

## Submitted by Alaska Department of Fish and Game<sup>i</sup>.

February 24, 2024

Supplemental information related to issues raised in Proposal 43.

The most recent comprehensive estimates of the historical abundance (1925 – 2015) of pink, chum, and sockeye salmon in the North Pacific Ocean were compiled in Ruggerone and Irvine (2018). In this data set, abundance is estimated for 1) returning mature adults (i.e. catch and escapement) in both numbers and biomass and 2) total biomass in the North Pacific Ocean (i.e. mature and immature salmon combined). These abundances are further divided into hatchery-origin and wild-origin components. This is the set of data most commonly used for studies of salmon ocean ecology and competition within and among species. Recent studies have extended the data set beyond 2015 for use in their analyses by projecting abundances into additional years. However, the full set of analyses used through 2015 has not yet been repeated.

On February 6, 2024, Dr. Kathrine Howard provided a presentation titled “Understanding Potential Contribution of Alaska Salmon Hatchery Production to Competition at Sea” to the House Fisheries Special Committee of the Alaska State Legislature. The following slides from her presentation used estimates directly from the Ruggerone and Irvine (2018) data set (1990 – 2015) to explore the potential for adjustment to Alaska’s hatchery program as a means to address competition in the North Pacific Ocean (Page 2). This includes plots of the mean proportion of pink salmon (both hatchery and wild) when measured as numbers of adults, biomass of adults, and biomass of salmon of all ages (Page 3). The best understanding of potential competition uses biomass as the measure and includes all ages of pink, chum and sockeye salmon in the ocean. The last slide (Page 4) illustrates the relative biomass of pink salmon in the North Pacific Ocean, the proportion of pink salmon from hatcheries, and the proportion of pink salmon that originate from Alaska hatcheries.

Ruggerone, G.T. and Irvine, J.R., 2018. Numbers and biomass of natural-and hatchery-origin pink salmon, chum salmon, and sockeye salmon in the north Pacific Ocean, 1925–2015. *Marine and Coastal Fisheries*, 10(2), pp.152-168.

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

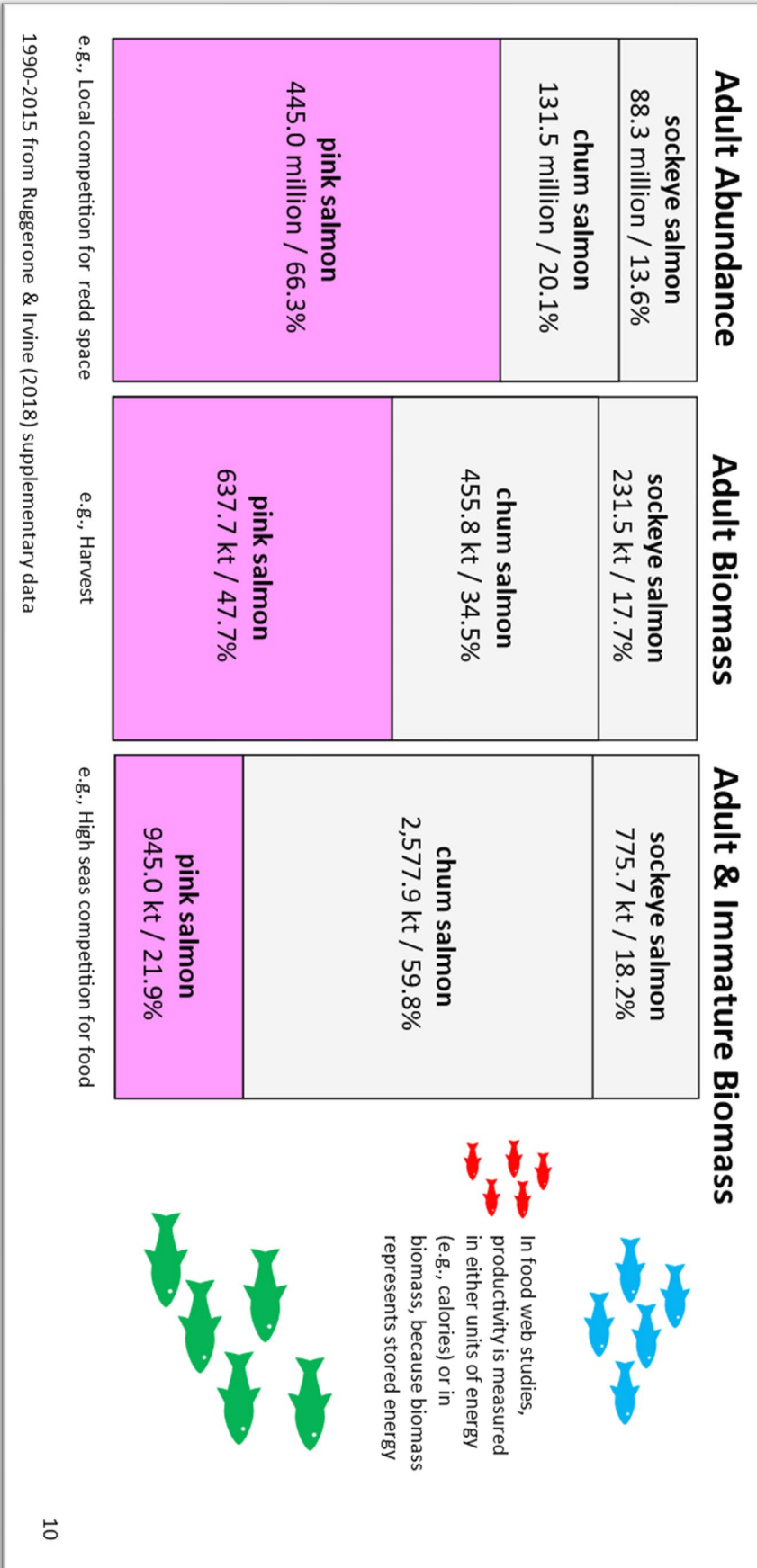
### This is partly a function of:

