Impacts on fecundity and fisheries of declining body size in Fraser River pink salmon

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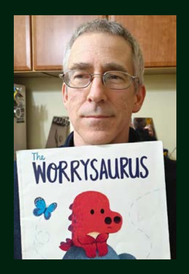


Shrinking body size

Pink salmon in the Fraser River, like many other salmon stocks in the North Pacific [1], are getting smaller, likely due to climate change[2], increased competition [2], and predation [3].

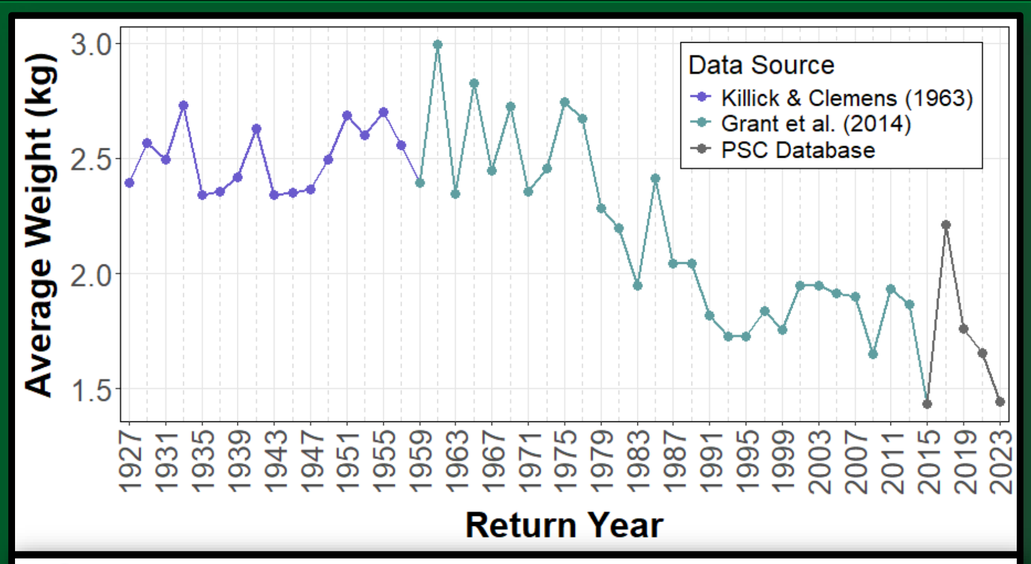
We explored consequences of decreasing size by comparing:

Size (figure 0) to:

1 **Fecundity** and 2 **Production**

We also explored trends in **Return Date** (3) over time compared to the return date of Fraser sockeye salmon, which are more valuable from both catch and preservation perspectives.

Size trend in Fraser River pink salmon



0 Fraser pinks were 50% larger in the recent past.

Background

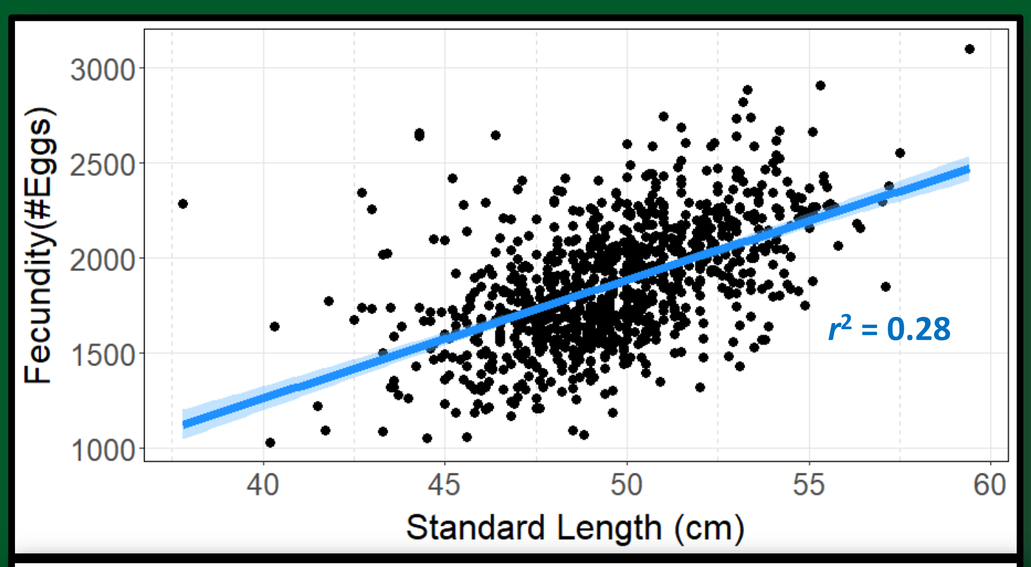
The Fraser River is in southern British Columbia, near the southern limit of the range of pink salmon.

Fraser River pink salmon are more numerous and less valued than sockeye salmon.

