production lost to habitat destruction.

# An Integrated Approach to Recovering Alaska's Salmon Fisheries

- Alaska used escapement-based in-season fisheries management to ensure sustained yield of wild populations while allowing for harvest of surplus.
- The Division of Fisheries Rehabilitation, Enhancement, and Development (FRED) did all things necessary to ensure perpetual use of the state's aquatic resources, in part, by involving private enterprise in the process
    - Hired a geneticist and established the Pathology section in 1974
    - Fish transport permit system established requiring review and pre-approval of stock transfers
    - FRED merged with Division of Commercial Fisheries in 1993
- By 1983, there were 20 state-operated hatcheries, 20 private non-profit (PNP) owned or operated hatcheries, and 3 federal hatcheries.
- In the late 1980s and 1990s, the operation of many state hatcheries was contracted to PNP corporations and PNP corporations were issued PNP permits to operate hatcheries previously operated by the state.
- Today there are 2 state-operated hatcheries, 30 PNP owned or operated hatcheries, and 3 federal hatcheries.

# Alaska's Propagative Program Types

1. **Private Nonprofit - PNP** (Commercial Fisheries focus)
Production hatcheries operated by PNP corporations to fulfill regional harvest objectives to **benefit common property fisheries,** primarily commercial.

AS 16.10.375-480; 5 AAC 40.005-990

2. **State** (Sport Fisheries focus)
ADF&G Division of Sport Fish (SF) operated hatcheries

PNP operated hatchery programs supported by cooperative agreement with SF to fulfill the statewide sport fish stocking plan objectives for the primary **benefit of sport fishers**.

3. **Aquatic Resource Permit** (Sci/Ed)
Projects with a **scientific or educational objective**

5 AAC 41.001-090

# Genetic policy by Davis and others (1985)

Use of appropriate local stocks

- Recognizes importance of local adaptation

Provisions for protection of wild stocks, preventing possible detrimental effects of gene flow

- No stocking where there may be a significant interaction or impact on significant or unique populations
- Identification of significant/unique wild stocks
- Bounds on rehabilitation and enhancement
- Establishment of wild stock sanctuaries (*a.k.a.*, broodstock reserves)

Maintenance of genetic variance

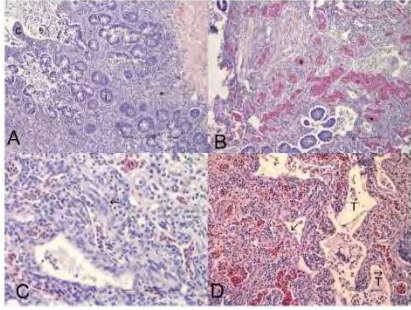
- Maximum of three hatcheries derived from a single donor stock
- No selective breeding, brood taken from entire run to maintain broad genetic variability
- Minimum effective population size

*Photo by Lorna Wilson*

http://www.adfg.alaska.gov/FedAidPDFs/FRED.GeneticsPolicy.1985.pdf

# Pathology

Example histopathology from ADF&G Pathology Lab (Accession No 2023-0009)




**Hatchery oversight/support**

- Advise good fish culture practices to maintain fish health
- Periodic hatchery inspections with written reports
- Preventative measures and therapy to control fish and shellfish diseases
- Collection of diagnostic samples
- Fish health workshops to train hatchery personnel
- Advice regarding use of aquaculture drugs and INAD permits
- Review hatchery permits (PNP and FTP).

**Statutory and regulatory authority, policies**

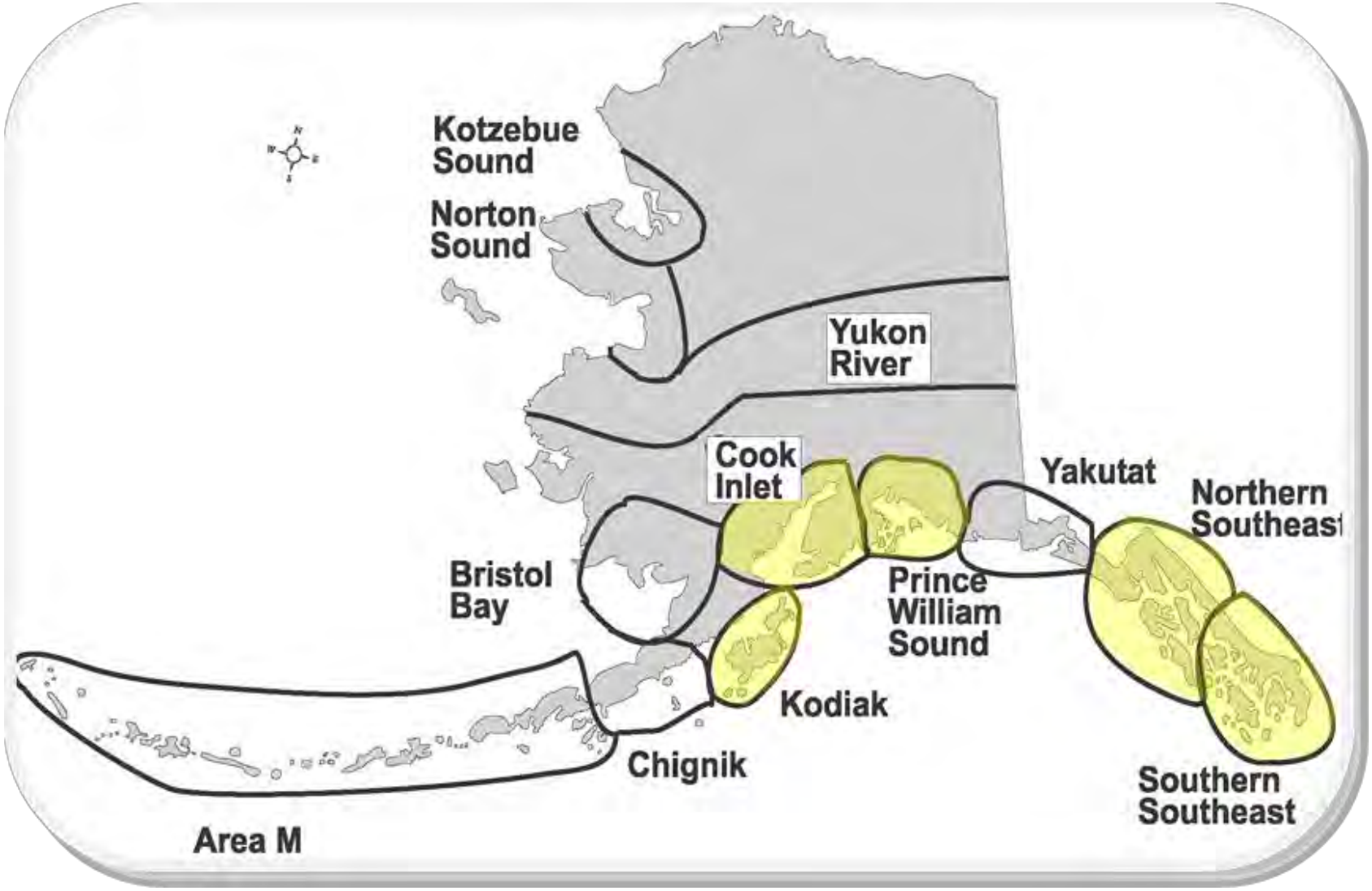
- Signatory on permits for fish and shellfish (5AAC 41.005, 41.030, 41.050, 41.290, 41.300)
- Inspection, reporting, control of fish diseases (AS 16.40.150, 5AAC 41.020, 41.080, 41.310) –Fish/shellfish disease policy, Sockeye Culture Policy
- Inspection of hatcheries (5AAC 41.080); maintain health specialist certification (AS 16.05.868)
- Certification imported Pacific oyster seed (5AAC 41.070)
- Destruction of diseased fish (5AAC 41.080)

March 2022 presentation: Statewide Fish/Shellfish Health Program in Alaska: Mitigating Disease Risks to Wild and Cultured Stocks

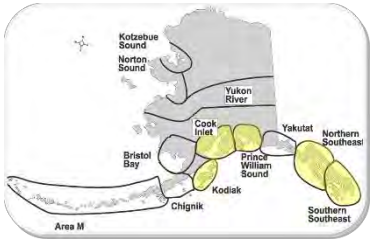
# Select Fisheries Management Policies

| | |
|---|---|
| Alaska Policy for the Management of Sustainable Salmon Fisheries (5 AAC 39.222) | → ADF&G reports to Board of Fisheries wild salmon stock status and identifies stocks of concern |
| Policy for the Management of Mixed-Stock Salmon Fisheries (5 AAC 39.220) | → Conservation of stocks of concern in a mixed fishery |
| Salmon Escapement Goal Policy (5 AAC 39.223), | → Conserve and develop Alaska's salmon fisheries on the sustained yield principle |
| Local fishery management plans (5 AAC 39.200) | → Protect the sustained yield while at the same time providing distribution of harvest among users |

# SALMON FISHERY ENHANCEMENT REGIONS



# REGIONAL AQUACULTURE ASSOCIATION (RAA)




Purpose is to enhance salmon production

Designated by ADF&G commissioner

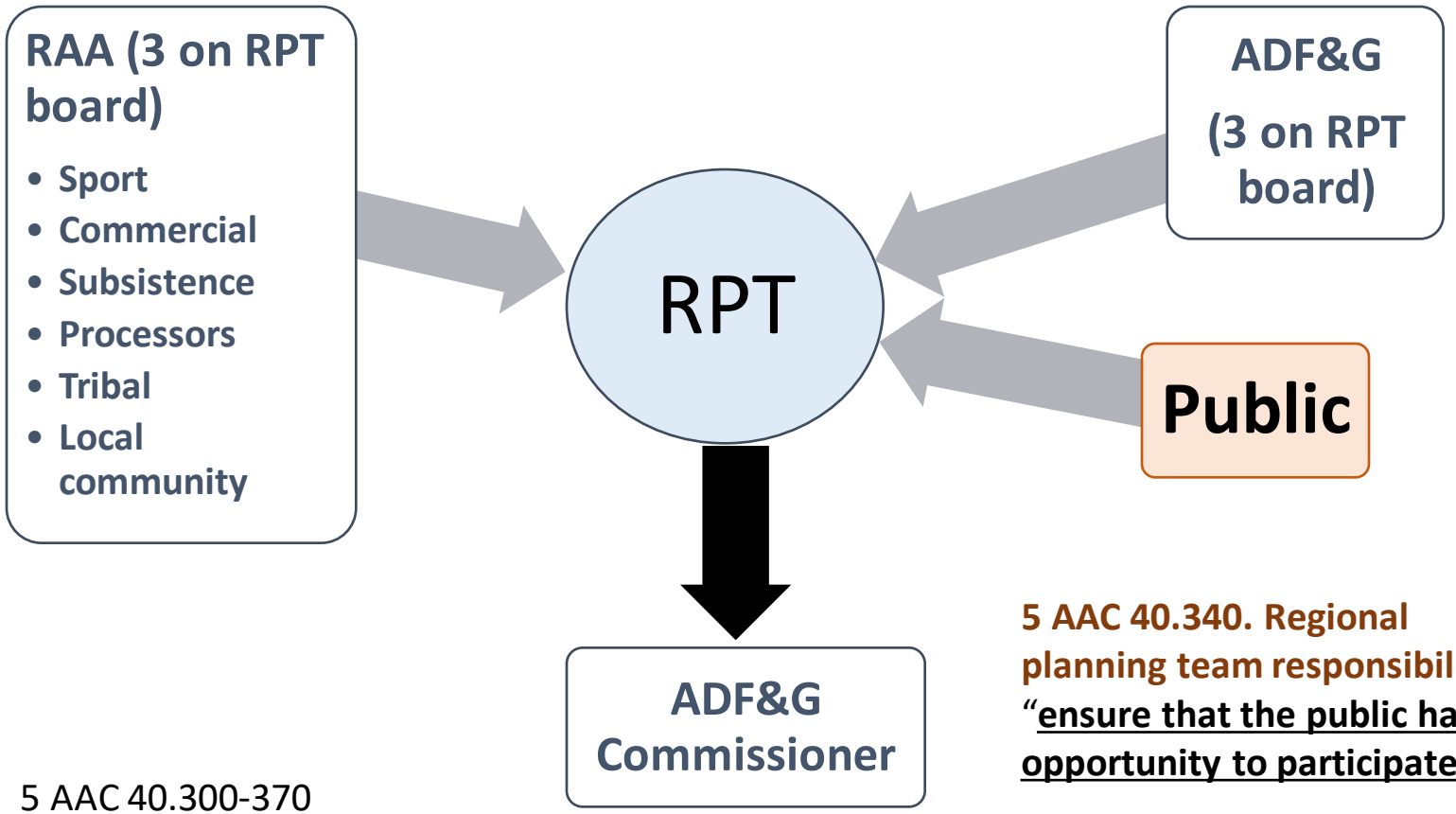
Board of Directors:

- Commercial salmon fishing permit holders
- Representatives of other stakeholder groups such as sport and subsistence harvesters, processors, and city officials.

An RAA must form a Private Non-Profit corporation to operate a hatchery

AS 16.10.380

# Regional Planning Team (RPT)




5 AAC 40.300-370

**5 AAC 40.340. Regional planning team responsibility.**
"**ensure that the public has opportunity to participate "**

Upcoming RPT meeting info:
http://www.adfg.alaska.gov/index.cfm?adfg=fishingHatcheriesPlanning.regional

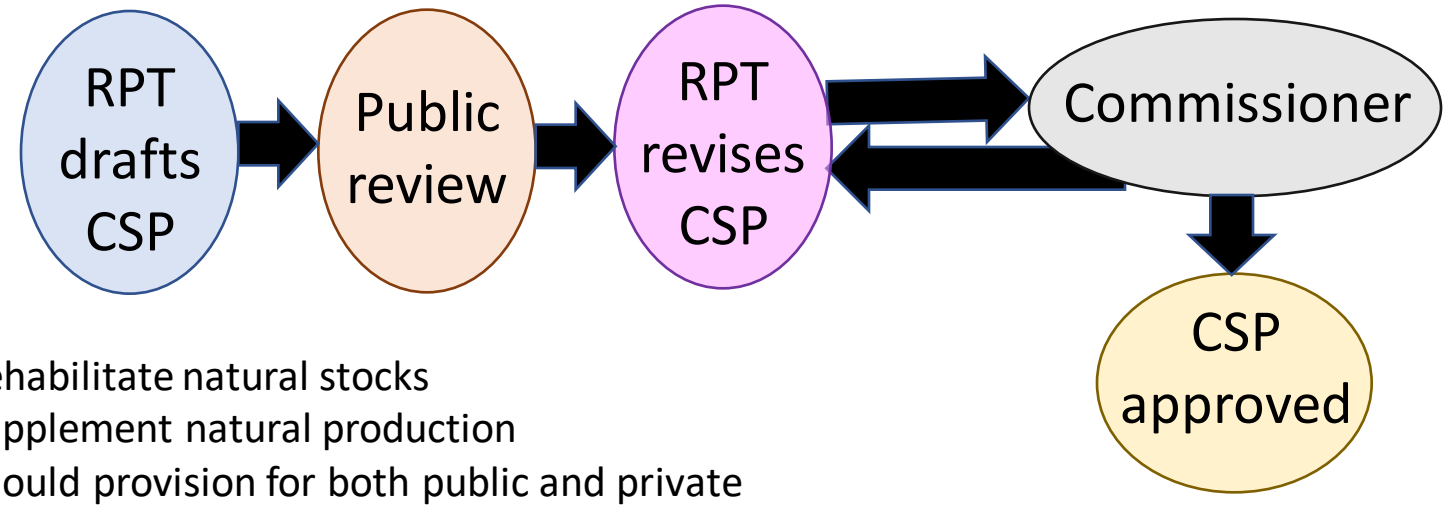
# WHAT THE RPT DOES

The RPT meets annually, or as necessary, to fulfill its advisory role to the Commissioner on regional salmon fishery enhancement activities:

1. Draft and update the **regional salmon plan**, provide to the Commissioner for approval;
2. **Review hatchery permit applications** and provide a **recommendation** to the Commissioner;
3. Following no substantial ongoing work, **comment on proposed PNP Permit suspension or revocation**;
4. Provide **annual recommendations** to the Commissioner on production changes (Southeast only)

RPT may provide support or review of regional fisheries enhancement in other areas at the commissioner's discretion.

