SALMON HATCHERIES FOR ALASKA

February 24, 2024

Board of Fisheries
Alaska Department of Fish and Game
1255 W. 8th Street
Juneau, AK 99811

Dear Members of the Board of Fisheries,

We are writing on behalf of Salmon Hatcheries for Alaska to inform you of the recent presentations given to the House Fisheries Committee in the Alaska State Legislature on February 6, 2024. These presentations, provided by the Alaska Department of Fish and Game (ADF&G), offer valuable insights into the complexities of Alaska's salmon hatchery production and its implications for our state's fisheries. Additional contributors to these presentations: Bill Templin, Chief Scientist for ADF&G Commercial Fisheries; Dr. Andrew Munro.

Presentation by Lorna Wilson - *Alaska Department of Fish and Game (ADF&G) Literature on Hatcheries & Alaska's Hatchery Program.* This presentation can be viewed here: https://www.akleg.gov/basis/get_documents.asp?session=33&docid=28426

Presentation by Dr. Katie Howard - *Understanding Potential Contribution of Alaska Salmon Hatchery Production to Competition at Sea.* This presentation can be viewed here: https://www.akleg.gov/basis/get_documents.asp?session=33&docid=28427

We have selected a small number of particularly relevant slides from these presentations to highlight in this RC. The full presentations offer a more comprehensive understanding of the scope of Alaska salmon hatchery production in the context of the North Pacific Ocean. Additionally, these presentations speak to competition at sea and highlight key findings and data that underscore the importance of evidence-based decision-making in managing Alaska's hatchery programs.

We urge the Board of Fisheries to carefully consider the information presented in these documents as you deliberate on Alaska's salmon hatchery production matters. Informed decision-making grounded in scientific research and data is paramount to ensuring the long-term sustainability of our state's fisheries. Thank you for your attention to this matter.

RC Submitted by Salmon Hatcheries for Alaska

Good Decisions Need Clear Objectives and Expectations

1. What is the intended outcome?
   - Reduce competition for food on the high seas where many stocks and species are co-mingling?
   - Reduce competitive interactions (food, breeding space, etc.) between wild and hatchery stocks in local areas where hatchery fish are concentrated as fry or adults?
2. What levers are available for each of these scenarios?
   - Which levers to use?
   - How far to move them?
   - How big of an effect will it have?
3. What are the risks, trade-offs, and benefits of a particular action?
   - Precautionary actions consider biological, cultural, social, and economic factors

Example: Exploring the AK pink salmon hatchery lever to address high seas competition for food

