

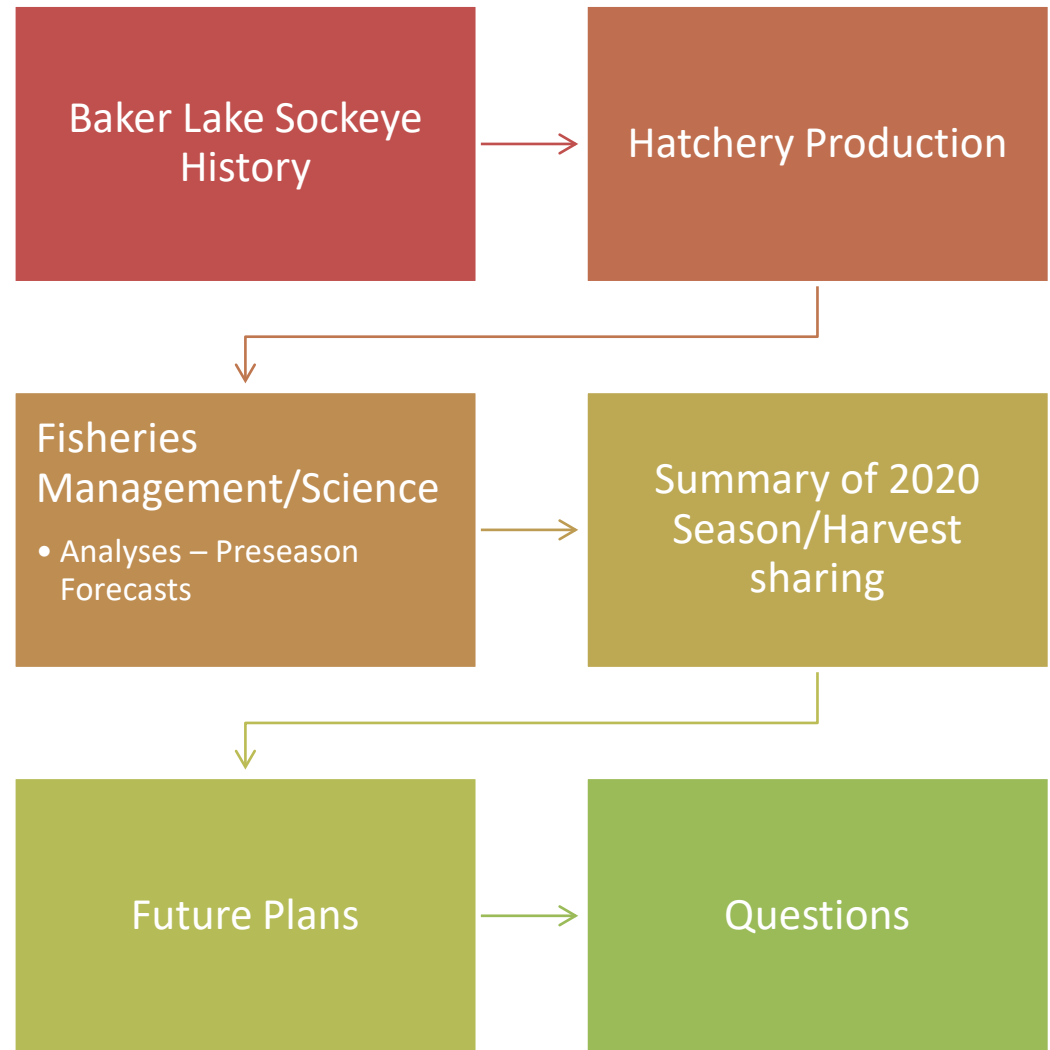
Baker Lake Sockeye 2020



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Presentation Outline

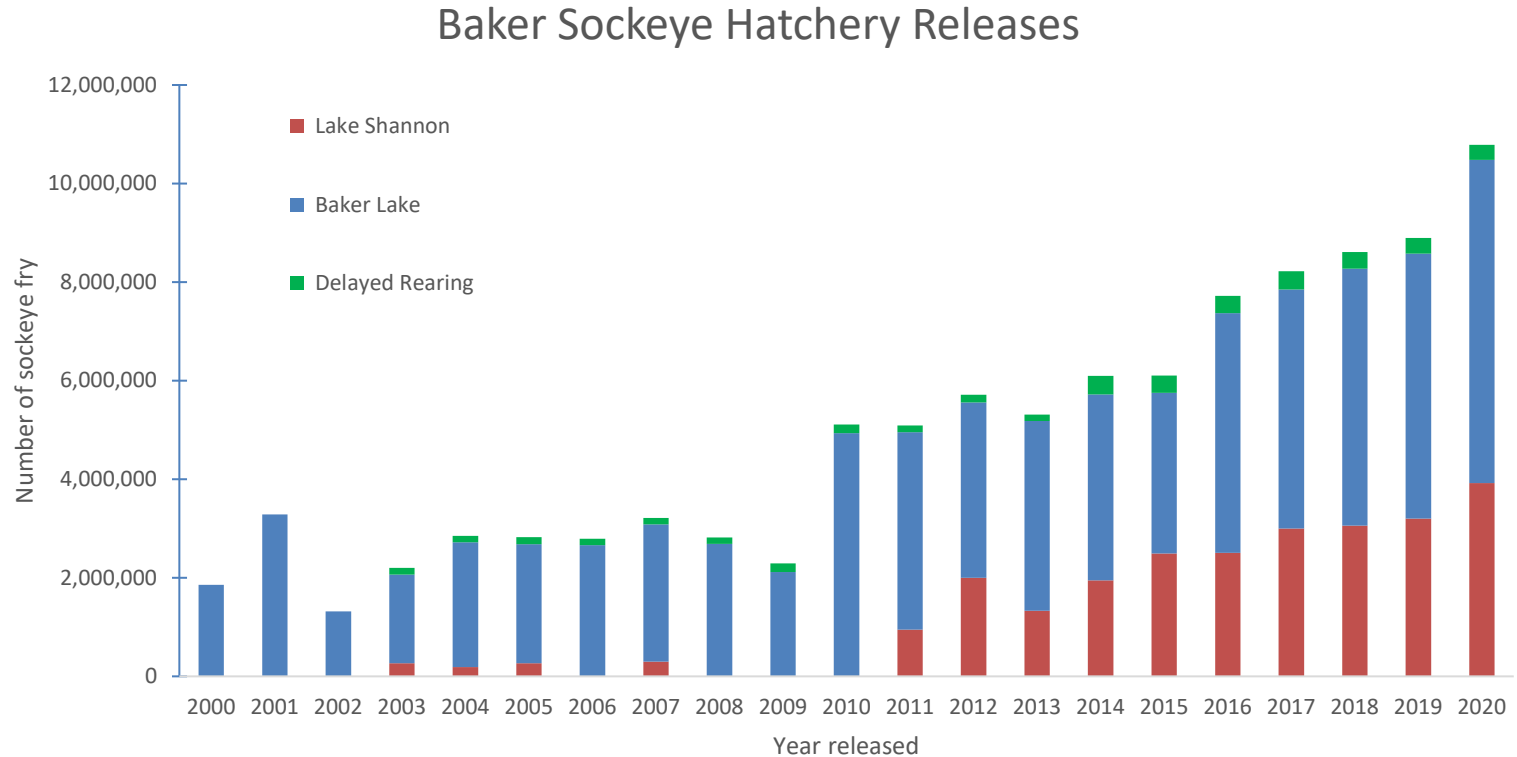