# Comprehensive Salmon Plan (CSP)




- Rehabilitate natural stocks
- Supplement natural production
- Should provision for both public and private hatchery systems
- Must consider needs of all user groups
- Define hatchery production goals by species, area, time

AS 16.10.375; 5 AAC 40.340-370

Link to CSPs:
http://www.adfg.alaska.gov/index.cfm?adfg=fishingHatcheriesPlanning.enhance

# Private Non-Profit (PNPs) Corporations

Oversight by the Alaska Nonprofit Corporation Act (AS 10.20)

Comprised of

- Representatives of commercial fishers and other user groups interested in fisheries (AS 16.10.380)
- Board of Directors (BOD) must have one representative of each user group that belongs to the association (AS 16.10.380(3))
- BOD establishes hatchery production goals and oversees business operations
- Committees: Executive, Finance, Production Planning, Board Development, among others.

A PNP Corporation may be

- Regional (RAA)
- Non-regional.

ADF&G has no oversight on non-RAA PNP Corporation BOD.

# PNP Hatchery Application Process

ADF&G Management Feasibility Analysis (MFA):

- Contribution to common property fishery
- Size, location of special harvest area
- Special management considerations
- Need for additional studies
- Broodstock sources
- Assessment of production potentials

5 AAC 40.130

Regional Planning Team review:

- Contribution to the common property fishery
- Protection of the naturally occurring stocks from adverse effects
- Compatibility with the regional comprehensive salmon plan
- Use of the site's potential to benefit the common property fishery

Public hearing

Approved by the Commissioner

- RPT review; department review; public hearing
- Decision based on 8 criteria (*i.e.*, will it work, 5 AAC 40.220)

# PNP Hatchery Permits

- Authorize PNP hatchery operation
- Specify the species, egg source, **egg capacity**, release locations, and other conditions
- Typically contains condition that the operator is required to remove unharvested fish in terminal area
- Do not expire
- Can be relinquished by the permit holder or revoked by the ADF&G commissioner

AS 16.10.400–16.10.470

# Fish Transport Permits (FTPs)

Needed to collect, transport, possess, propagate, export from the state, or release into the waters or the lands of the state, any aquatic organism.

Specific to hatchery, species, stock. Specifies maximum egg number, fish, locations.

PNP hatchery FTPs comply with PNP hatchery permit.

Reviewed by regional sport and commercial managers, genetics, and pathology staff. Approved by the commissioner.

Fixed term.

5 AAC 41.005-41.100

Online: https://mtalab.adfg.alaska.gov/FMPD/PermitSearch.aspx

# Terminal Harvest Areas

Designated by the commissioner, Board of Fisheries regulation, or Emergency Order

- **Terminal harvest area (THA)**

…where hatchery returns have achieved a reasonable degree of segregation from naturally occurring stocks and may be *harvested by the common property fishery* without adverse effects.

AS 16.10.455(g)(3) and 5 AAC 40.990(13)

- **Special harvest area (SHA)**

..where hatchery returns are to be *harvested by the hatchery operators*, and, in some situations by the common property fishery.

Cost recovery funds are used to pay for the hatchery's reasonable operating and capital costs.

SHAs may be designated in the PNP permit.

AS 16.10.455 (g)(2) and 5 AAC 40.990(12)

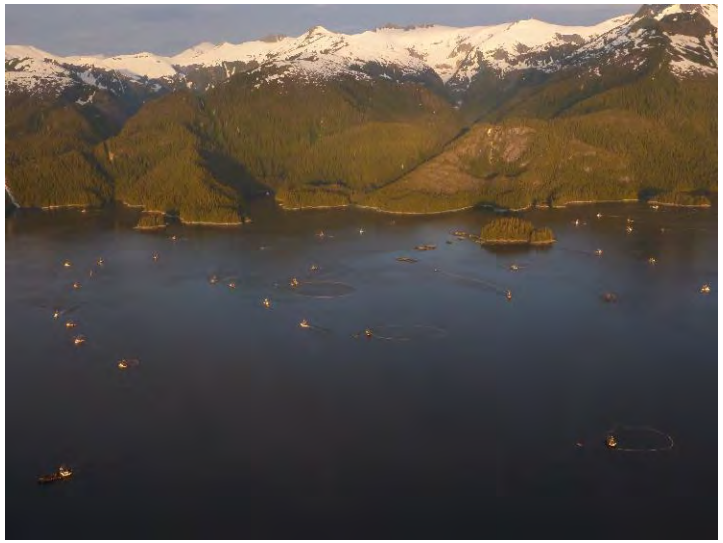
AS 16.05.730

5 AAC 40.005


Northern Southeast Regional Aquaculture Association
Seining chum salmon

# Fishery Assessment

A hatchery permit holder may harvest salmon for a facility in a terminal harvest area through the common property fishery.

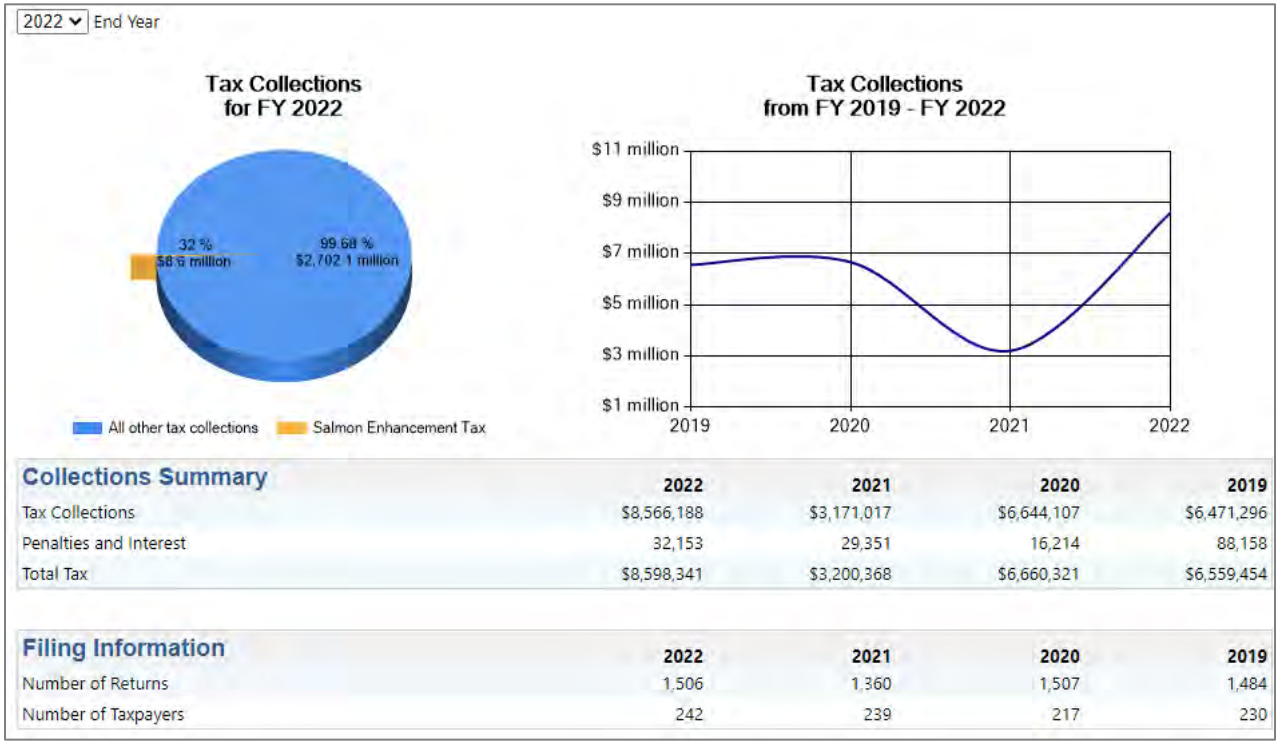


Fishery Assessment
Hidden Falls Terminal Harvest Area
Southeast Alaska

AS 16.10.455. Cost Recovery Fisheries. (a)(2)

# Salmon Enhancement Tax (SET)

- Commercial Fishers ibn the region vote to self-impose a tax on the sale of all salmon
- Distributed to the RAA
- Finance:
  - Hatchery operations
  - Other enhancement and rehabilitation activities.
- Non-regional PNP operators do not receive SET funds

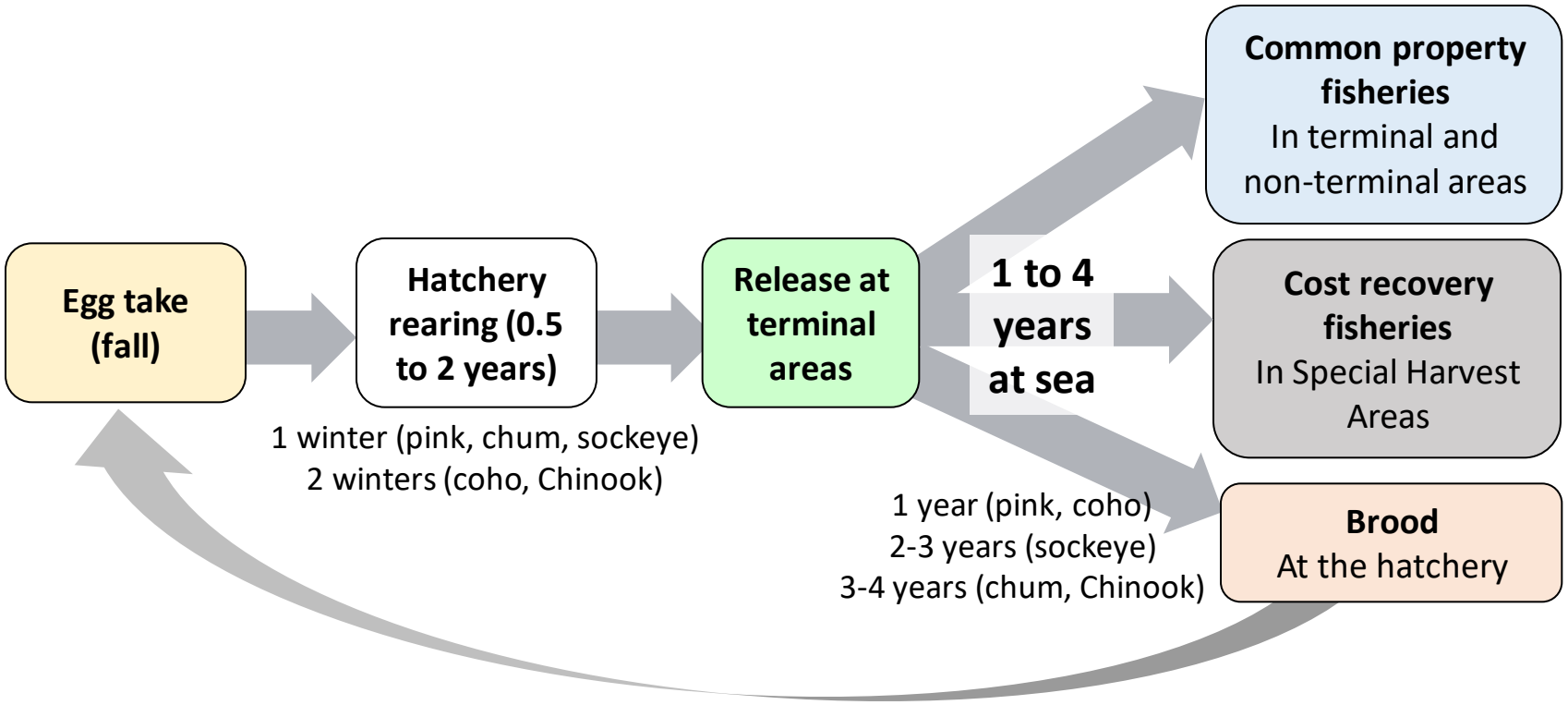



| Collections Summary | 2022 | 2021 | 2020 | 2019 |
|---|---|---|---|---|
| Tax Collections | $8,566,188 | $3,171,017 | $6,644,107 | $6,471,296 |
| Penalties and Interest | 32,153 | 29,351 | 16,214 | 88,158 |
| Total Tax | $8,598,341 | $3,200,368 | $6,660,321 | $6,559,454 |

| Filing Information | 2022 | 2021 | 2020 | 2019 |
|---|---|---|---|---|
| Number of Returns | 1,506 | 1,360 | 1,507 | 1,484 |
| Number of Taxpayers | 242 | 239 | 217 | 230 |

Source: Alaska Dept. of Revenue Tax Division
http://tax.alaska.gov/programs/programs/reports/AnnualData.aspx?60632

# Hatchery production planning revolves around salmon life cycle



# Economic efficiency

## Pink salmon

- Short rearing time, one winter in the hatchery
- 1 year at sea
- High and quick economic return on investment

## Chum salmon

- Short rearing time, one winter in the hatchery
- 3-4 years at sea
- High but slow return on investment

## Chinook, sockeye, and coho salmon

- Long freshwater rearing time, typically two years in fresh water
- Coho spend 1 year at sea
- Chinook and sockeye spend 2-4 years at sea for a low and slow return on investment

➢ Pink and chum salmon are the bulk of Alaska hatchery production because they have the highest return on investment for the cost of production.

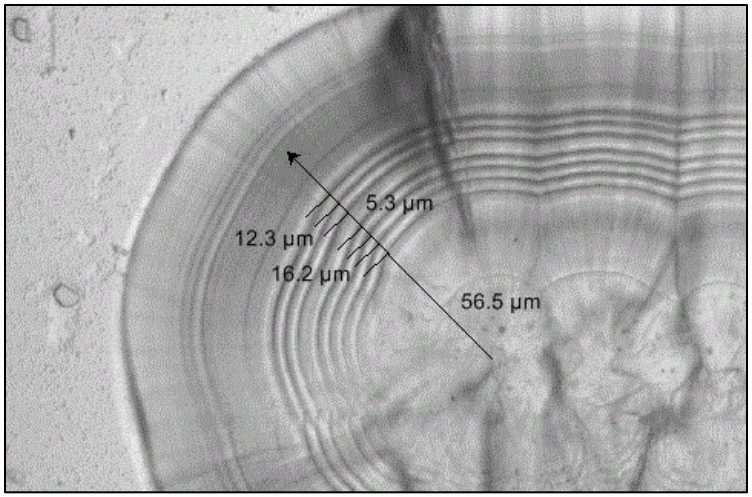
# Changes in Production

Permit Alteration Request (PAR)

- PNP Corporation Board of Directors
- Due to PNP coordinator February 15
  - Commissioner may extend the deadline if justified by extraordinary circumstances or emergency
- Fisheries management, Pathology, Genetics, and Aquaculture sections review
- Regional Planning Team spring meeting review
  - Early March – End of April
- Commissioner Decision April - May

5 AAC 40.850

# Hatchery releases are marked to estimate fishery contribution




Thermal marked sockeye salmon otolith from Snettisham Hatchery.


Coded wire tag (CWT).

Hatchery operators and ADF&G read otoliths for thermal mark presence and identification and sample tagged fish to estimate harvest composition.

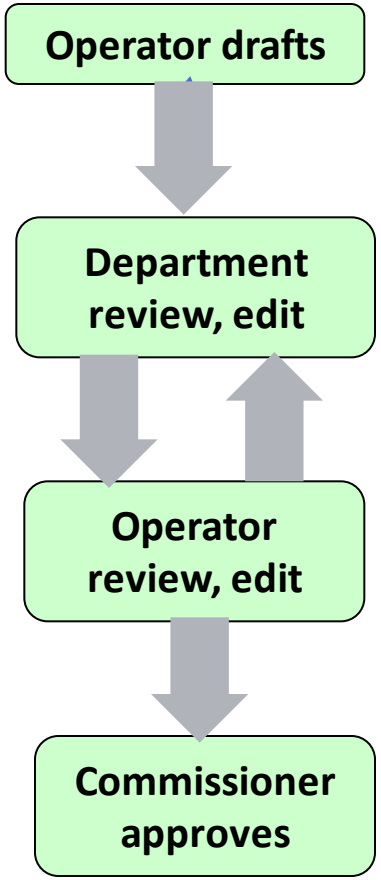
# Annual Management Plan (AMP)

Organize and guide the hatchery's operations regarding production goals, broodstock development, and harvest management of hatchery returns

- Current year's egg-take goals
- Planned juvenile releases
- Remaining fish inventory for release the following year
- Expected adult returns by location
- Harvest management plans
- PNP and Fish Transport Permits
- Reference evaluation plans (marking, sampling, etc.)