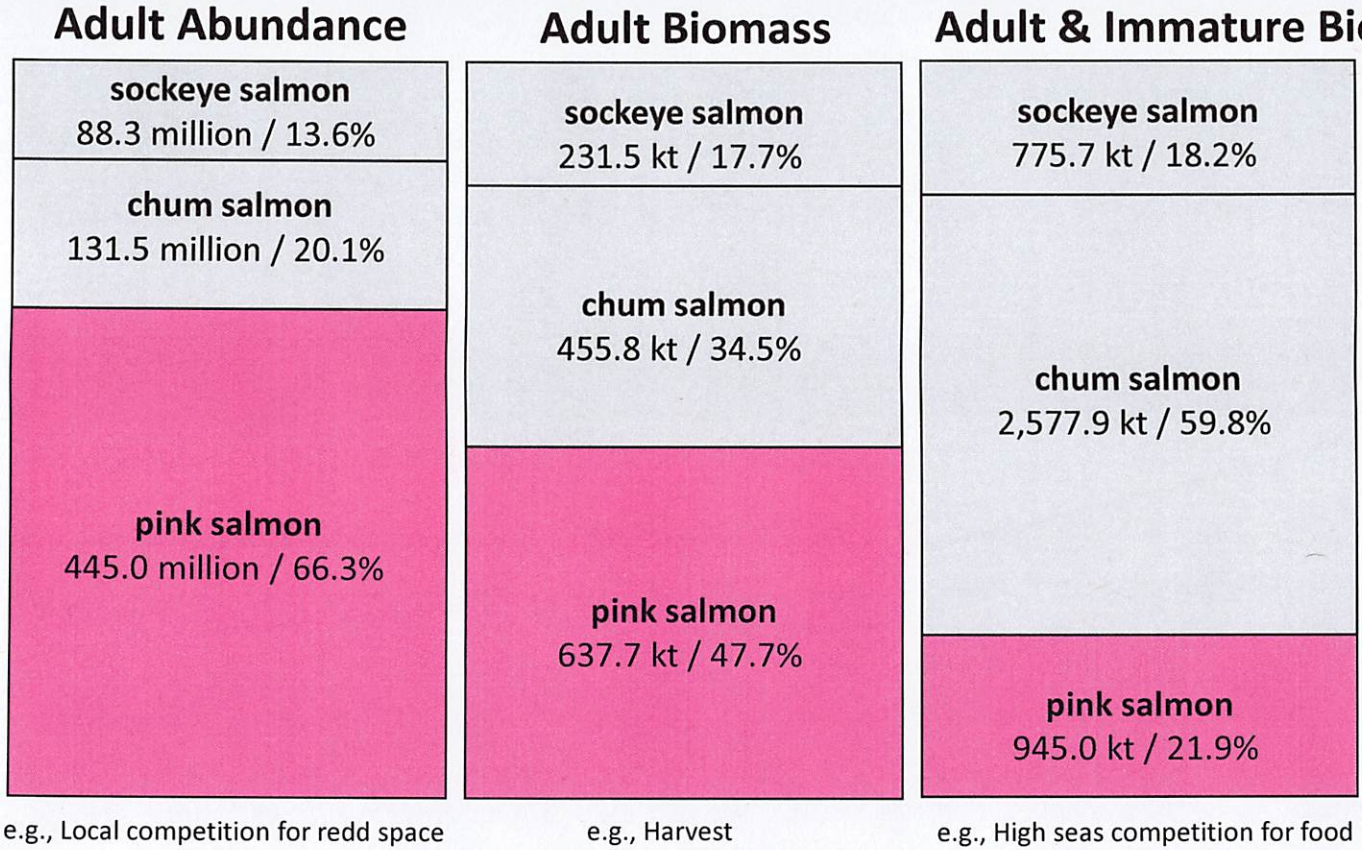
This is partly a function of:

- The relative abundance of pink salmon compared to other species with overlapping diets
- How much of the pink salmon are hatchery-origin fish?
- How much of the hatchery-origin pink salmon come from Alaska hatcheries?

Best source of data:

- Ruggerone & Irvine (2018) Numbers and Biomass of Natural and Hatchery-Origin Pink, Chum and Sockeye Salmon
  - Most comprehensive assessment of available data
  - Used by majority of studies of at sea competition
  - Provide estimates of
    - Hatchery and wild
    - Major species only: pink, chum, sockeye
    - Adult abundance and biomass
    - Adult and immature (total) biomass
    - Cannot account for overlapping non-salmon species in the North Pacific Ocean that share food resources

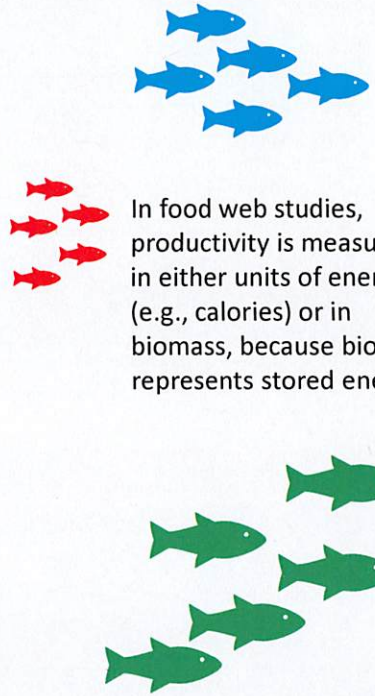
Understanding Different Hatchery + Wild Measurements



