



# Declines in body size of Fraser River sockeye salmon and impacts on age-at-maturity, fecundity, and run timing

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## Shrinking Body Size

Body size in many eastern North Pacific salmon, including sockeye salmon, is getting smaller.<sup>1</sup>

Could be due to climate change<sup>2</sup>, increased competition<sup>2</sup>, and predation<sup>3</sup>.

We explored the consequence of decreasing size by comparing **Size** (figure 0) to:

- 1 **Fecundity**
- 2 **Age**
- 3 **Return date**



Scan to explore the data yourself!

## In the Fraser River...

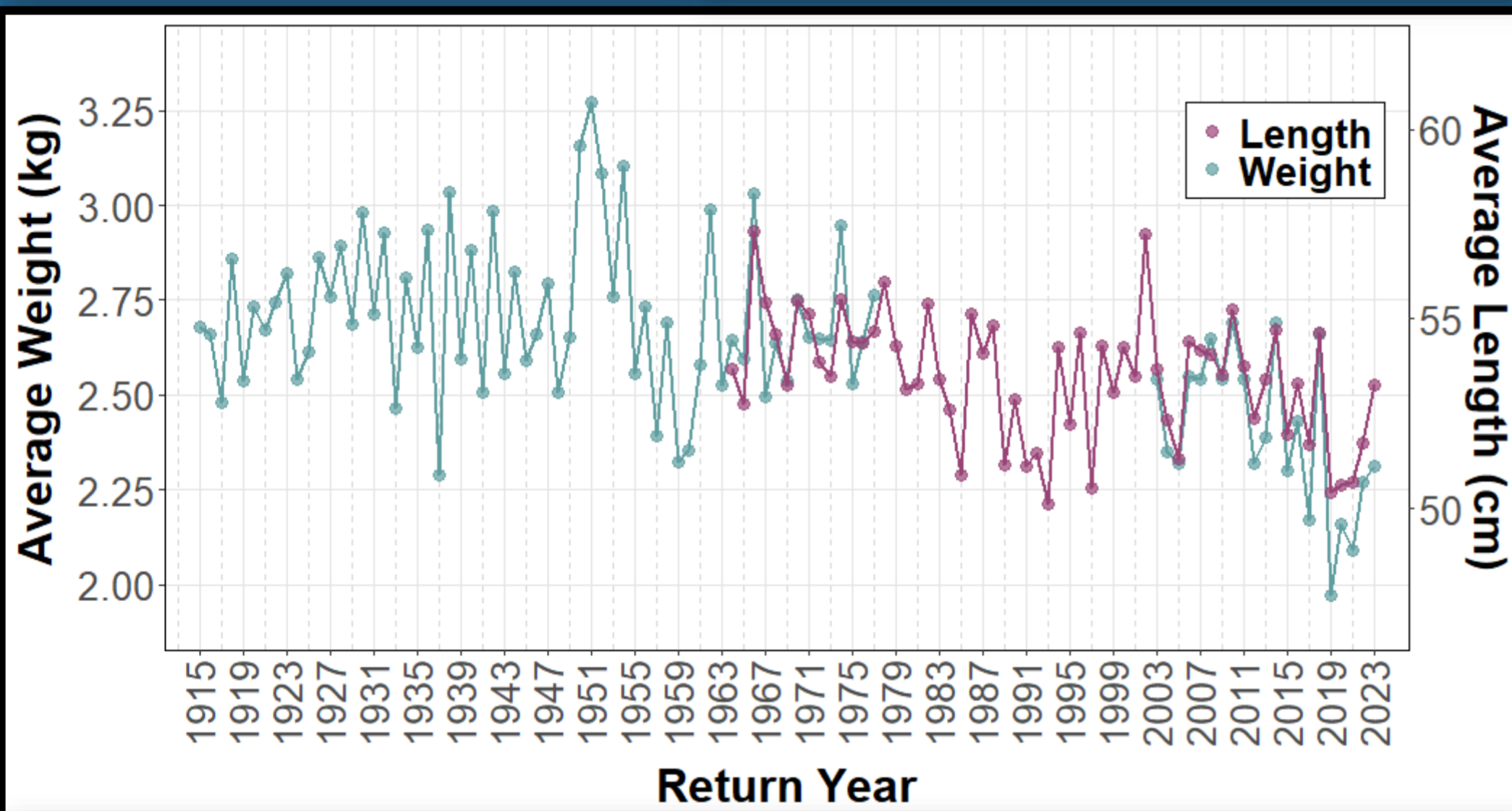


The Fraser River is located in southern British Columbia, on the west coast of Canada.

Fraser River sockeye usually spend 1-3 years in the ocean, aka their **ocean age**.