Online: http://www.adfg.alaska.gov/index.cfm?adfg=fishingHatcheriesPlanning.annual

5 AAC 40.840



# Hatchery Annual Report

Include by stock and species:

- Broodstock source and numbers
- Number of eggs taken
- Number of juveniles released
- Adult returns attributable to the hatchery
  - Cost recovery harvest
  - Common property contribution (commercial, sport, personal use, and subsistence)
  - Escapement, if required
  - Brood numbers
- Forecasted returns

Due each year by December 15.

AS 16.10.470


Pillar Creek Hatchery
Kodiak Regional Aquaculture Association

# Hatchery Annual Report

Provides department oversight to ensure production is as permitted

Used in:

- Department season summaries
- Annual fishery management reports
- ADF&G harvest projections for the subsequent year
- Comprehensive annual fisheries enhancement report for the legislature (AS 16.05.092)

**2022 report** http://www.adfg.alaska.gov/FedAidPDFs/RIR.5J.2022.02.pdf

Can be provided to Department of Commerce per 5 AAC 40.890

- Fisheries Enhancement Loan Program (AS 16.10.500-16.10.560)

Economic Interests

- For example, McKinley Research (McDowell Group) Economic Reports

Research

- For example, correlations with salmon production and genetics studies

# ENHANCED PRODUCTION OF SALMON

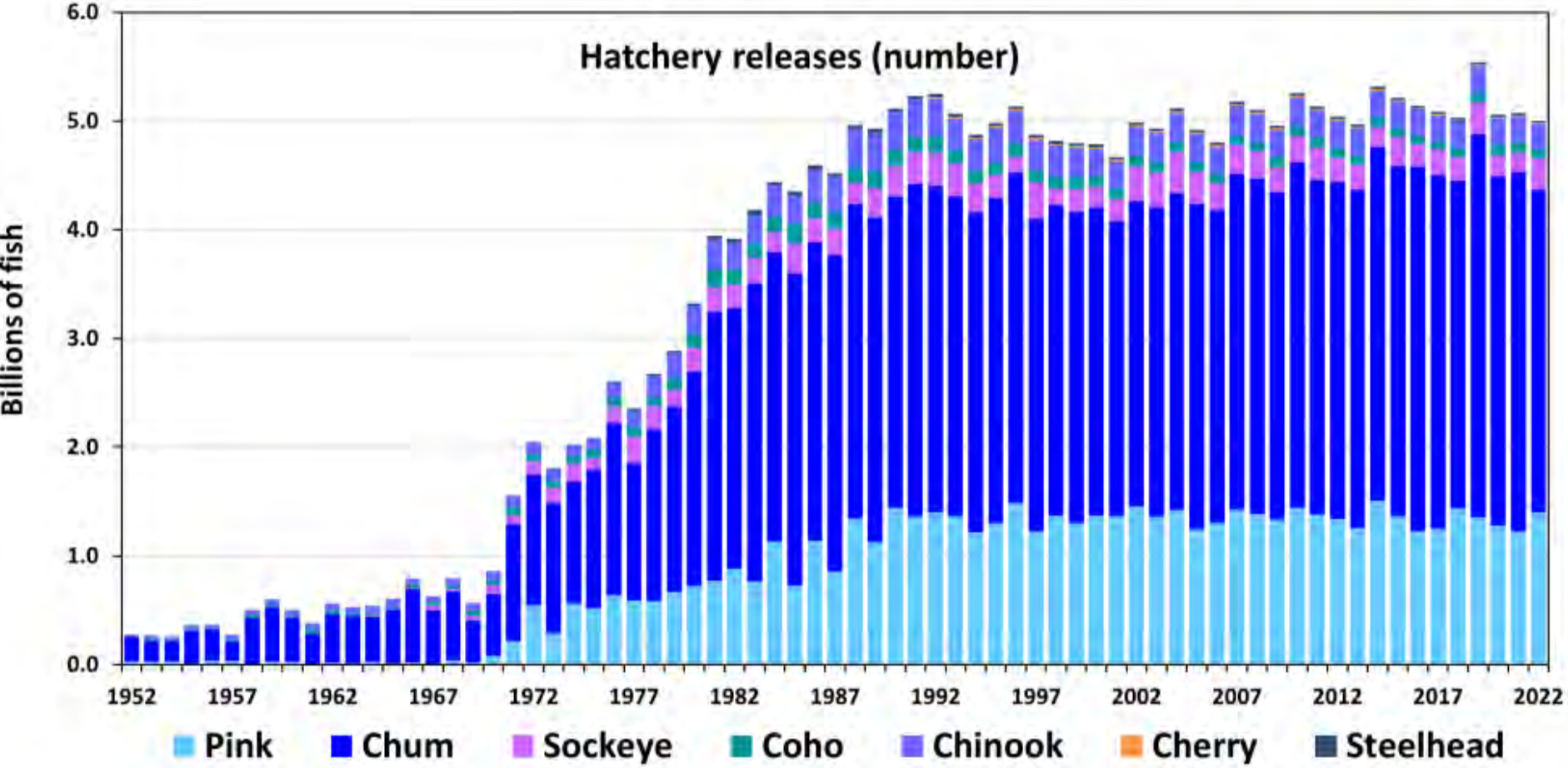
North Pacific Production

Alaska Egg Takes and Permitted Egg Capacities by species

Alaska Production

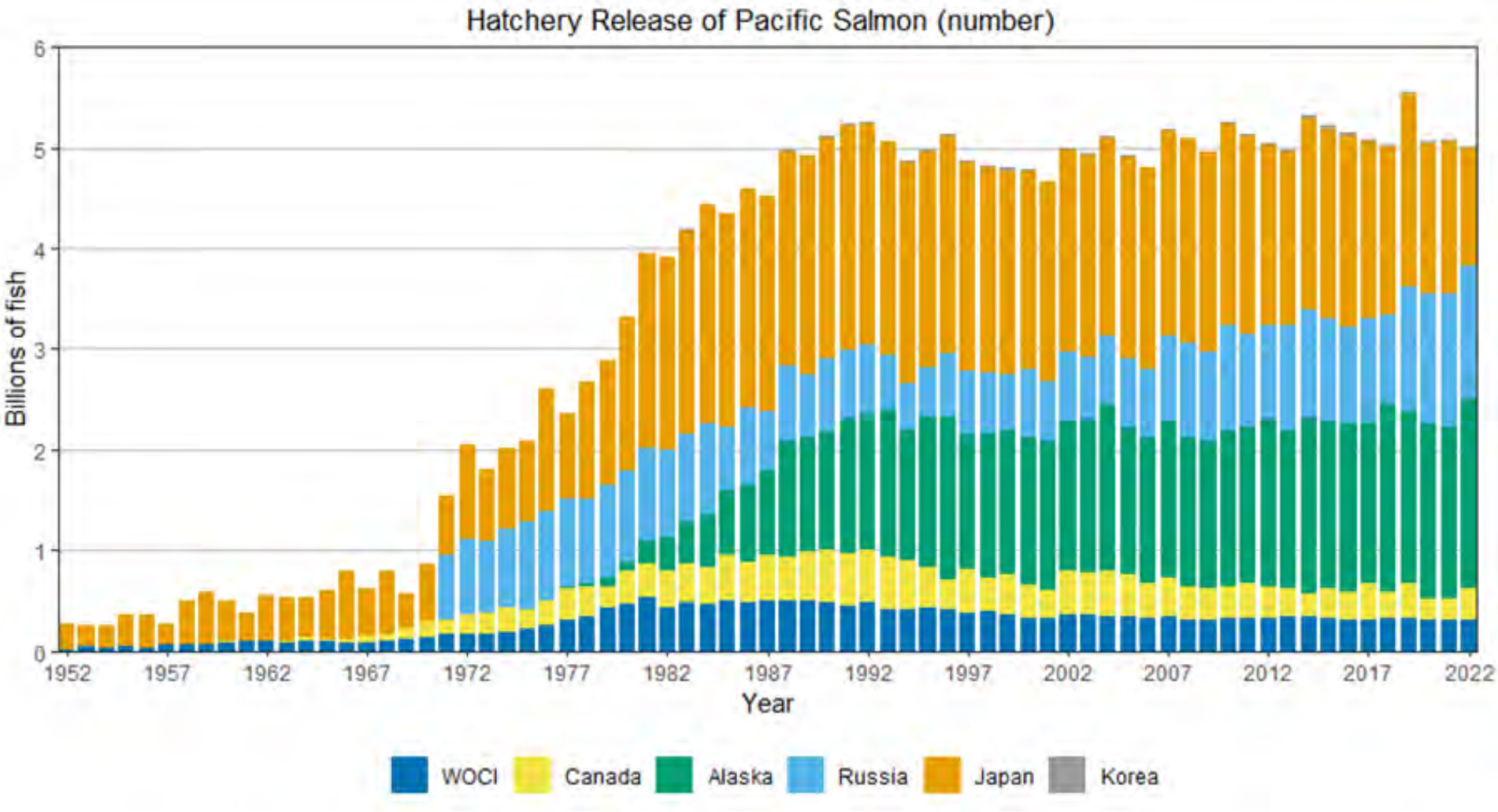
Alaska Production by Region

# North Pacific Production



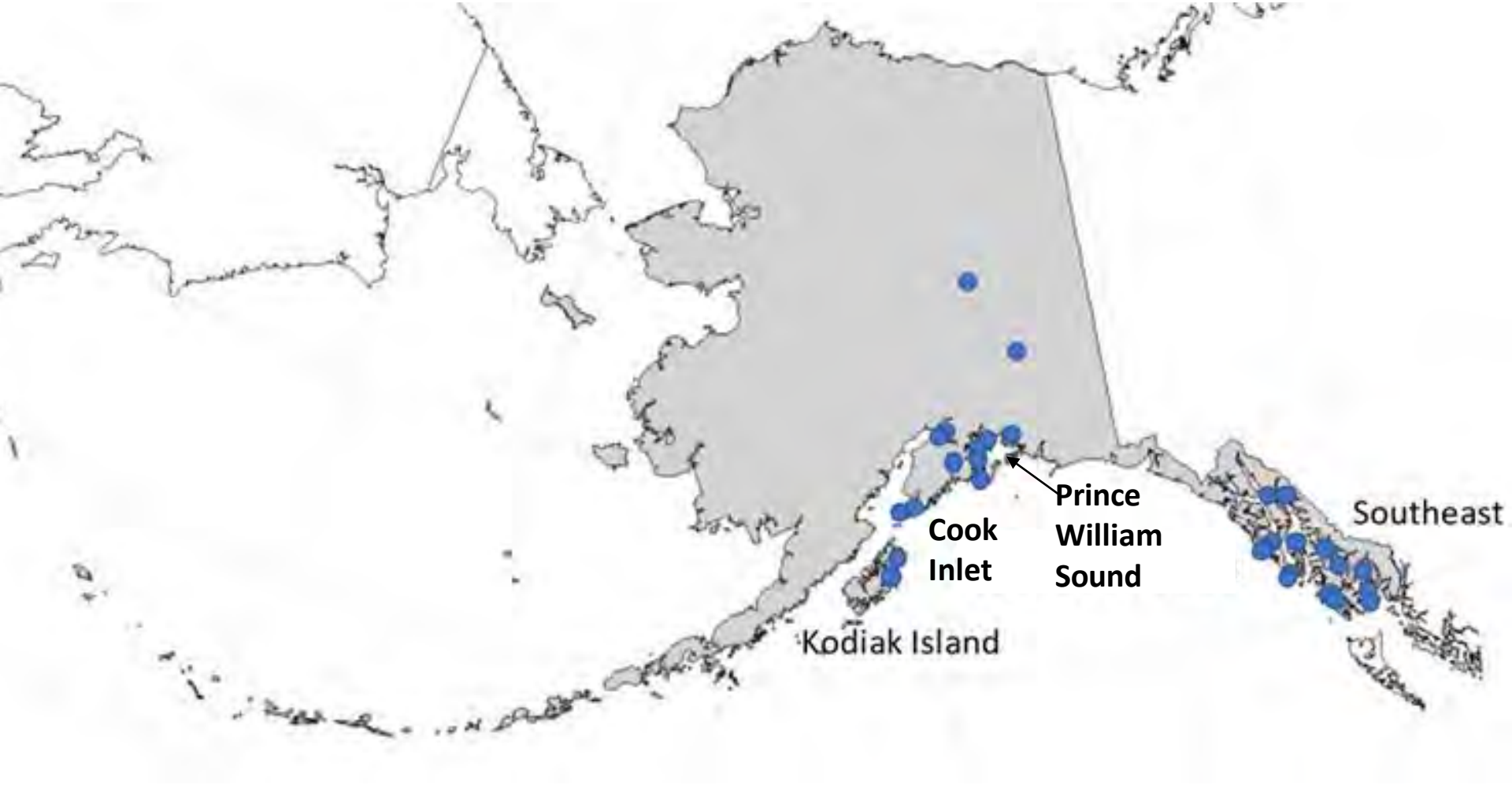

Data Source: North Pacific Anadromous Fish Commission (NPAFC). 2023. NPAFC Pacific salmonid hatchery release statistics (updated July 2023). North Pacific Anadromous Fish Commission, Vancouver. Accessed July, 2023. Available: https://npafc.org