e.g., Local competition for redd space

e.g., Harvest

e.g., High seas competition for food

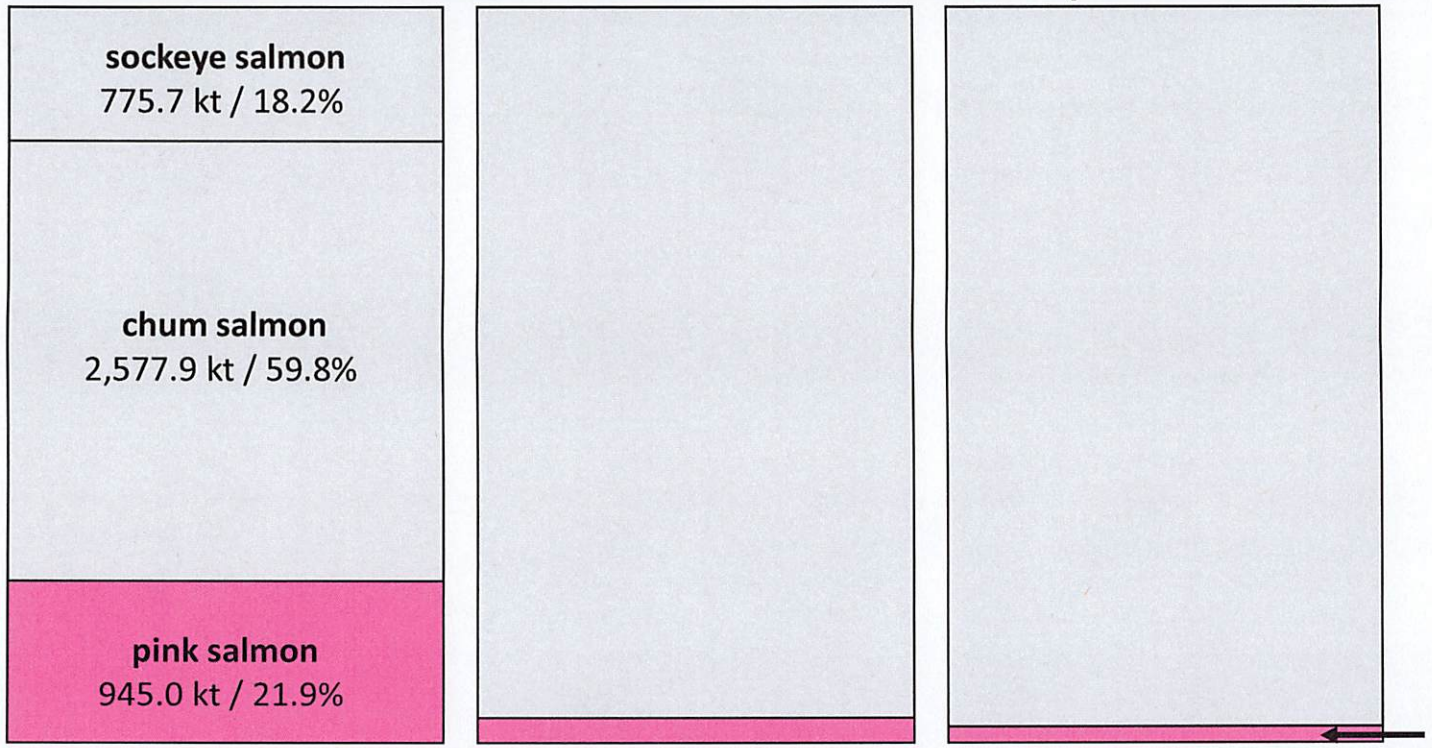


In food web studies, productivity is measured in either units of energy (e.g., calories) or in biomass, because biomass represents stored energy