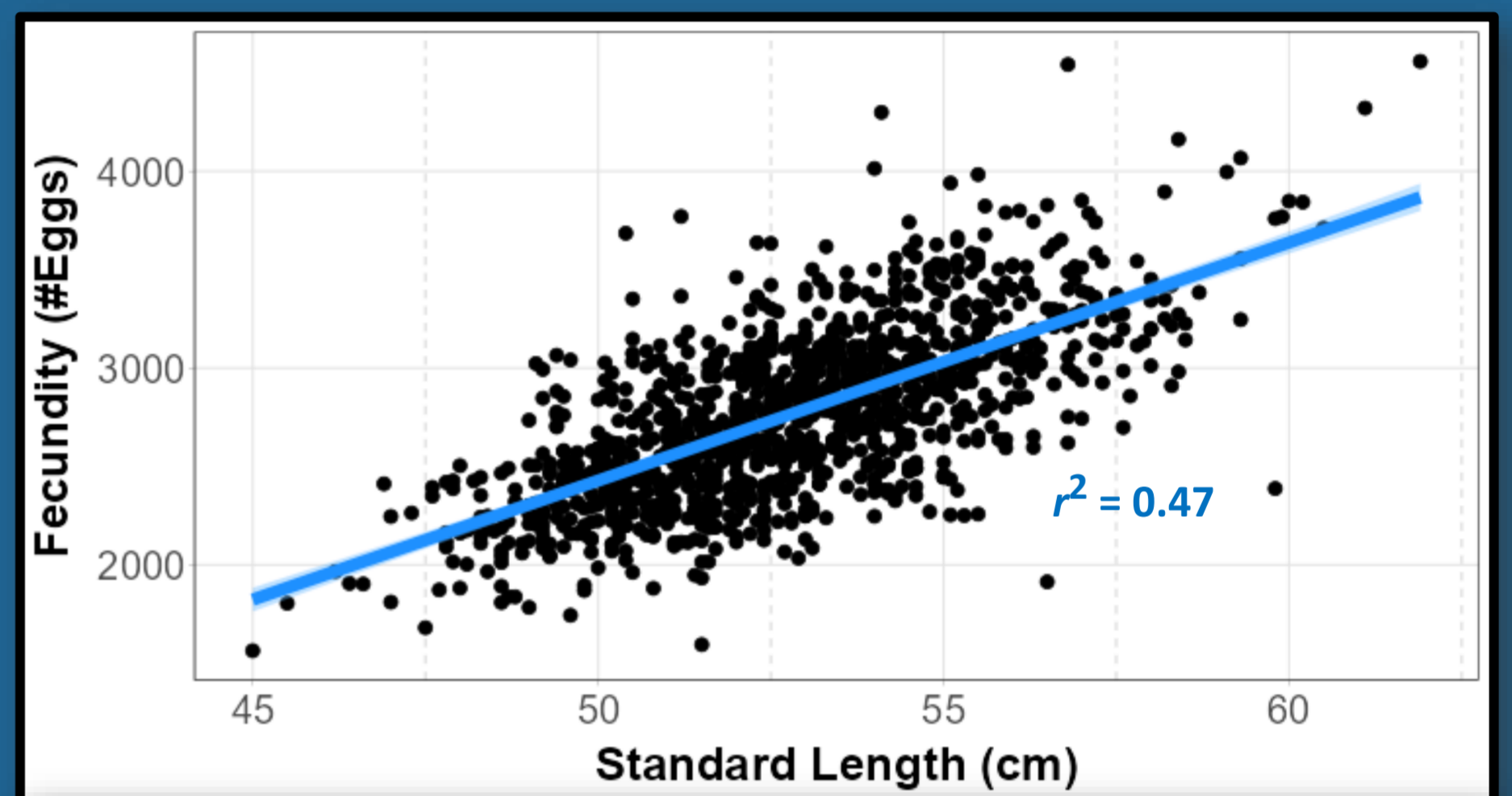
When mature, they enter the Fraser River to spawn, which happens between June and October.

Fraser River sockeye size has been decreasing in past 100 years (figure 0).