# North Pacific Production

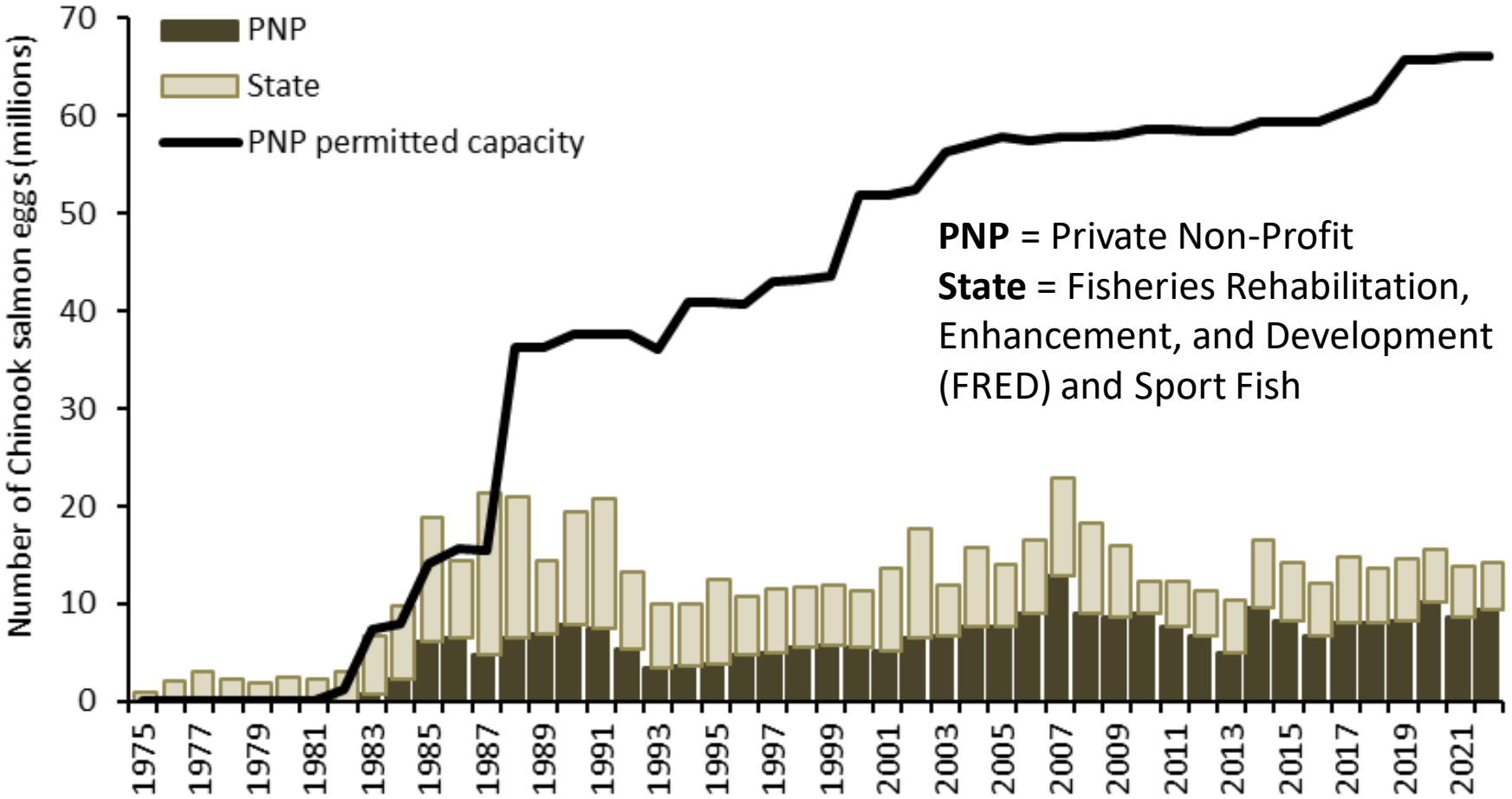



WOCI = Washington, Oregon, California, Idaho

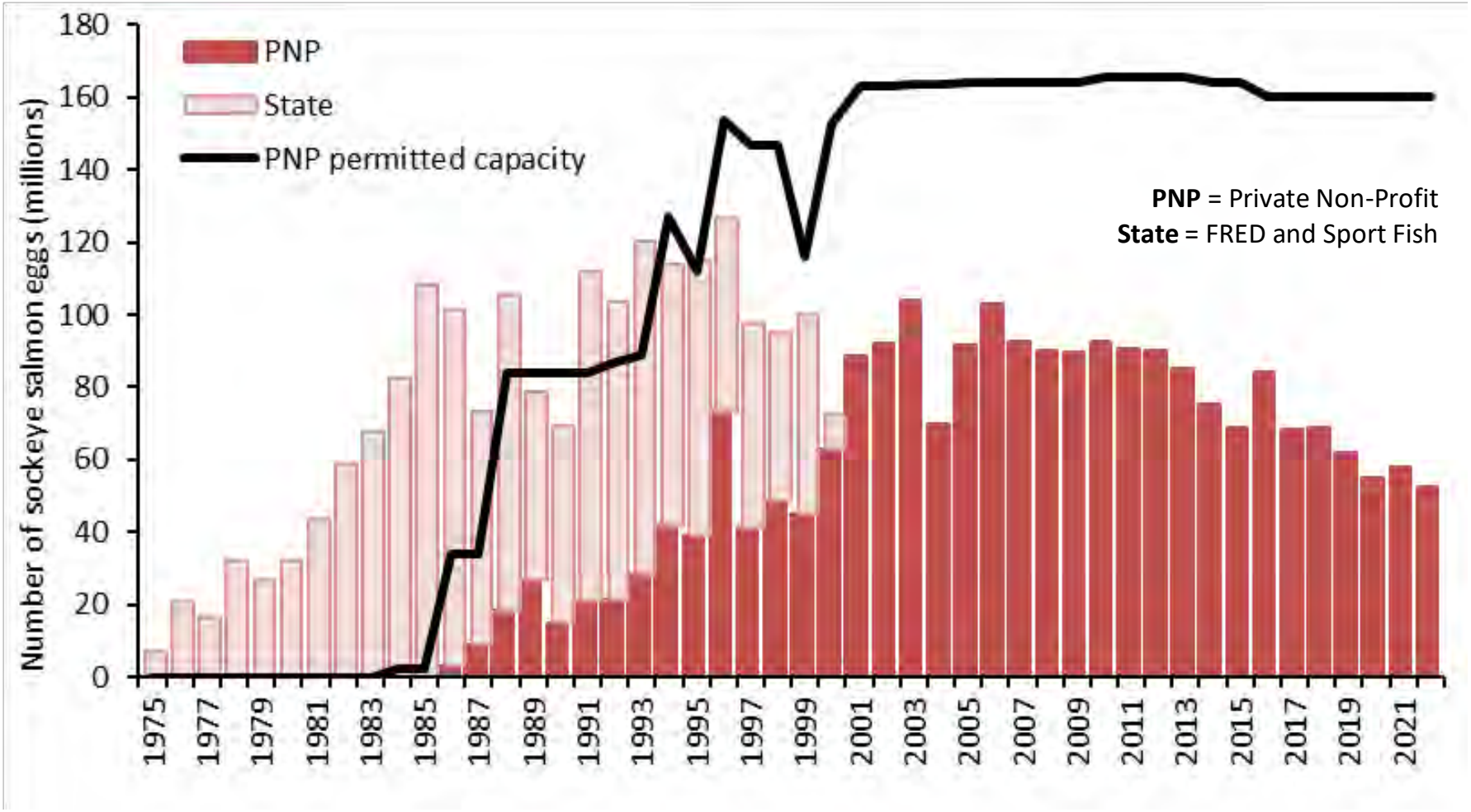
# Salmon Hatchery Locations in Alaska



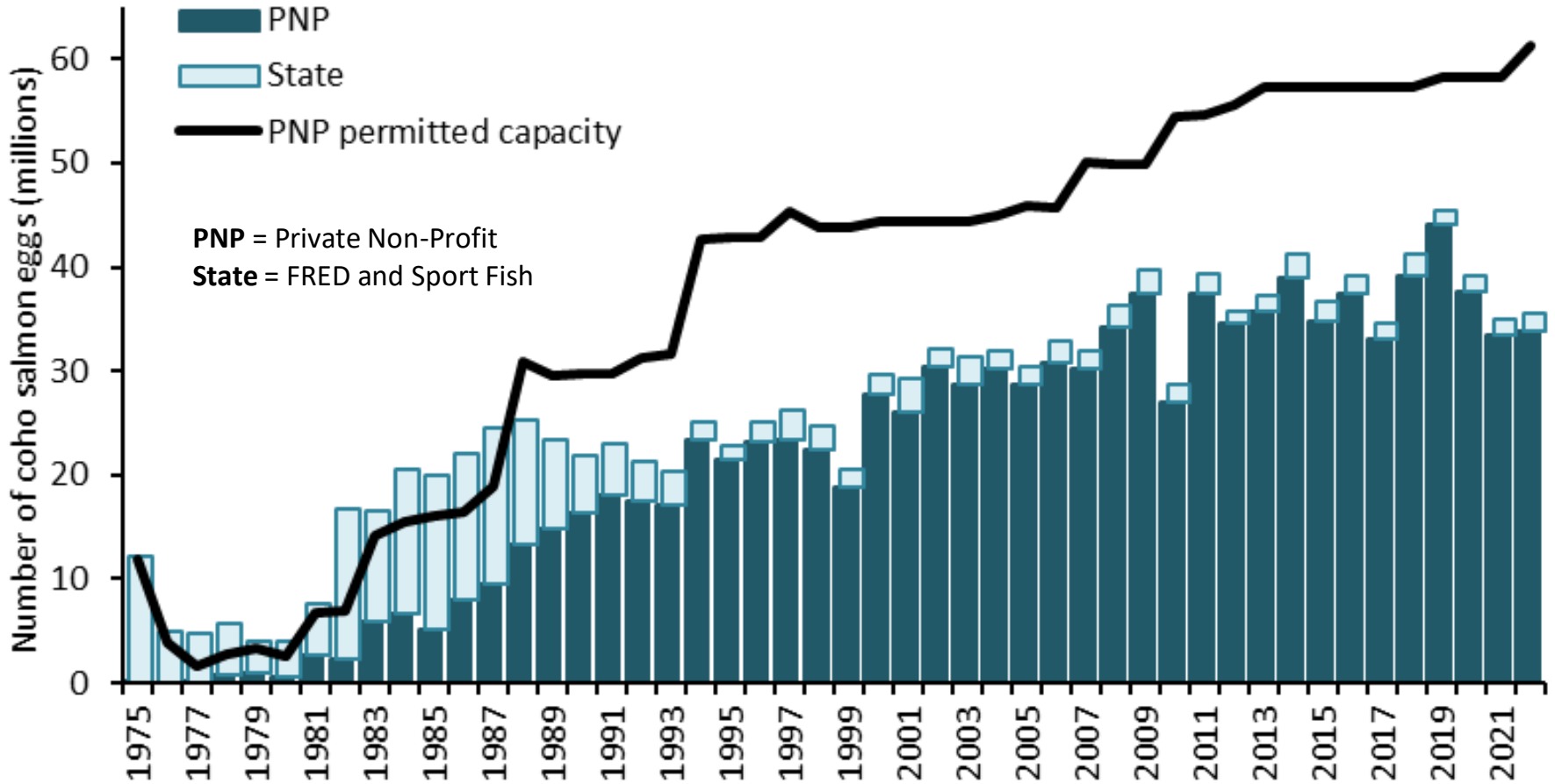
# Chinook salmon eggs taken at Alaska hatcheries, 1975–2022