1990-2015 from Ruggerone & Irvine (2018) supplementary data

Size of the Hatchery Pink Salmon Lever

Total Adult & Immature Biomass in North Pacific (1990–2015)



***The size of the lever will be different if the intended outcome is focused on local areas/impacts**

1990-2015 from Ruggerone & Irvine (2018) supplementary data

Alaska Prioritizes Wild Stocks

Fisheries Management

Salmon released from Alaska hatcheries return to terminal areas with reasonable segregation from wild stocks. This allows for fisheries to be managed for wild stock escapement (*i.e.*, close fisheries as needed to ensure enough salmon return to spawn and sustain wild-stock fisheries and populations into the future).

Genetic Policy (Davis et al. 1985) http://www.adfg.alaska.gov/FedAidPDFs/FRED.GeneticsPolicy.1985.pdf

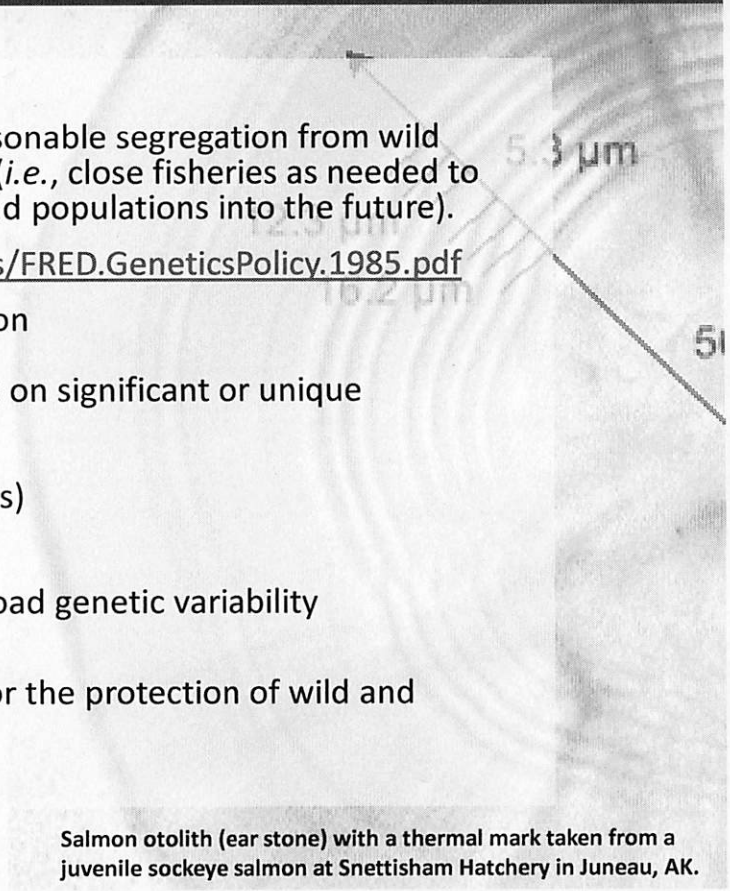
Use appropriate local stocks, recognizing the importance of local adaptation
Provisions for protecting wild stocks:

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

Provisions for 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 to ensure genetic diversity

Fish Health: The Pathology Lab oversees the health of fish at hatcheries for the protection of wild and hatchery stocks.



Salmon otolith (ear stone) with a thermal mark taken from a juvenile sockeye salmon at Snettisham Hatchery in Juneau, AK.

What in McMillan et al. (2023) is relevant for Alaska salmon?

Main finding: 83% of 206 papers report adverse/minimally adverse effects on wild salmonids.

U.S. (86 of 113)

Hatchery type: **Production** (132 out of 143); Alaska's sub-type is ocean ranching

Species: **Pink, chum, sockeye, coho, and Chinook** (51 of 68), 138 not species specific or other (brown trout, cutthroat trout...)