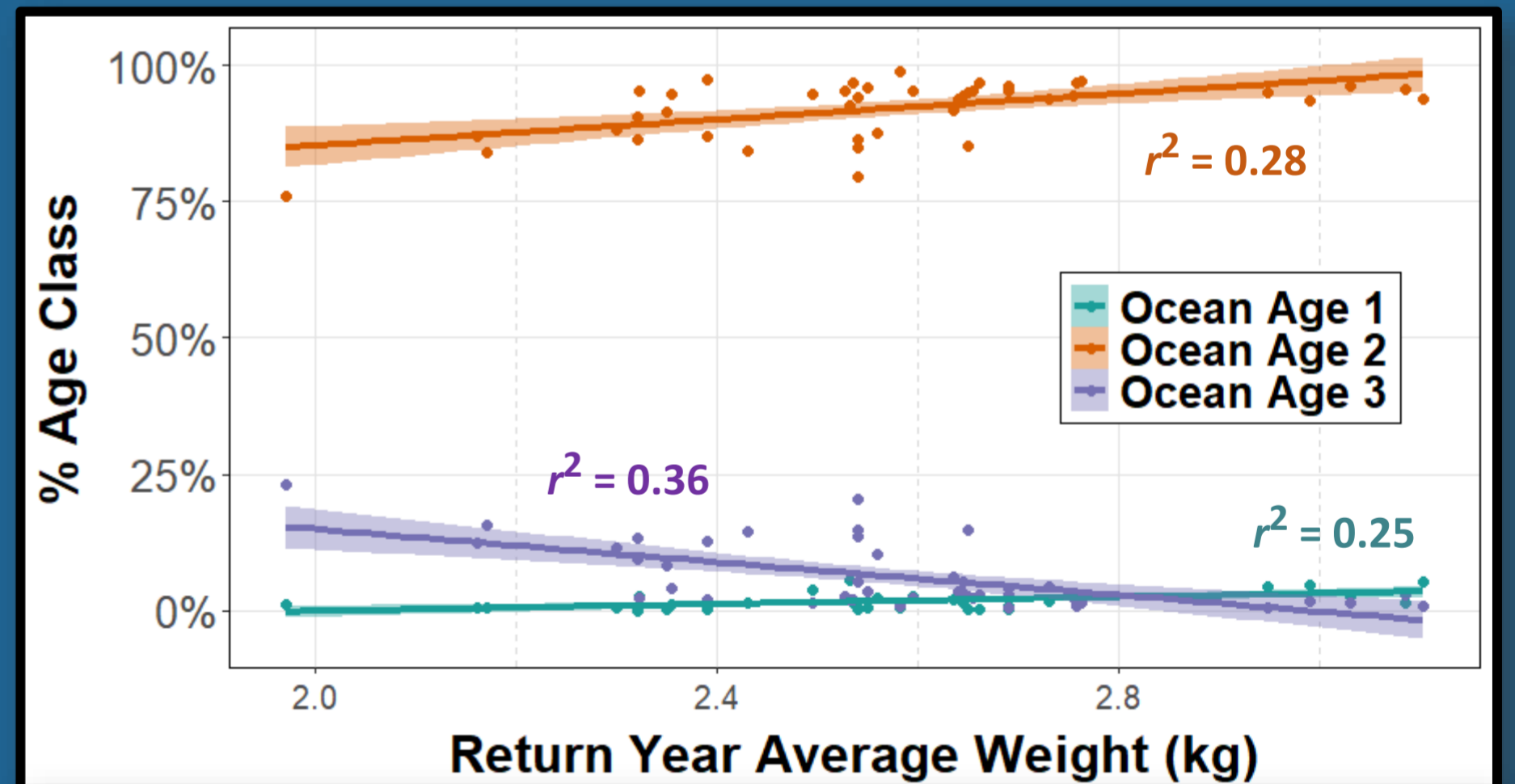


0 Body size trend in ocean age-2 Fraser River sockeye.

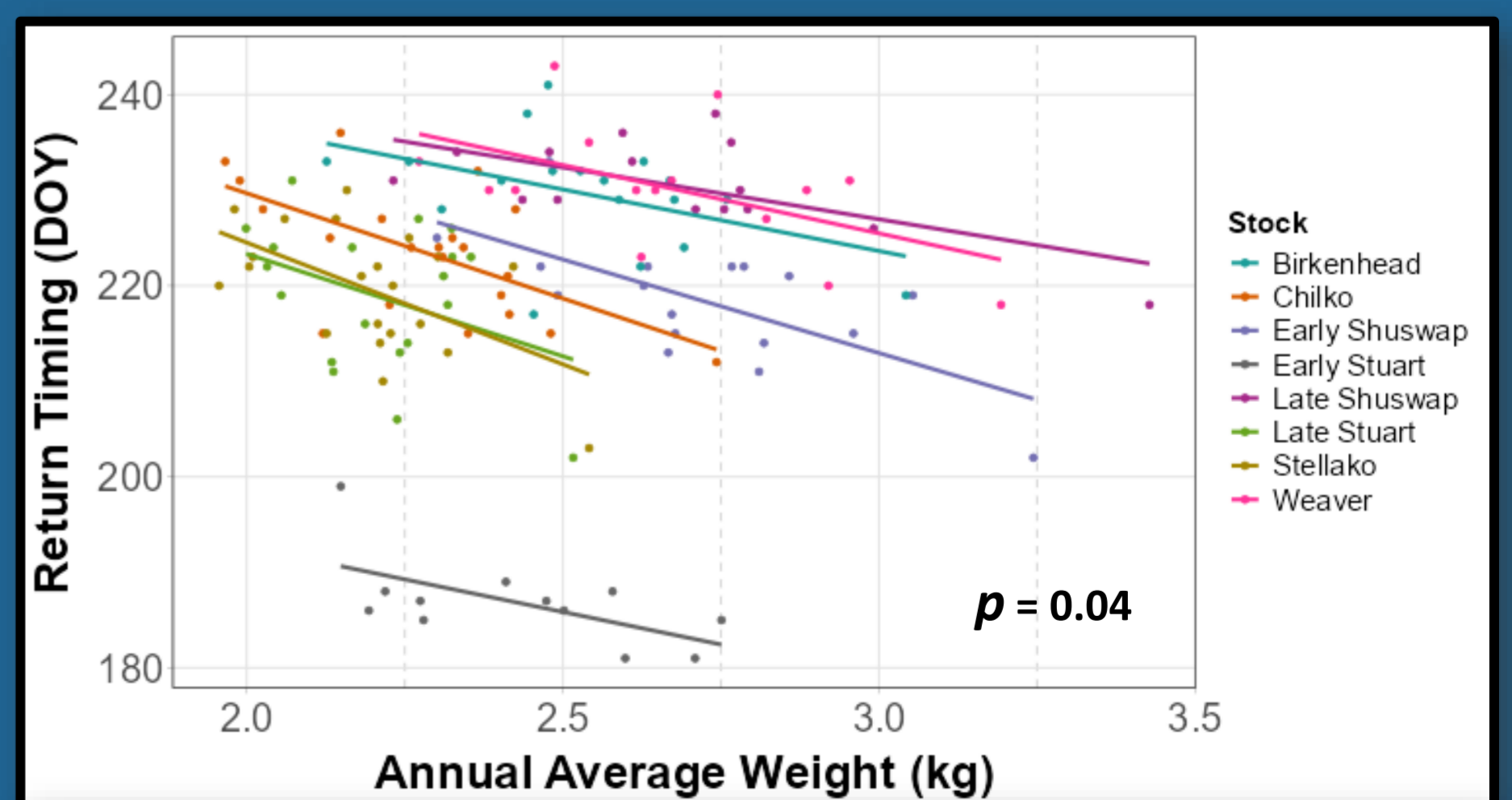
## Results



1 Fecundity vs. length for individual ocean age-2 sockeye from the Chilko stock.



2 Percent of each age class from the same brood year vs. average ocean age-2 weight four years later.



3 Median return date vs. average ocean age-2 weight for 8 major sockeye stocks.

## Conclusions and Takeaways

### 1 Fecundity

As Size  $\downarrow$ , Fecundity  $\downarrow$   
Smaller fish means less eggs and possibly productivity in future years.

### 2 Age of Return

As Size  $\downarrow$ , Age  $\uparrow$   
Sockeye are more likely to stay in the ocean for an additional year when smaller.  
Older age means:  
• It takes an additional year before reproducing  
• Less resilience to disasters  
• Less adaptability

### 3 Return Timing

As Size  $\downarrow$ , Return Date  $\uparrow$   
Sockeye are more likely to return later when smaller.  
Later timing means:  
• More overlap with other salmon runs  
• More interaction with other salmon  
• Issues with fishery management due to sensitive sockeye runs interfering with fishery openings

## References

- 1 Latham, S., et al. In: Bolt, J. et al. 2022 (Eds). State of the Physical, Biological and Selected Fishery Resources of Pacific Canadian Marine Ecosystems in 2021. Can. Tech. Rep. Fish. Aquat. Sci. 3482: vii + 242 p.
- 2 Connors, B., et al. 2020. Climate and competition influence Sockeye Salmon population dynamics across the Northeast Pacific Ocean. Can. J. Fish. Aquat. Sci. 77: 943-949.
- 3 Ohlberger, J., et al. 2018. Demographic changes in Chinook salmon across the Northeast Pacific. Fish and Fisheries 19: 533-546.

## Acknowledgements

IPSC: Samples and data collected in 1985 and earlier were collected or compiled by the International Pacific Salmon Fisheries Commission.  
DFO: Fisheries and Oceans Canada collected spawning ground samples and data (contributing to run-size, age composition, and body length estimates) since 1985.  
PSC: All other post-1985 sampling and data compilation shown here is the work of the Pacific Salmon Commission.

Photo by: Thomas Quinn, University of Washington