# Sockeye salmon eggs taken at Alaska hatcheries, 1975–2022

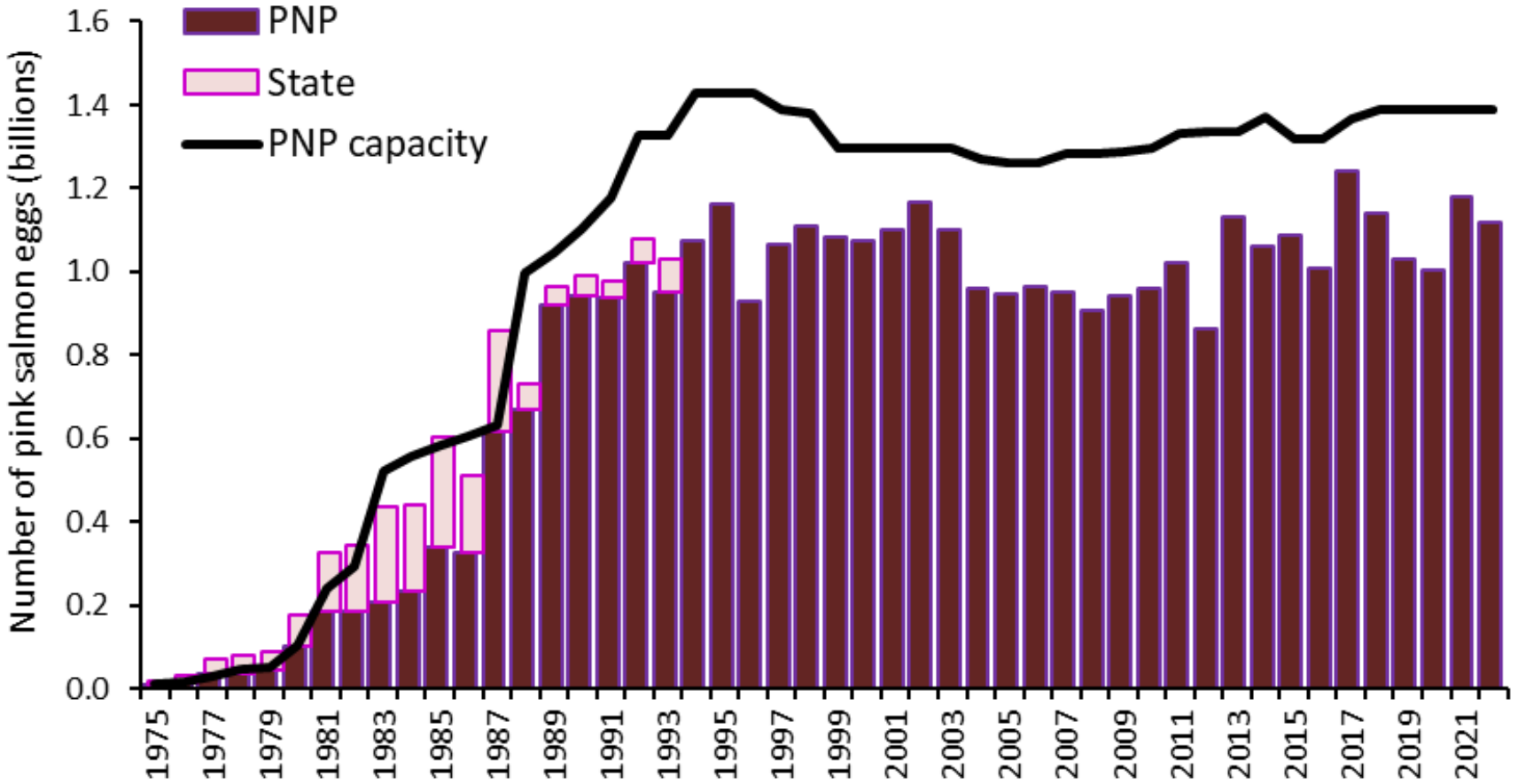


# Coho salmon eggs taken at Alaska hatcheries, 1975–2022

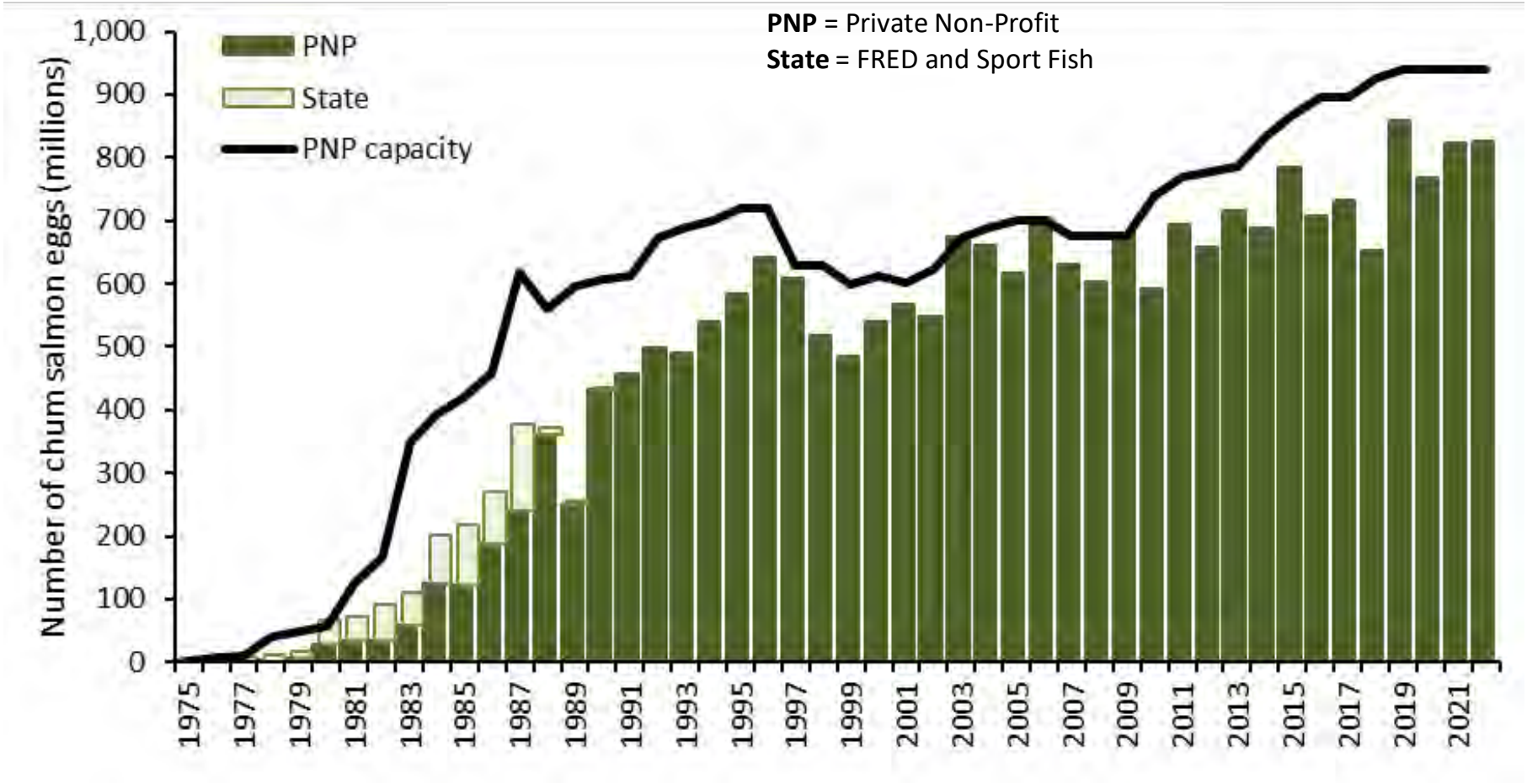


# Pink salmon eggs taken at Alaska hatcheries, 1975–2022

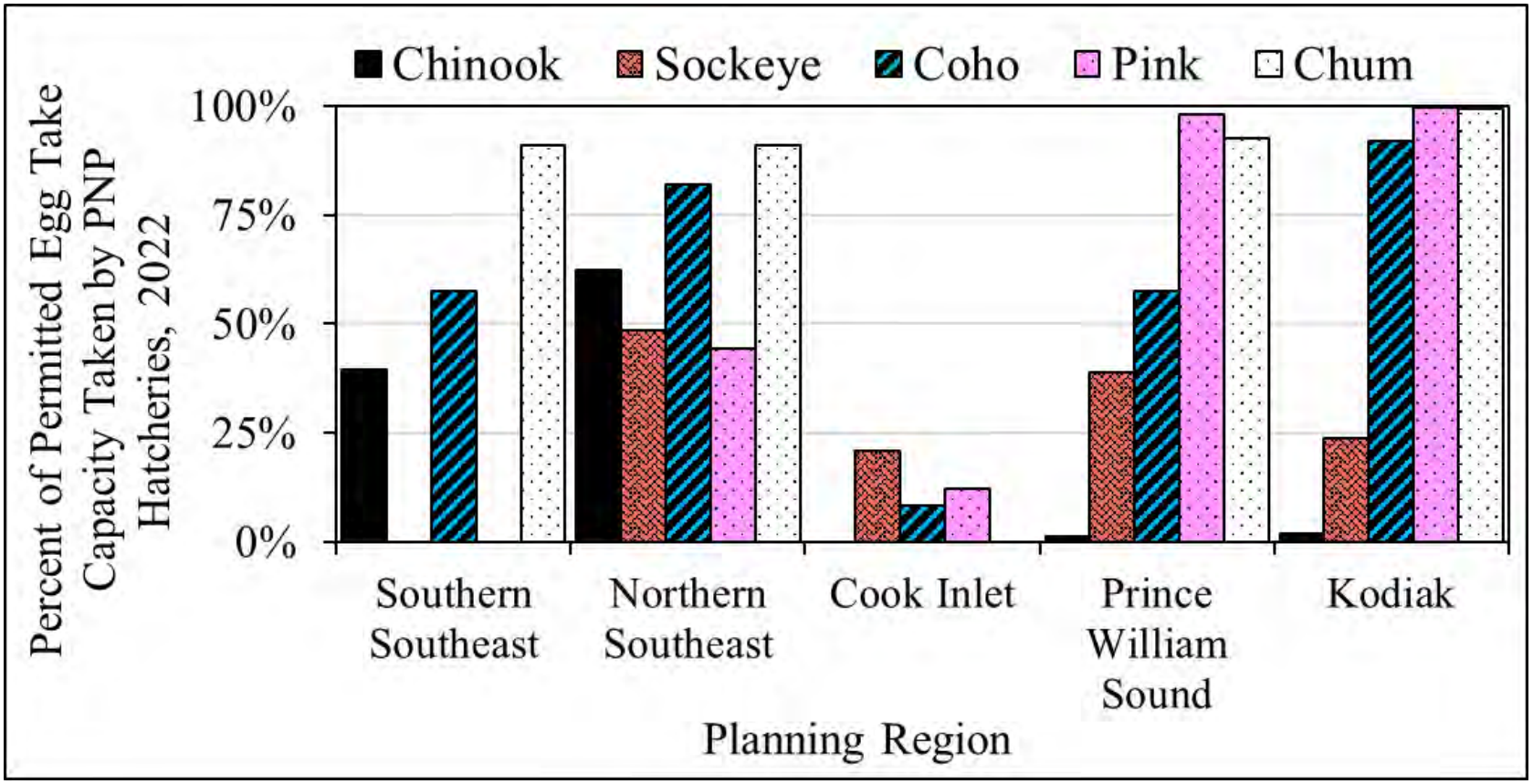
**PNP** = Private Non-Profit
**State** = FRED and Sport Fish



# Chum salmon eggs taken at Alaska hatcheries, 1975–2022



# Permitted egg capacity used by PNP hatcheries, 2022




Production is limited by egg takes, which is limited by permitted egg capacity.

# Eggs taken at PNP Hatcheries, 2022

Appendix G1 of [Alaska salmon fisheries enhancement annual report 2022.]

http://www.adfg.alaska.gov/FedAidPDFs/RIR.5J.2023.04.pdf

| Region/Area/Operator/Hatchery | | | Chinook | Sockeye | Coho | Pink | Chum | R. Trout | Total |
|---|---|---|---|---|---|---|---|---|---|
| Southeast | | | | | | | | | |
| | Southern Southeast | | | | | | | | |
| | | SSRAA | Burnett Inlet | 0.00 | 0.00 | 0.00 | 0.00 | 90.16 | 0.00 | 90.16 |
| | | | Neets Bay | 0.00 | 0.00 | 4.20 | 0.00 | 91.94 | 0.00 | 96.14 |
| | | | Whitman Lake | 2.20 | 0.00 | 3.45 | 0.00 | 40.00 | 0.00 | 45.65 |
| | | | Deer Mountain | 0.05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.05 |
| | | | Klawock River | 0.00 | 0.00 | 5.31 | 0.00 | 0.00 | 0.00 | 5.31 |
| | | | Port Saint Nicholas | 0.00 | 0.00 | 0.00 | 0.00 | 8.00 | 0.00 | 8.00 |
| | Southern Southeast total | | | 2.25 | 0.00 | 12.96 | 0.00 | 230.10 | 0.00 | 245.31 |
| | Northern Southeast | | | | | | | | |
| | | NSRAA | Gunnuk Creek | 0.00 | 0.00 | 0.00 | 0.00 | 18.93 | 0.00 | 18.93 |
| | | | Haines Projects | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | | Hidden Falls | 0.88 | 0.00 | 7.70 | 0.00 | 123.51[a] | 0.00 | 132.09 |
| | | | Medvejie | 5.72[b] | 0.00 | 0.00 | 0.20 | 76.22 | 0.00 | 82.14 |
| | | | Sawmill Creek | 0.33 | 0.00 | 3.83 | 0.00 | 49.46[c] | 0.00 | 53.62 |
| | | AKI | Port Armstrong | 0.00 | 0.00 | 6.00 | 53.60 | 34.39 | 0.00 | 93.99 |
| | | | Little Port Walter | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | DIPAC | Macaulay | 1.09 | 0.00 | 1.50 | 0.00 | 135.13 | 0.00 | 137.72 |
| | | | Snettisham | 0.00 | 17.24 | 0.00 | 0.00 | 0.00 | 0.00 | 17.24 |
| | | SSSC | Sheldon Jackson | 0.00 | 0.00 | 0.27 | 3.21 | 3.24 | 0.00 | 6.72 |
| | | | Medvejie | 0.00 | 0.00 | 0.00 | 0.00 | 9.00 | 0.00 | 9.00 |
| | Northern Southeast total | | | 8.02 | 17.24 | 19.30 | 57.02 | 449.87 | 0.00 | 551.45 |
| **Southeast total** | | | | **10.27** | **17.24** | **32.26** | **57.02** | **679.97** | **0.00** | **796.75** |
| Southcentral | | | | | | | | | |
| | Prince William Sound | | | | | | | | |
| | | PWSAC | A F Koernig | 0.00 | 0.00 | 0.00 | 182.00 | 20.13 | 0.00 | 202.13 |
| | | | Cannery Creek | 0.00 | 0.00 | 0.00 | 178.40 | 0.00 | 0.00 | 178.40 |
| | | | Gulkana | 0.00 | 6.62 | 0.00 | 0.00 | 0.00 | 0.00 | 6.62 |
| | | | Main Bay | 0.00 | 12.40 | 0.00 | 0.00 | 0.00 | 0.00 | 12.40 |
| | | | Wally Noerenberg | 0.05 | 0.00 | 1.44 | 141.40 | 132.66 | 0.00 | 275.55 |
| | | VFDA | Solomon Gulch | 0.00 | 0.00 | 2.00 | 276.83 | 0.00 | 0.00 | 278.83 |
| | **Prince William Sound total** | | | **0.05** | **19.02** | **3.44** | **778.63** | **152.79** | **0.00** | **953.94** |
| | Cook Inlet | | | | | | | | |
| | | CIAA | Eklutna | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | | Port Graham | 0.00 | 0.00 | 0.00 | 21.18 | 0.00 | 0.00 | 21.18 |
| | | | Trail Lakes | 0.00 | 10.10 | 0.51 | 0.00 | 0.00 | 0.00 | 10.61 |
| | | | Tutka Bay | 0.00 | 0.00 | 0.00 | 9.20 | 0.00 | 0.00 | 9.20 |
| | **Cook Inlet total** | | | **0.00** | **10.10** | **0.51** | **30.38** | **0.00** | **0.00** | **41.00** |
| Southcentral Total | | | | 0.05 | 29.12 | 3.96 | 809.01 | 152.79 | 0.00 | 994.94 |
| Kodiak | | | | | | | | | |
| | | KRAA | Kitoi Bay | 0.00 | 0.77 | 2.30 | 213.99 | 35.78 | 0.00 | 252.84 |
| | | | Pillar Creek | 0.01 | 4.19 | 0.28 | 0.00 | 0.00 | 0.20 | 4.68 |
| **Kodiak total** | | | | **0.01** | **4.97** | **2.58** | **213.99** | **35.78** | **0.20** | **257.52** |
| Statewide Total | | | | 10.33 | 51.33 | 38.80 | 1,080.02 | 868.54 | 0.20 | 2,049.21 |

[a] Includes eggs on behalf of Sheldon Jackson Hatchery operated by SSSC and NSRAA's Medvejie Creek Hatchery.

[b] Includes eggs on behalf of Hidden Falls Hatchery.

[c] Includes eggs on behalf of Medvejie Creek Hatchery for release at Deep Inlet.

# Permitted capacities of PNP Hatcheries

Appendix B1 of [Alaska salmon fisheries enhancement annual report 2022.]

http://www.adfg.alaska.gov/FedAidPDFs/RIR.5J.2023.04.pdf

Appendix B1.–Permitted capacity of Alaska private nonprofit hatcheries, in millions of eggs, 2022.

| Region/Area | Corp. | Hatchery | Chinook | Sockeye | Coho | Pink | Chum | Other | Total |
|---|---|---|---|---|---|---|---|---|---|
| Southeast | | | | | | | | | |
| Southern Southeast | SSRAA | Burnett Inlet | 0 | 2.70 | 4.50 | 0 | 97.20 | 0 | 104.40 |
| | | Neets Bay | 2.00 | 0 | 5.00 | 0 | 102.70 | 0 | 109.70 |
| | | Whitman Lake | 2.30 | 0 | 7.50 | 0 | 45.10 | 0 | 54.70 |
| | | Deer Mountain | 0.60 | 0 | 0 | 0 | 0 | 0.20 | 0.80 |
| | | Klawock River | 0 | 1.00 | 5.50 | 0 | 0 | 0 | 6.6 |
| | | Port Saint Nicholas | 0.77 | 0 | 0 | 0 | 8.00 | 0 | 8.77 |
| Southern Southeast total | | | 5.67 | 3.70 | 22.50 | 0 | 253.00 | 0.20 | 285.07 |
| Northern Southeast | NSRAA | Gunnuk Creek | 0 | 0 | 0.50 | 20.00 | 65.00 | 0 | 85.50 |
| | | Haines projects[a] | 0 | 2.00 | 0 | 0 | 4.80 | 0 | 6.80 |
| | | Hidden Falls | 3.80 | 0 | 7.70 | 0 | 101.00 | 0 | 112.50 |
| | | Medvejie Creek | 5.20 | 0 | 3.30 | 0.30 | 77.00 | 0 | 85.80 |
| | | Sawmill Creek | 2.00 | 0 | 4.33 | 0 | 30.00 | 0 | 36.33 |
| | AKI | Port Armstrong[b] | 2.00 | 0 | 6.00 | 105.00 | 60.00 | 0 | 171.00 |
| | | Little Port Walter[a,c] | 0.60 | 0 | 0 | 0 | 0 | 0 | 0.60 |
| | DIPAC | Macaulay | 1.25 | 0 | 1.50 | 0 | 135.00 | 0.05 | 137.80 |
| | | Snettisham | 0 | 33.50 | 0 | 0 | 0 | 0 | 33.50 |
| | SSSC | Sheldon Jackson | 0 | 0 | 0.25 | 3.00 | 12.00 | 0 | 15.25 |
| | | Medvejie | 0 | 0 | 0 | 0 | 9.00 | 0 | 9.0 |
| Northern Southeast total | | | 12.85 | 35.50 | 23.58 | 128.30 | 493.80 | 0.05 | 694.08 |
| Southeast total | | | 18.52 | 39.20 | 46.08 | 128.30 | 746.80 | 0.25 | 979.15 |
| Southcentral | | | | | | | | | |
| Prince William Sound | PWSAC | Armin F. Koernig | 0 | 0 | 0 | 190.00 | 34.00 | 0 | 224.00 |
| | | Cannery Creek | 0 | 0 | 0 | 187.00 | 0 | 0 | 187.00 |
| | | Gulkana | 0 | 36.75 | 0 | 0 | 0 | 0 | 36.75 |
| | | Main Bay | 0 | 12.40 | 0 | 0 | 0 | 0 | 12.40 |
| | | Wally Noerenberg | 4.00 | 0 | 4.00 | 148.00 | 131.00 | 0 | 287.00 |
| | VFDA | Solomon Gulch | 0.30 | 0 | 2.00 | 270.00 | 0 | 0 | 272.30 |
| Prince William Sound total | | | 4.30 | 49.15 | 6.00 | 795.00 | 165.00 | 0 | 1,019.45 |
| Cook Inlet | | | | | | | | | |
| | CIAA | Ekluna[a] | 0 | 18.00 | 0.16 | 0 | 0 | 0 | 18.16 |
| | | Trail Lakes | 4.00 | 30.00 | 6.00 | 0 | 0 | 0 | 40.00 |
| | | Tutka Bay | 0 | 0.66 | 0 | 125.00 | 0 | 0 | 125.66 |
| | | Port Graham | 0 | 0 | 0 | 125.00 | 0 | 0 | 125.00 |
| Cook Inlet total | | | 4.00 | 48.66 | 6.16 | 250.00 | 0 | 0 | 308.82 |
| Southcentral total | | | 8.30 | 97.81 | 12.16 | 1,045.00 | 165.00 | 0 | 1,328.27 |
| Kodiak/Westward | | | | | | | | | |
| Kodiak | KRAA | Kitoi Bay | 0 | 0.85 | 2.30 | 215.00 | 36.00 | 0 | 254.15 |
| | | Pillar Creek | 0.45 | 20.00 | 0.50 | 0 | 0 | 0.20 | 21.15 |
| Kodiak/Westward total | | | 0.45 | 20.85 | 2.80 | 215.00 | 36.00 | 0.20 | 275.30 |
| Statewide total | | | 27.27 | 157.86 | 61.04 | 1,388.30 | 947.80 | 0.45 | 2,582.72 |

*Note:* Perry Island Hatchery (Prince William Sound) is permitted but currently has zero capacity.