Life history: **Anadromous** (102 of 132), 78 on resident or both

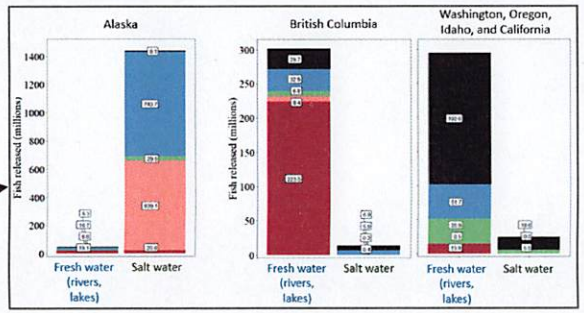
Pathway of adverse effect: Genetic (106 of 126), ecological (49 of 60), disease (2 of 2), fishery (3 of 3)

Adverse effect: diversity (86 of 102), productivity (41 of 51), abundance (11 of 13).

What was the pathway and adverse effect for Alaska's salmon?

13 papers in McMillan *et al*. (2023) relate to Alaska salmon.

5 papers relate to salmon trends in the North Pacific.



*"…**3% of hatcheries** globally … were found to benefit wild populations"*

*The percent of papers reporting an adverse impact of hatcheries on wild populations is **not** the percentage of hatcheries with an adverse impact on wild populations.*

Is McMillan et al. (2023) useful for Alaska?

What it tells us

13 papers on Alaska wild populations, **all on at-sea interactions.**

- 12 considered as hatcheries having adverse (11) or minimally adverse (1) effects; **however**
  - 7 papers found adverse effects
    - 4 use chum and pink salmon from Asian hatcheries
    - 2 use pink salmon from PWS hatcheries
    - 1 uses hatchery plus wild competitor abundance
  - 2 papers found *mixed effects (using PWS hatchery releases)*
    - No relationship with pink and Chinook salmon productivity but negative relationship with sockeye productivity
    - No relationship with pink salmon survival but negative relationship with length at age
  - 3 papers did not find adverse effects: no relationship with length at age (1), productivity/survival (2).
- 1 considered as having no effect (the only paper with at-sea sampling)

5 papers considered as having adverse effects that review salmon trends in the North Pacific.

What it does NOT tell us

- Will reducing pink salmon permitted capacity of Alaska hatcheries benefit wild-stock Alaska salmon?
- Alaska's hatchery activities adhere to ADF&G genetic, fisheries management, and pathology policies.
- Alaska hatcheries use local stocks, maintain genetic diversity of hatchery stocks, and release in terminal areas away from wild stocks.
- In Alaska, we are examining the genetic structure of pink salmon in Prince William Sound and chum salmon in Southeast, the extent of straying, and the impact of straying on wild stock fitness in the **Alaska Hatchery Research Project** (AHRP): https://www.adfg.alaska.gov/index.cfm?adfg=fishingHatcheriesResearch.findings_updates

McMillan et al. summary

- Adverse interactions are more likely to be published, reality is under-represented.
- The majority of McMillan *et al*. may be more useful outside Alaska, it is less useful for Alaska.
- This is an accounting of papers, not an analysis of the risk hatcheries pose to wild stocks.

Alaska is Critical of Hatchery Programs

McMillan, "*despite an **overwhelming body of research** showing most hatcheries programs hurt wild fish populations, it's often controversial to criticize such programs*"

It is problematic to criticize all hatchery programs as one because of the many approaches to managing hatcheries, let alone understand implications of results given the complex interactions between salmon and their environments, such as in ocean ecology.

Alaska's statutes and policies are safeguards. Critical oversight of Alaska's hatcheries ensures protection of wild-stock salmon populations into the future. **ADF&G *is* continuously critical of hatchery programs.**

Also, Alaska is investing in research to better understand salmon ocean ecology.