- 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:

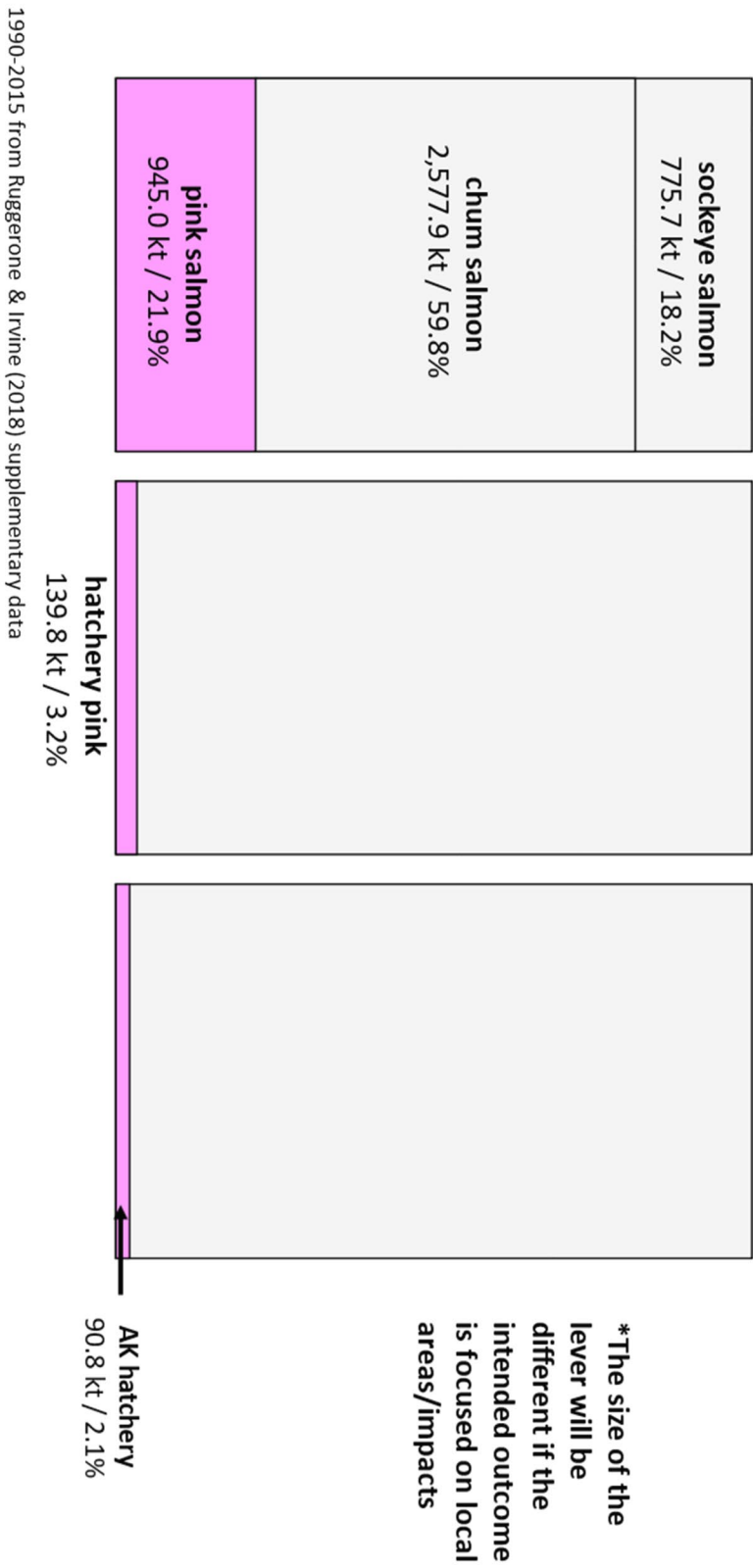
- Ruggerson & Irvine (2018) Numbers and Biomass of Natural and Hatchery-Origin Pink, Chum and Sockeye Salmon
  - Most comprehensive assessment of available data
  - Used by majority of studies of at sea competition
  - Provide estimates of
    - Hatchery and wild
    - Major species only: pink, chum, 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



# Size of the Hatchery Pink Salmon Lever

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



<sup>1</sup> Preparation of draft substitute language at the request of a Board member does not imply ADF&G support. The Department will state its position on the language during deliberation.