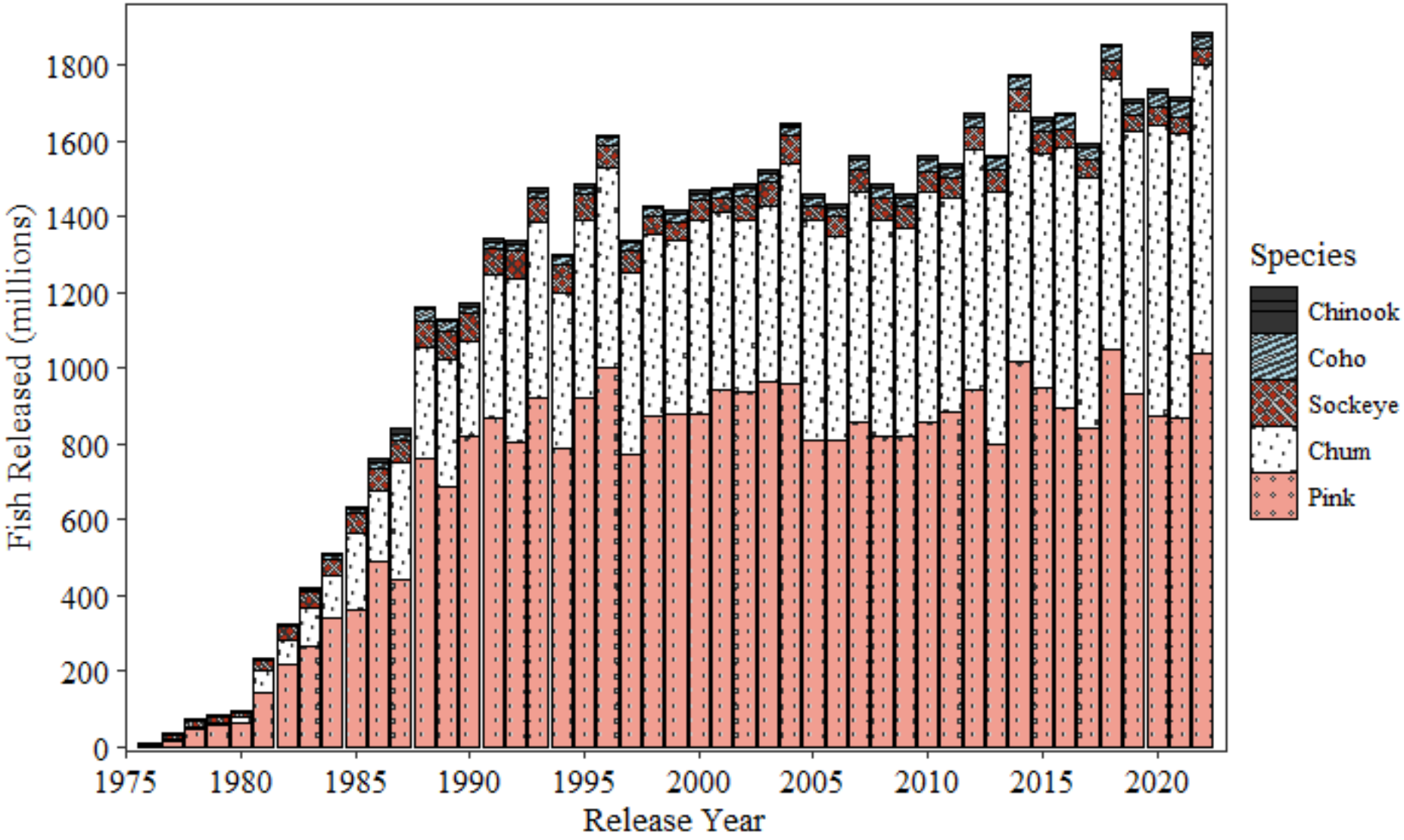
*Note:* SSRAA = Southern Southeast Regional Aquaculture Association; NSRAA = Northern Southeast Regional Aquaculture Association; AKI = Armstrong-Keta Inc.; DIPAC = Douglas Island Pink and Chum, Incorporated; SSSC = Sitka Sound Science Center; PWSAC = Prince William Sound Aquaculture Association; VFDA = Valdez Fisheries Development Association, Inc.; CIAA = Cook Inlet Aquaculture Association; KRAA = Kodiak Regional Aquaculture Association.

[a] Inactive.

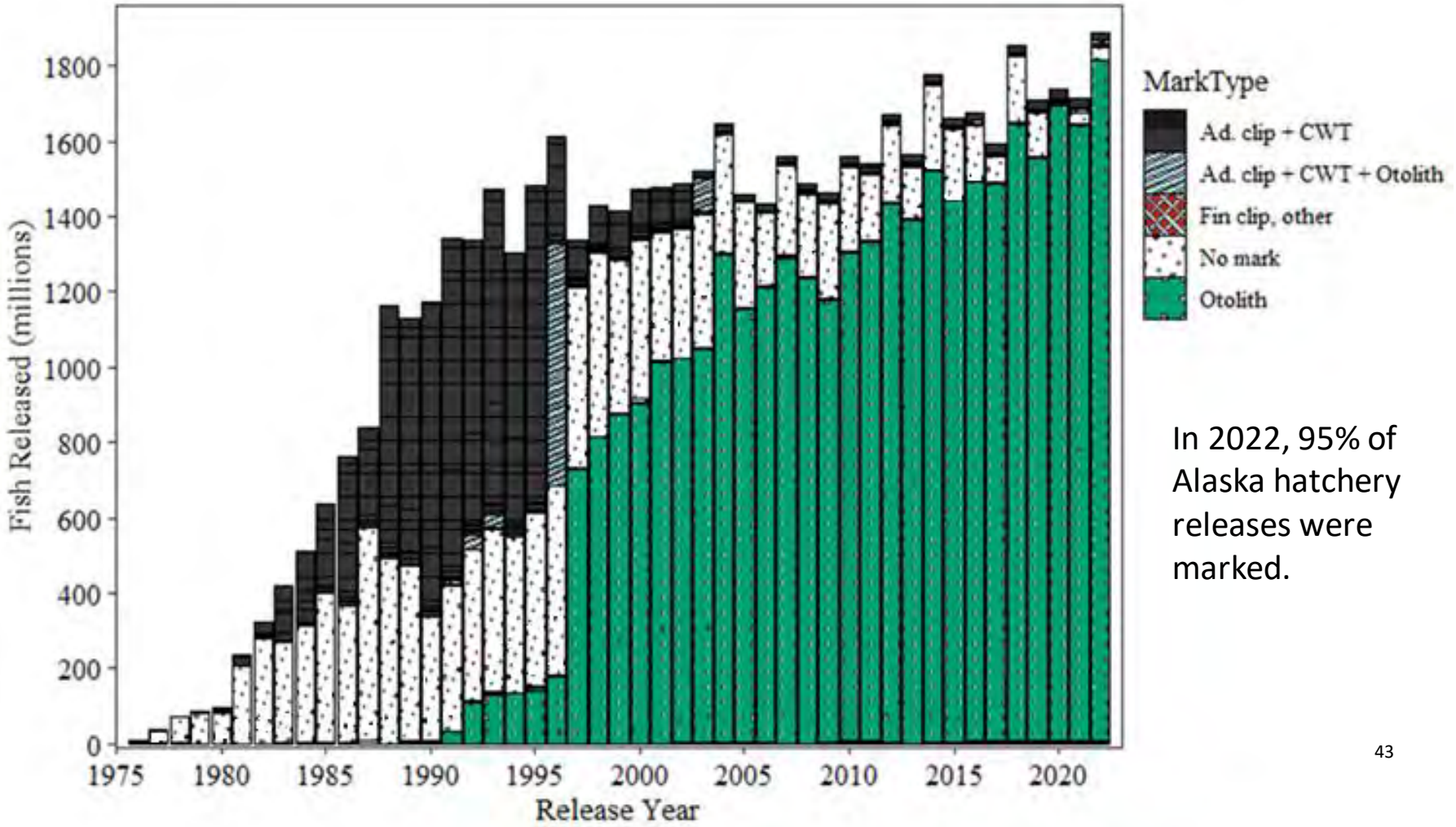
[b] Port Armstrong can take up to 6.0 million Chinook and coho salmon eggs in combination, not to exceed 2.0 million Chinook salmon eggs. Egg capacity is broken out by species in table cells, and the coho capacity but not the Chinook capacity are added in the totals.

[c] Little Port Walter operated by AKI is under a use agreement with NMFS. Little Port Walter operated by NMFS is under Aquatic Resource Permits and not a PNP permit and does not have a permitted capacity.

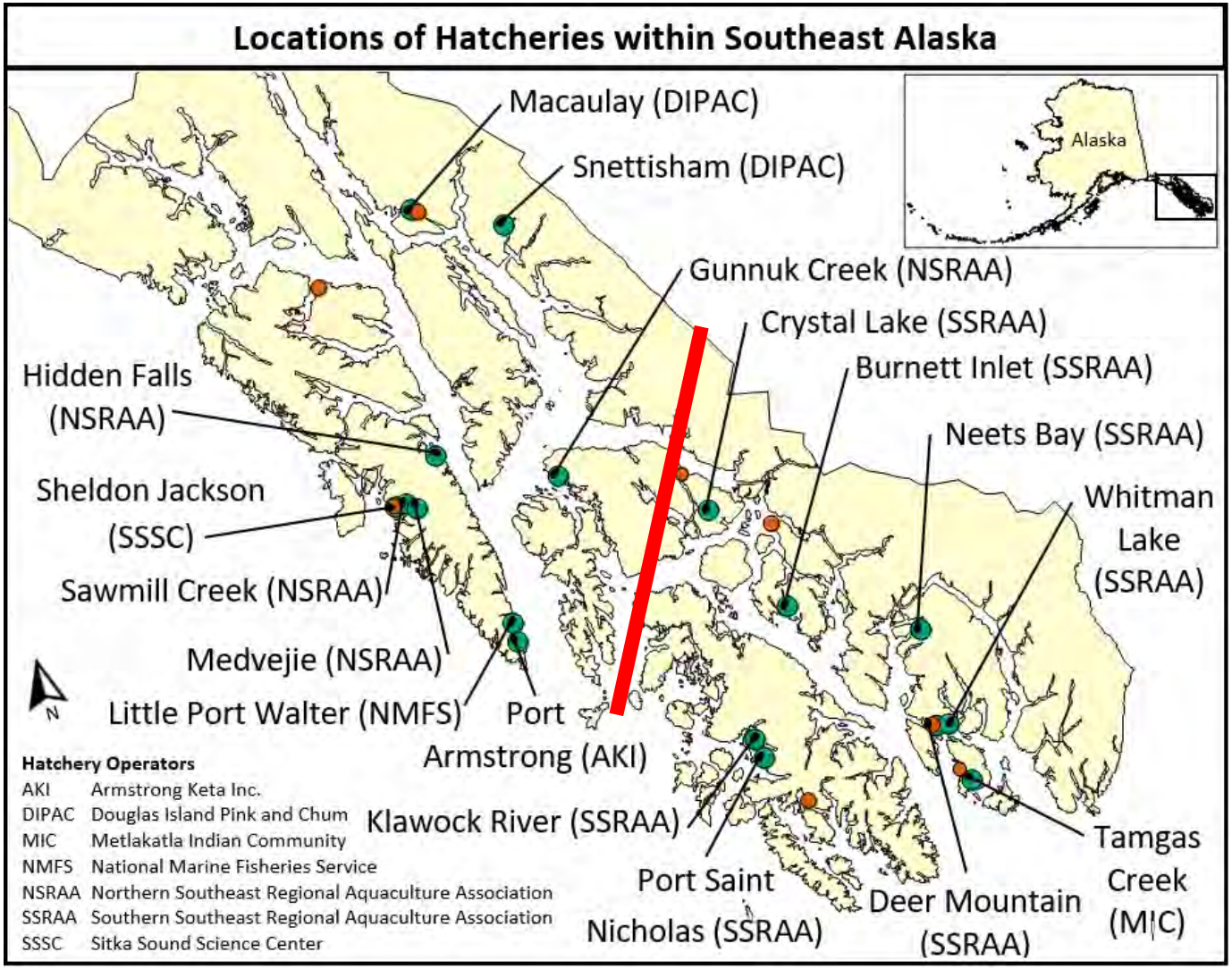
# Statewide hatchery production, 1975–2022



# Statewide hatchery production by mark type, 1975–2022




In 2022, 95% of Alaska hatchery releases were marked.




<u>Southern Southeast</u>

SSRAA

- Burnett Inlet
- Neets Bay
- Whitman Lake
- Deer Mountain
- Klawock River[S]
- Port Saint Nicholas
- Crystal Lake Hatchery[S]*

MIC

- Tamgas Creek*

<u>Northern Southeast</u>

NSRAA

- Gunnuk Creek
- Hidden Falls[S]
- Medvejie Creek
- Sawmill Creek

AKI

- Port Armstrong

DIPAC

- Macaulay
- Snettisham[S]

SSSC

- Sheldon Jackson

NMFS

- Little Port Walter*

*Non-PNP

[S]State-owned

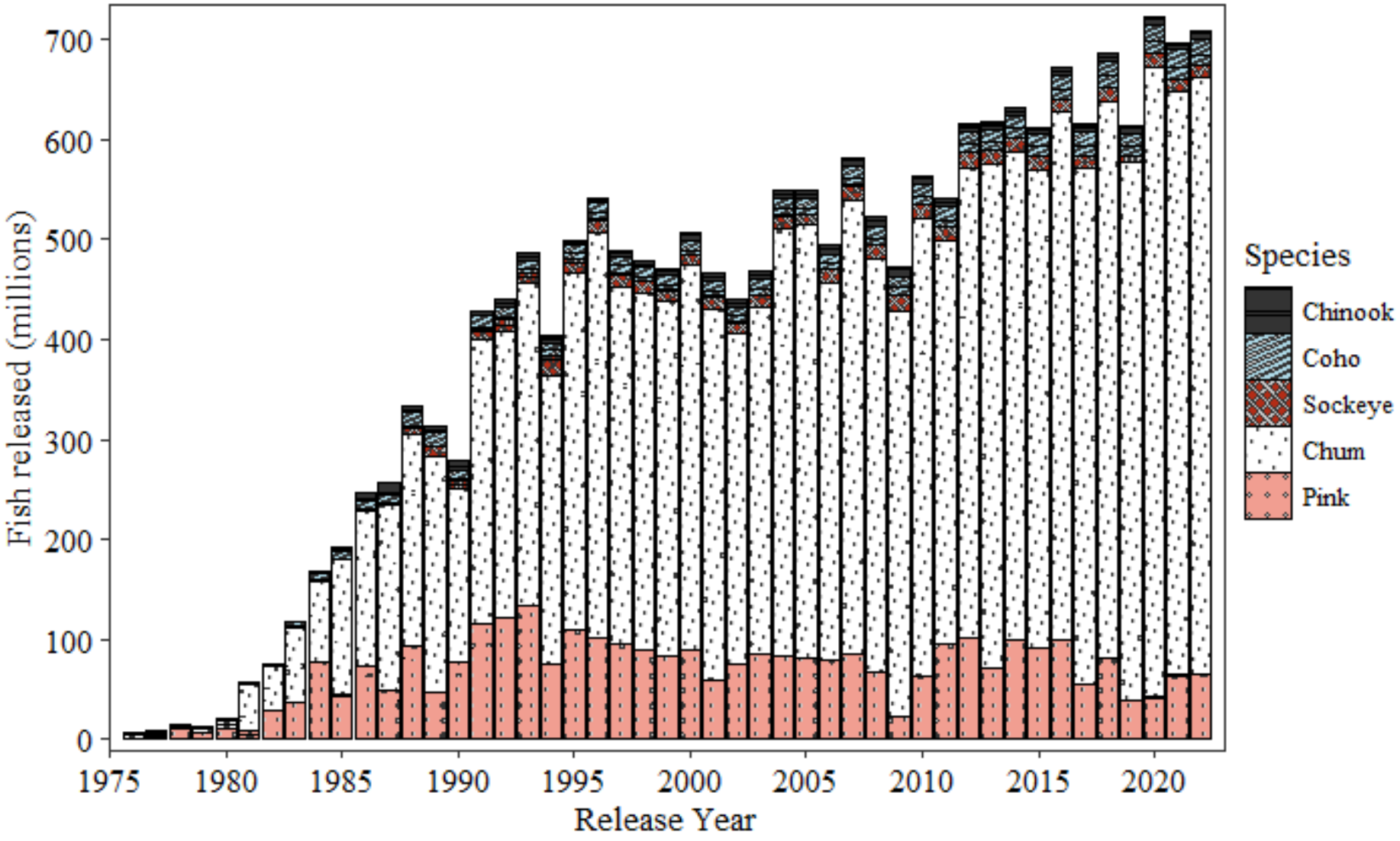
# PNP Permit Alteration Requests and Applications