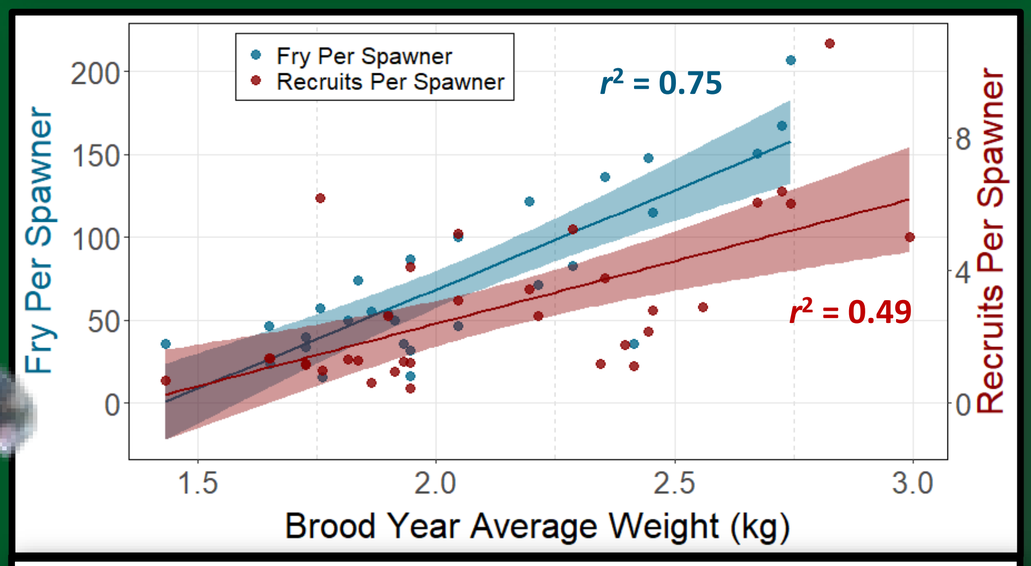
Pink salmon return to the Fraser River only on odd-numbered years to spawn as 2-year-olds.

Fraser pink salmon body size decreased markedly after 1970 (0).

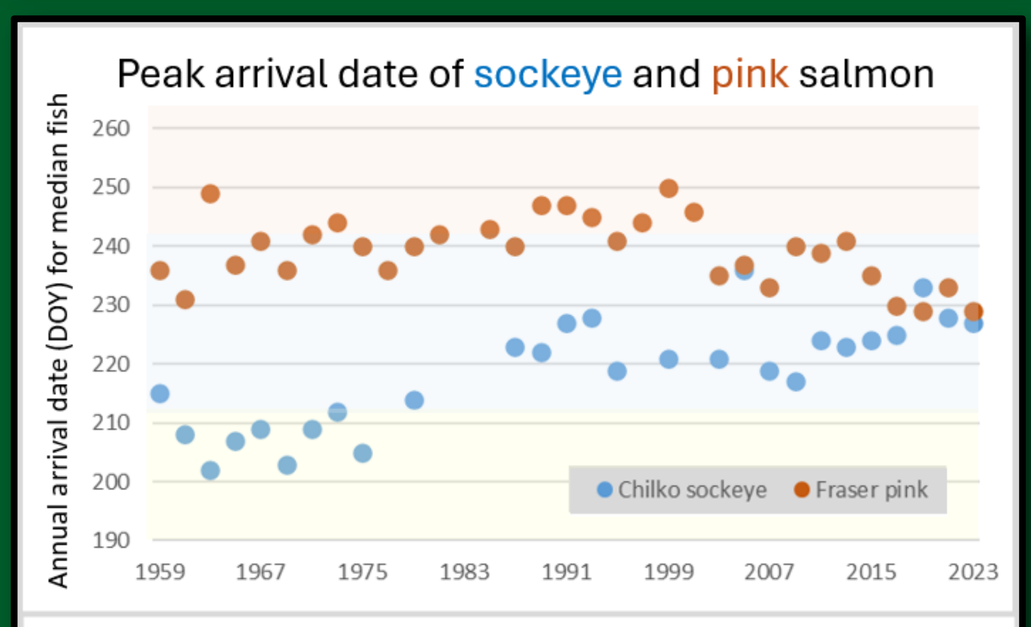
Results



1 Fecundity vs length for mature Fraser pink salmon.



2 Production of fry and recruits per spawner vs mean weight (escapement targets currently ignore this).



3 Increased overlap in migration timing with sockeye.

Conclusions and takeaways

1 Fecundity

As **Size** ↘, **Fecundity** ↘

Smaller fish means fewer eggs on the spawning grounds for a given numerical escapement

2 Production

As **Size** ↘, **Fry/Recruits** ↘

Fewer eggs corresponds to reduced production per spawner:

- Fewer fry going to sea
- Fewer recruits returning

3 Return Timing

Return Date ↘ **???**

Unexpected result

Earlier return timing means:

- More overlap with sockeye
- Worse species composition estimates to assess run sizes

Management implication:

- Severely constrained pink salmon catch due to concerns for sensitive sockeye salmon

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…. 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

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IPSFC: Samples and data from 1985 and earlier were collected or compiled by the International Pacific Salmon Fisheries Commission.
PSC: All other post-1985 sampling and data compilation shown here is the work of the Pacific Salmon Commission.