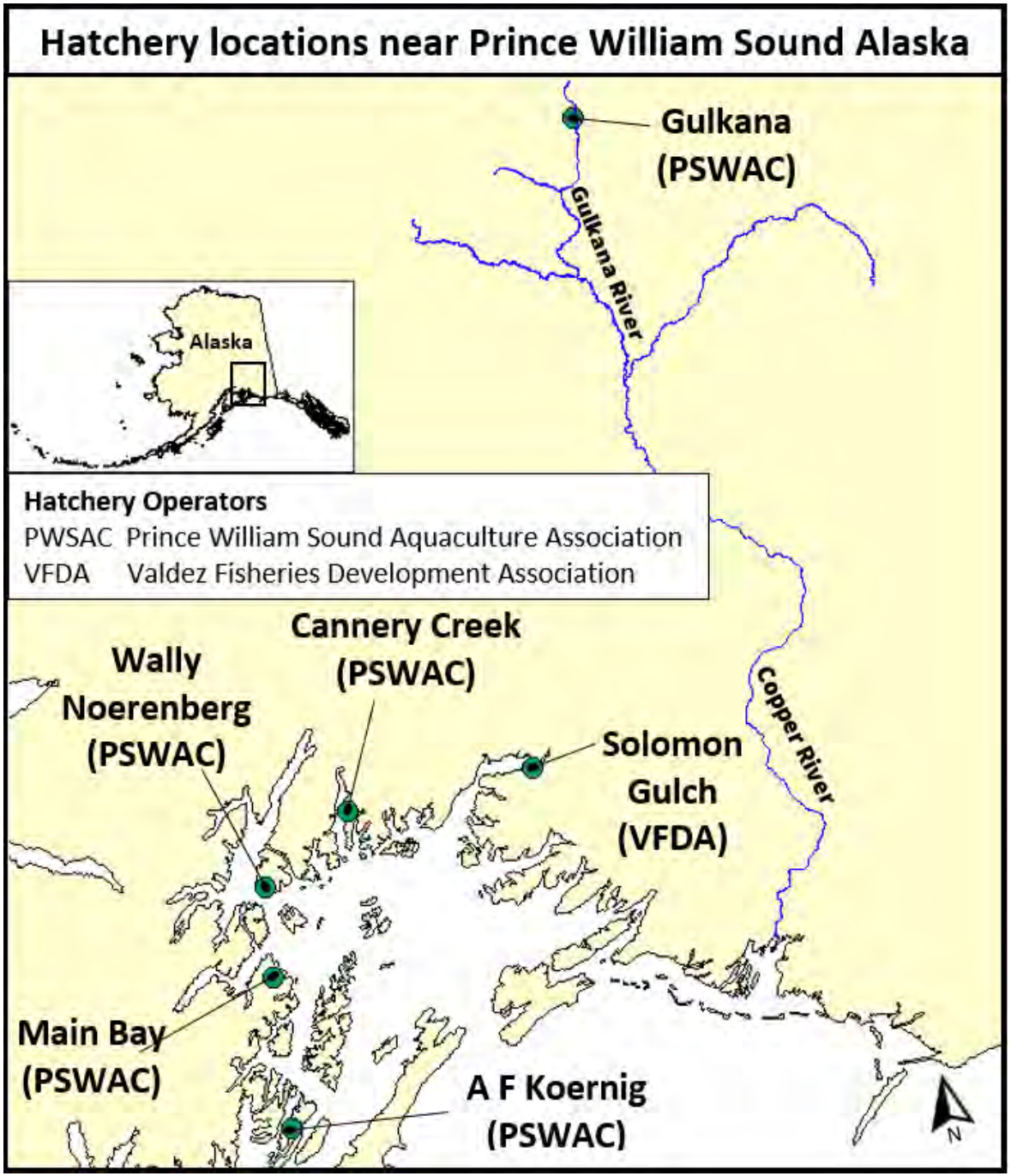
In 2023, all were in Northern Southeast:

- Hidden Falls Hatchery (HFH) PNP permit #28 was altered to allow up to 40 million chum salmon green eggs to be taken at HFH on behalf of the Port Armstrong Hatchery PNP Permit #13 for release at HFH permitted release sites.
  - There was no overall change in permitted egg capacity.

- Northern Southeast Regional Aquaculture Association started the application process for a PNP Permit to operate Little Port Walter Hatchery.

# Southeast hatchery production, 1975–2022






PWSAC

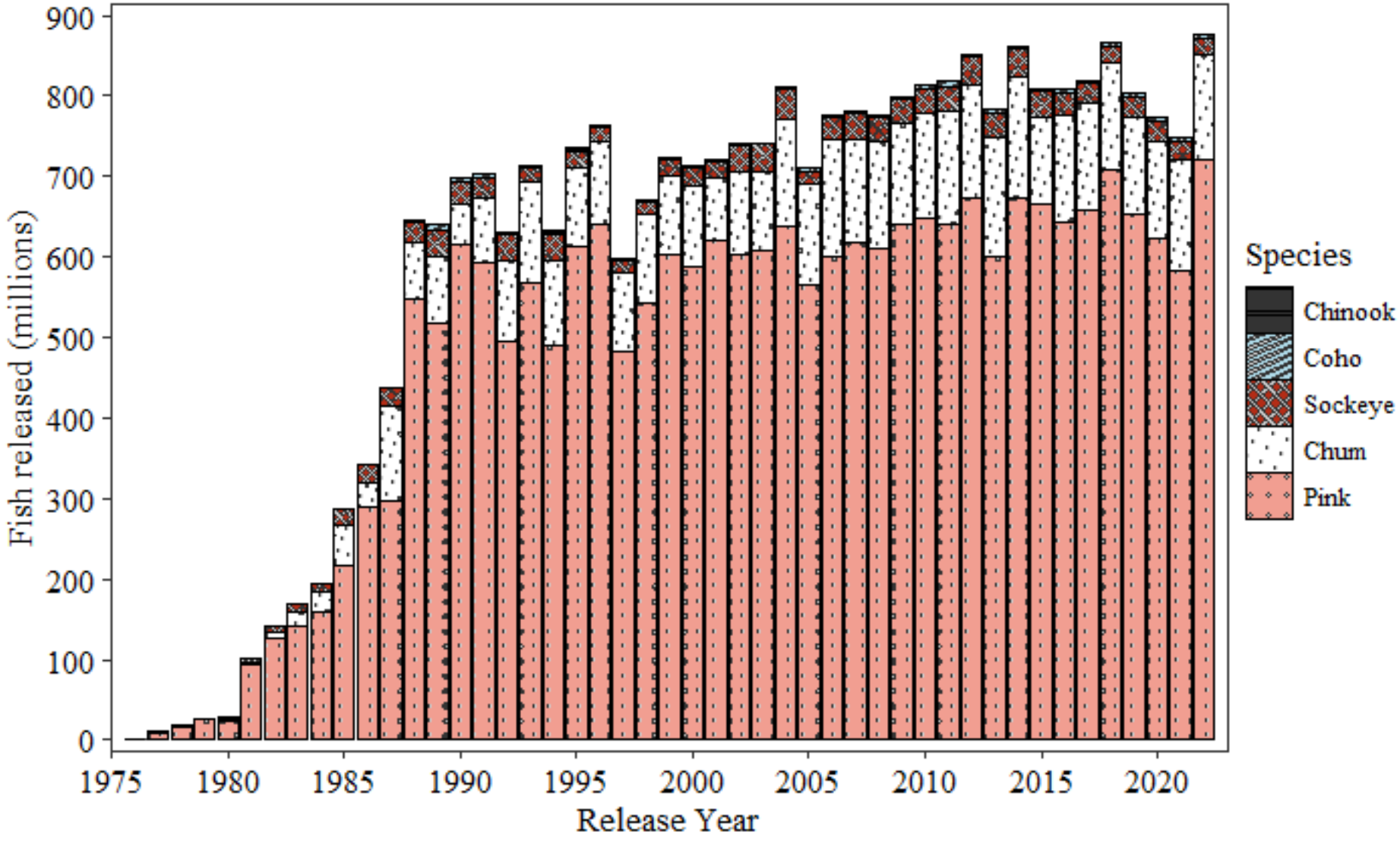
- Armin F. Koernig
- Main Bay[S]
- Wally Noerenberg
- Cannery Creek[S]
- Gulkana[S]

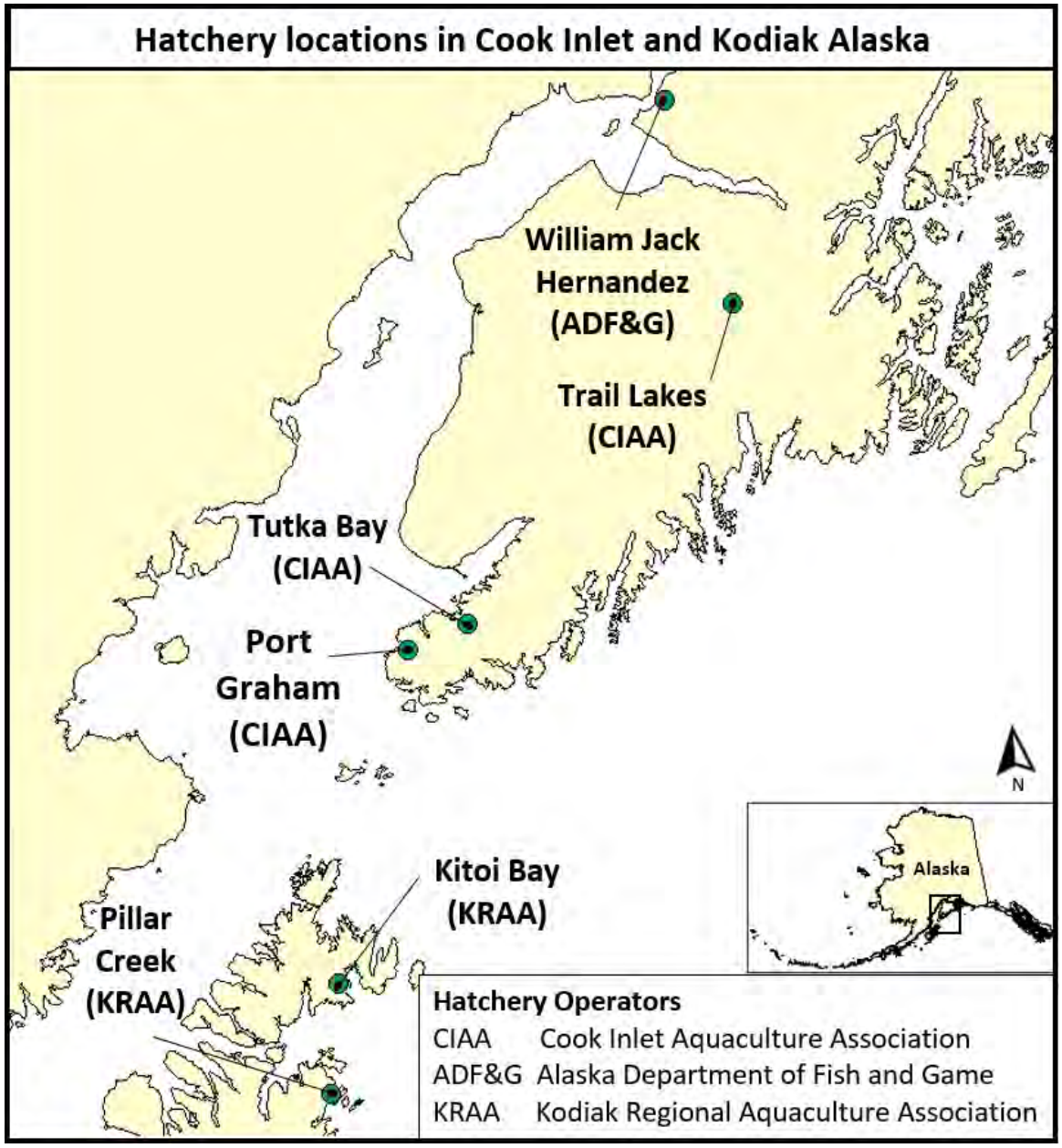
VFDA

- Solomon Gulch Hatchery

[S] State-owned

# Prince William Sound hatchery production, 1975–2022






**Cook Inlet**

Cook Inlet Aquaculture Association (CIAA)

- Trail Lakes[S]
- Tutka Bay Lagoon[S]
- Port Graham

ADF&G Sport Fish

- William Jack Hernandez Sport Fish Hatchery*

**Kodiak**

Kodiak Regional Aquaculture Association (KRAA)

- Kitoi Bay[S]
- Pillar Creek[S]

**Interior** (not shown)

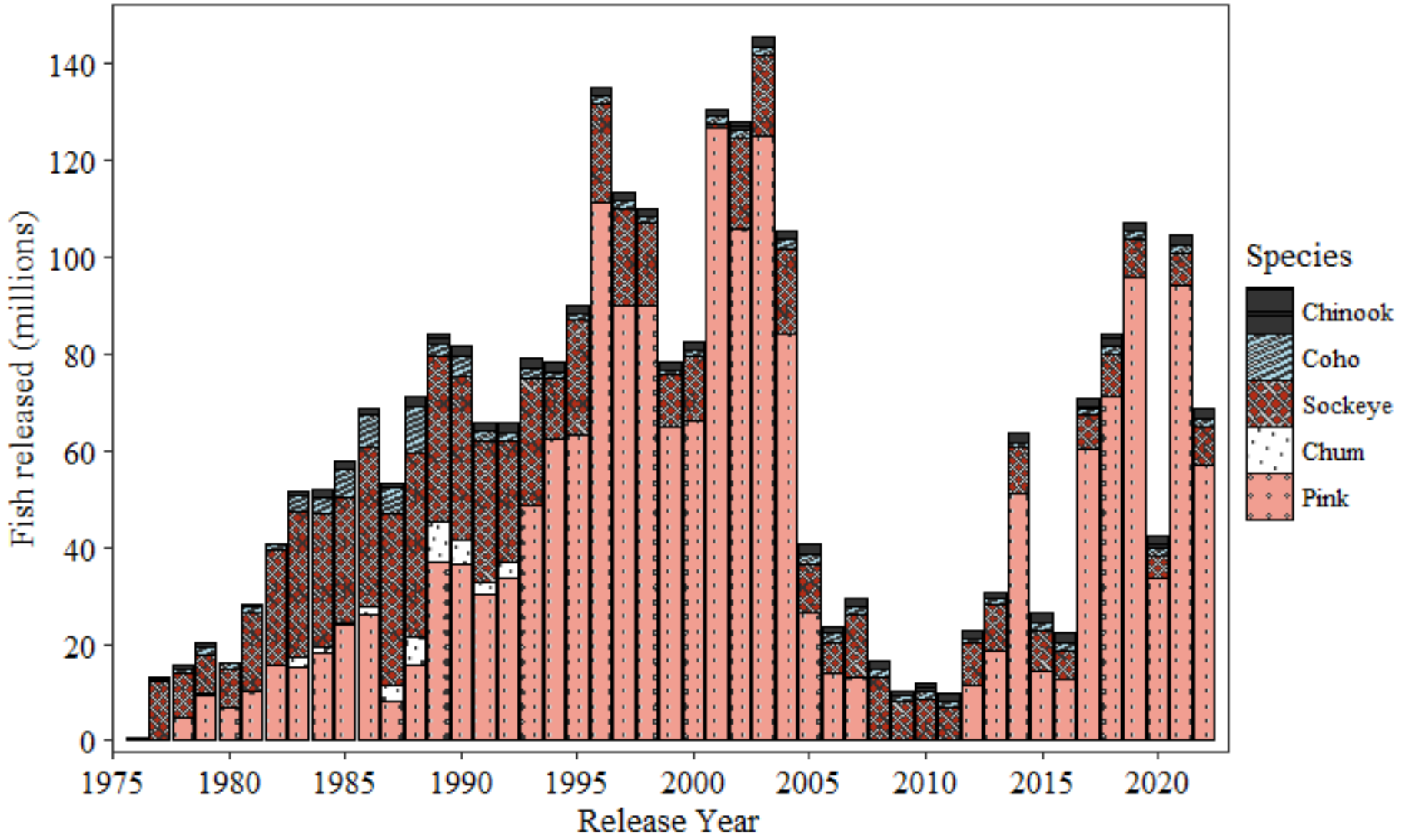
ADF&G Sport Fish

- Ruth Burnett Sport Fish Hatchery*

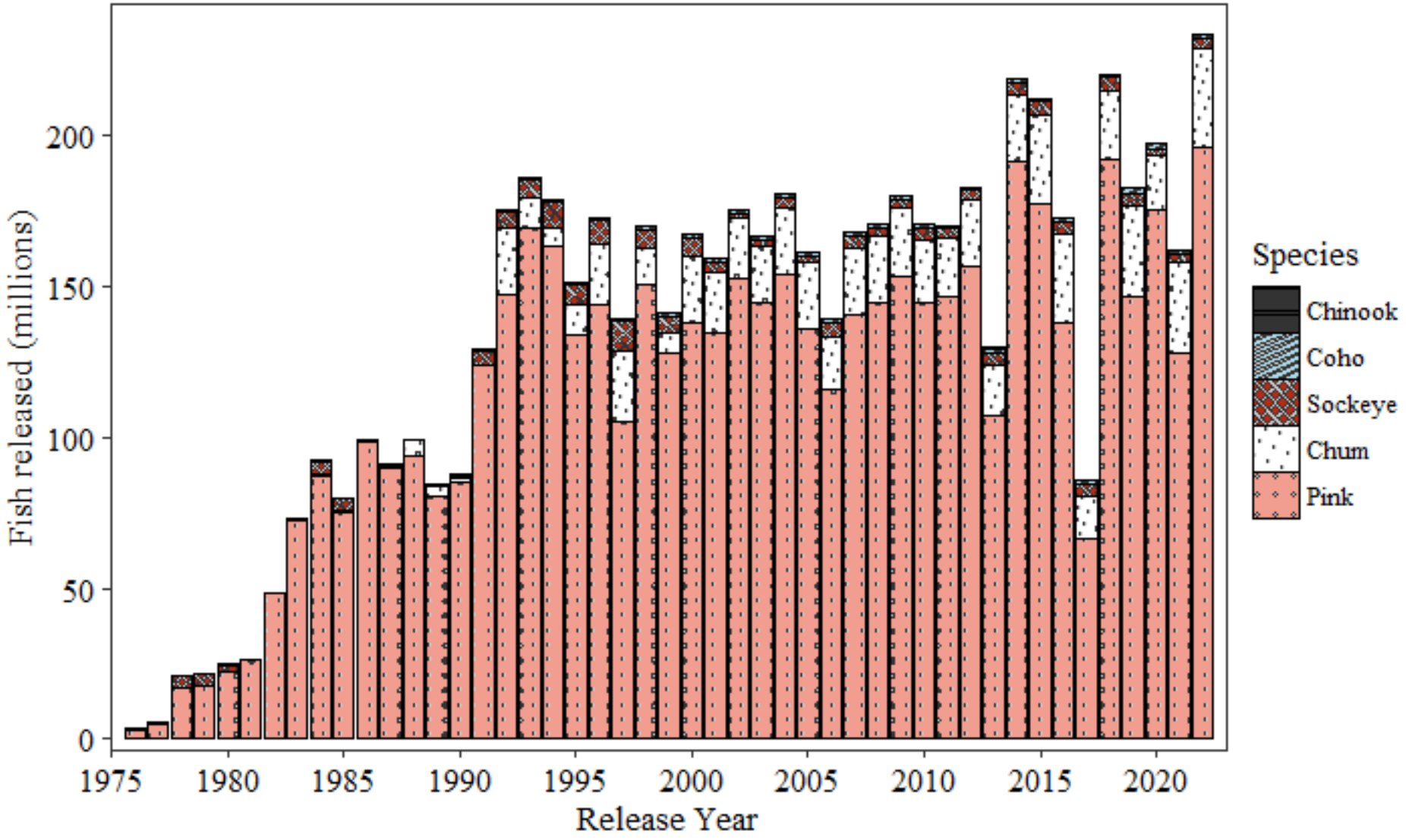
[S] State-owned

*Non-PNP

# Cook Inlet hatchery production, 1975–2022



# Kodiak hatchery production, 1975–2022



# Indices of Survival from Annual Report Totals by Species

- Freshwater survival is greater in hatcheries than in the wild.
- Marine survival of hatchery-produced salmon is underestimated and is comparable to wild-origin fish.

| Species | Egg take year | Estimated # of eggs taken | Release year | Number of fish released | Egg to release (%) | Attributable returns in 2022 | Release to return (%) |
|---|---|---|---|---|---|---|---|
| Pink | 2020 | 982,577,607 | 2021 | 870,554,004 | 89% | 28,558,753 | 3.3% |
| Chum | Average of 2017 and 2018 | 821,507,000 | Average of 2018 and 2019 | 693,244,152 | 84% | 12,319,678 | 1.8% |
| Sockeye | Average of 2017 and 2018 | 68,603,500 | Average of 2018 and 2019 | 45,201,383 | 66% | 1,488,313 | 3.3% |
| Coho | 2019 | 47,027,862 | 2021 | 36,899,653 | 78% | 844,111 | 2.3% |
| Chinook | Average of 2016 and 2017 | 13,100,525 | 2018 and 2019 | 10,289,390 | 79% | 85,734 | 0.8% |

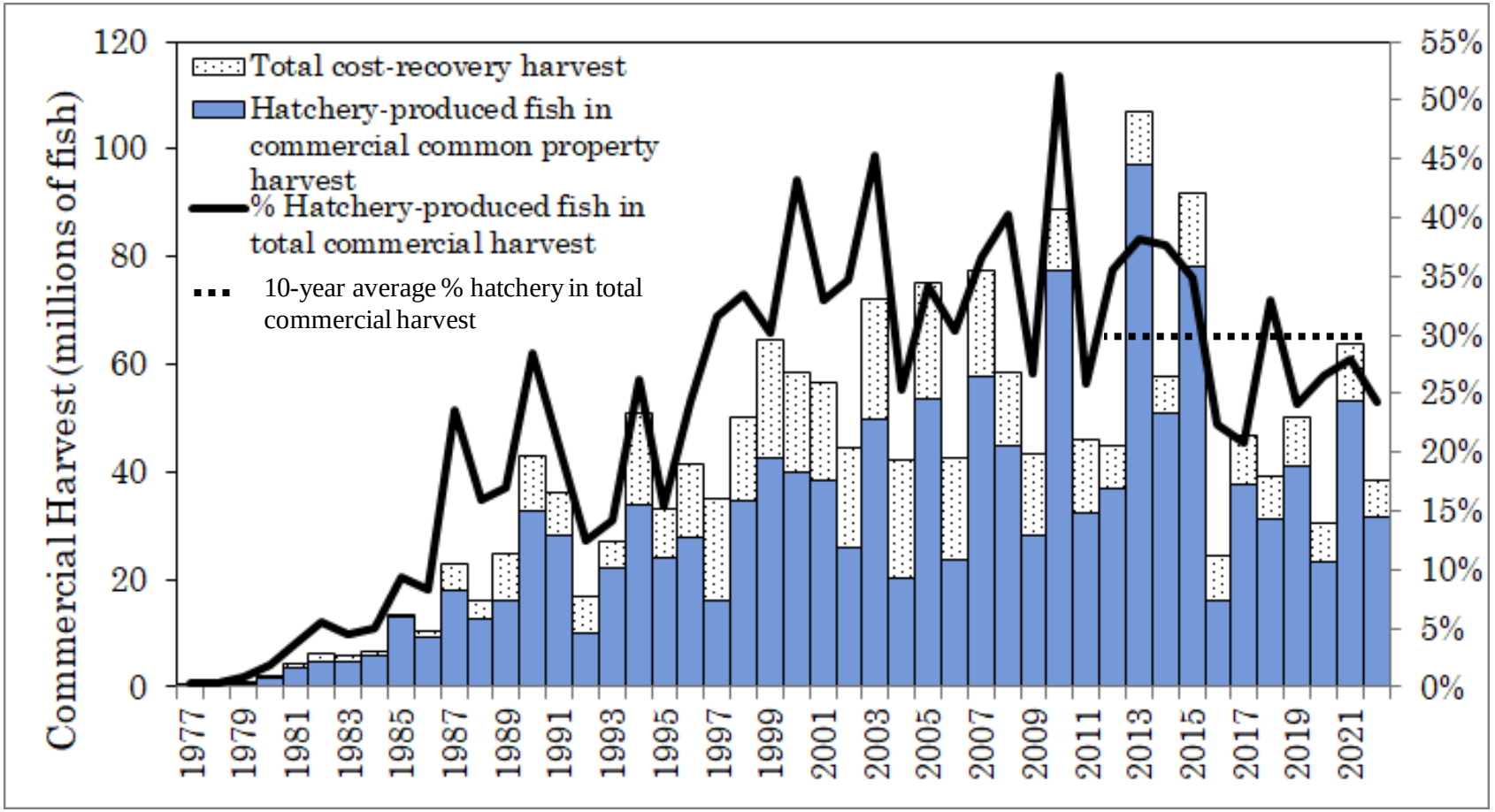
Sockeye typically spend a year rearing in a lake before migrating to sea.
Release to return percentages are minimum values. Harvest is not always attributed to origin (for example, in some sport and mixed stock fisheries for sockeye, coho, and Chinook salmon).

Wild/naturally rearing fish (Quinn, Table 15-1)

Egg to fry/smolt survival
- Pink = 11.5%
- Chum 12.9%
- Sockeye = 2.1%
- Coho = 1.8%
- Chinook = 10.4%

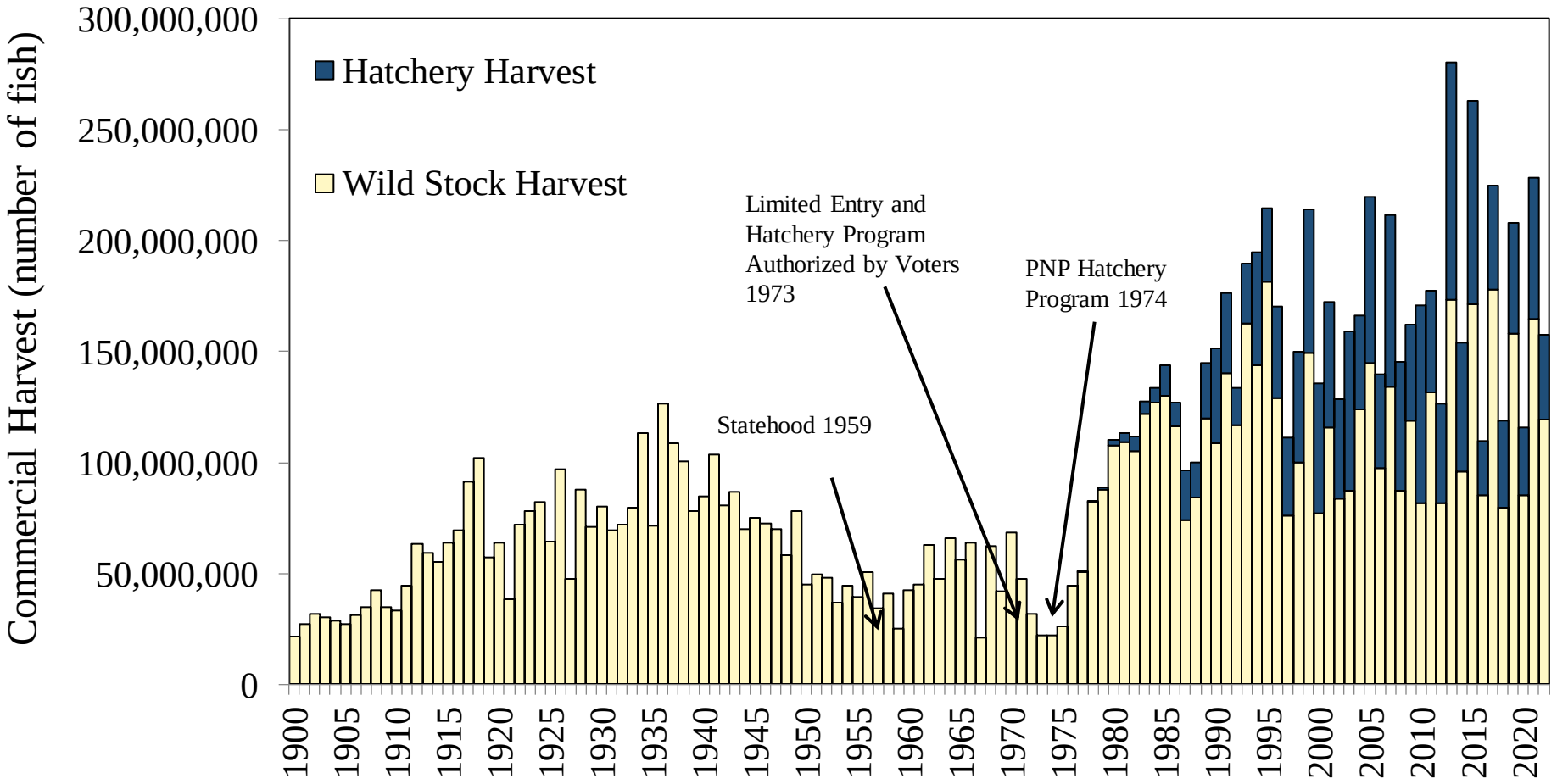
Smolt to adult survival:
- Pink = 2.8%
- Chum 1.4%
- Sockeye = 13.1%
- Coho = 10.4%
- Chinook = 3.1%

# Statewide hatchery contributions to commercial fisheries




Hatcheries contributed 25% of the statewide commercial salmon harvest in 2022.

# Alaska's commercial salmon harvest, 1900–2022



# Some recent concerns and research

**Alaska Hatchery Research Project** (ongoing): http://www.adfg.alaska.gov/index.cfm?adfg=fishingHatcheriesResearch.main
**Ocean Ecology**: ADF&G hired its first scientist for salmon ocean ecology in 2020.
**Release strategies (SEAK)**: Predators of released salmon, such as whales and sablefish, may have reduced survival.

- In response, some hatcheries tow net pens or transport in a vessel a portion of post-smolt juvenile salmon offshore before release to avoid near-shore predators and increase survival.
- Because of the concern that transport could impact imprinting, FTPs were approved with conditions such as maximum travel distance and requiring evaluation of impacts of transport on homing behavior.

**Tagging:** SEAK hatcheries started using tagging trailers to increase tag rates of Chinook salmon and increase data confidence.
**Predator survey (NSRAA):** Near-shore fish species' composition, biomass, and isotopies were surveyed to investigate the cause of declining salmon marine survival
**Maturity age shifts (NSRAA):** High proportions of age 3 chum salmon returns complicated forecasting. Does early-life growth from scale measurements relate to age shifts?
**Homing and imprinting (NSRAA, SSSC, NOAA, and UA):** Can amino acids derived from kelp and red algae improve homing efficiency of chum salmon?
**Plankton studies and monitoring (SSRAA, PWSAC)**: Can phytoplankton bloom timing predict zooplankton bloom timing to optimize release timing?
**Site suitability for aquaculture (SSRAA, UA)**: Developing an understanding of currents, nutrients, seasonal variability in temperature, and salinity for potential aquaculture at salmon hatchery release sites.
**Reduced non-hatchery fishery enhancement (CIAA):** Non-hatchery fishery enhancement projects, fertilization at Leisure Lake and Bear Lakes, and Delight Lake weir operation, were suspended for budgetary reasons. Other non-hatchery fishery enhancement projects (pike eradication, beaver dam monitoring, flow control monitoring to provide for enough water in streams for fish to reach spawning areas, and culvert monitoring) are ongoing.
**Predator deterrence/exclusion (PWSAC, AKI, DIPAC):** Mammals (*e.g.* sea lions) have been observed in increasing numbers in terminal areas (*e.g.*, in 2022, they consumed an estimated 8800 pounds of fish/day at Wally Noerenberg Hatchery). Methods such as exclusion devices (a cone) on buoys to prevent sea lions from hauling-out and acoustic seal fences are being trailed to protect broodstock.

# Thank you