Baker Sockeye Hatchery Releases



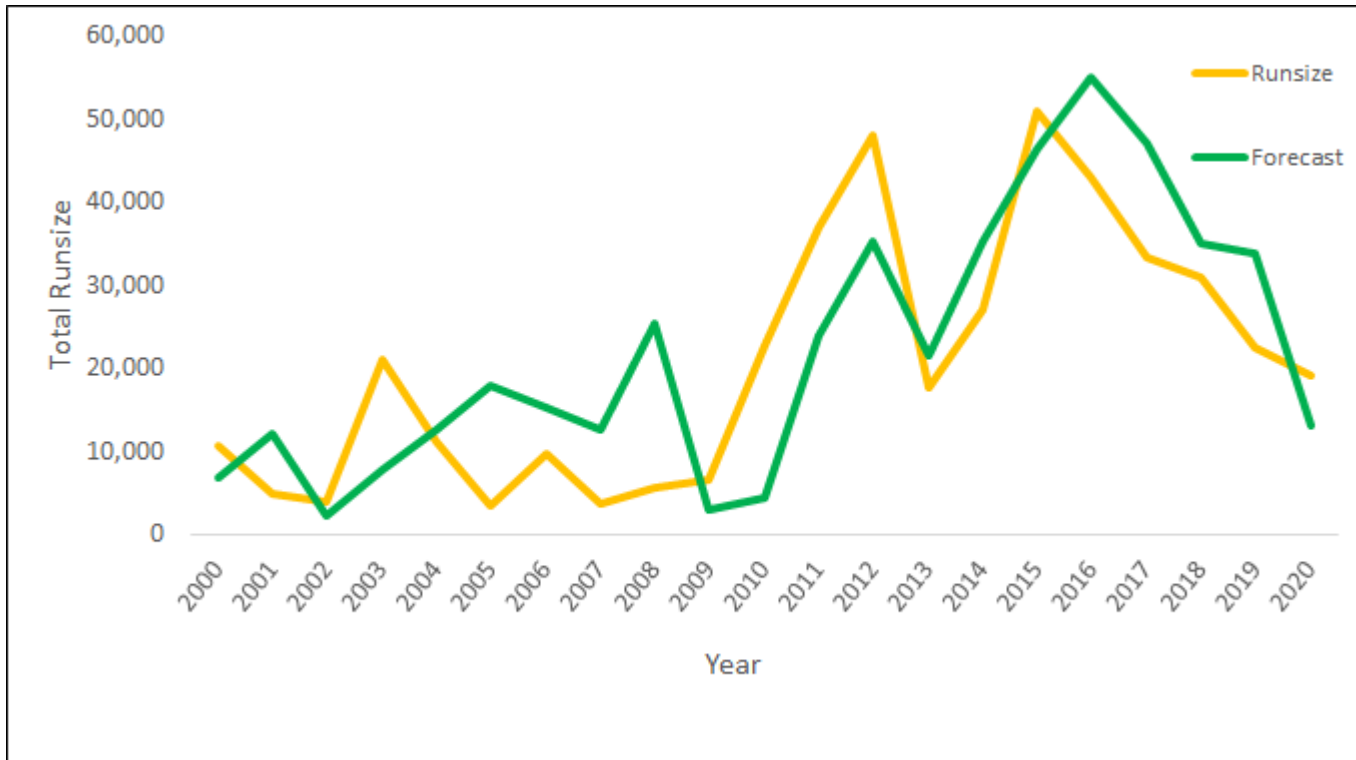
- Record 10,781,926 fry released in 2020.



Fishing Locations – Skagit R.



Pre-Season Management/Science



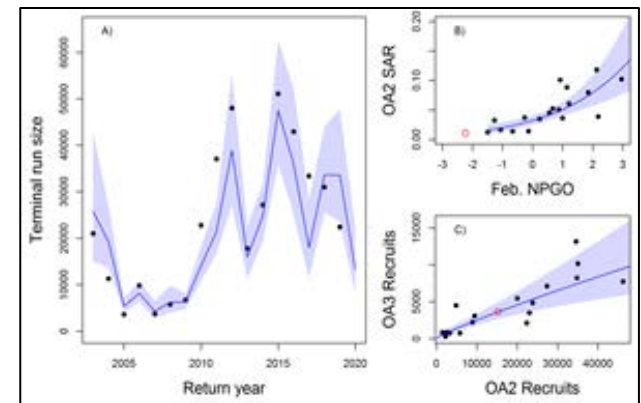
- Baker River sockeye experiencing multi-year decline
- Conservation-based approach to 2020 season



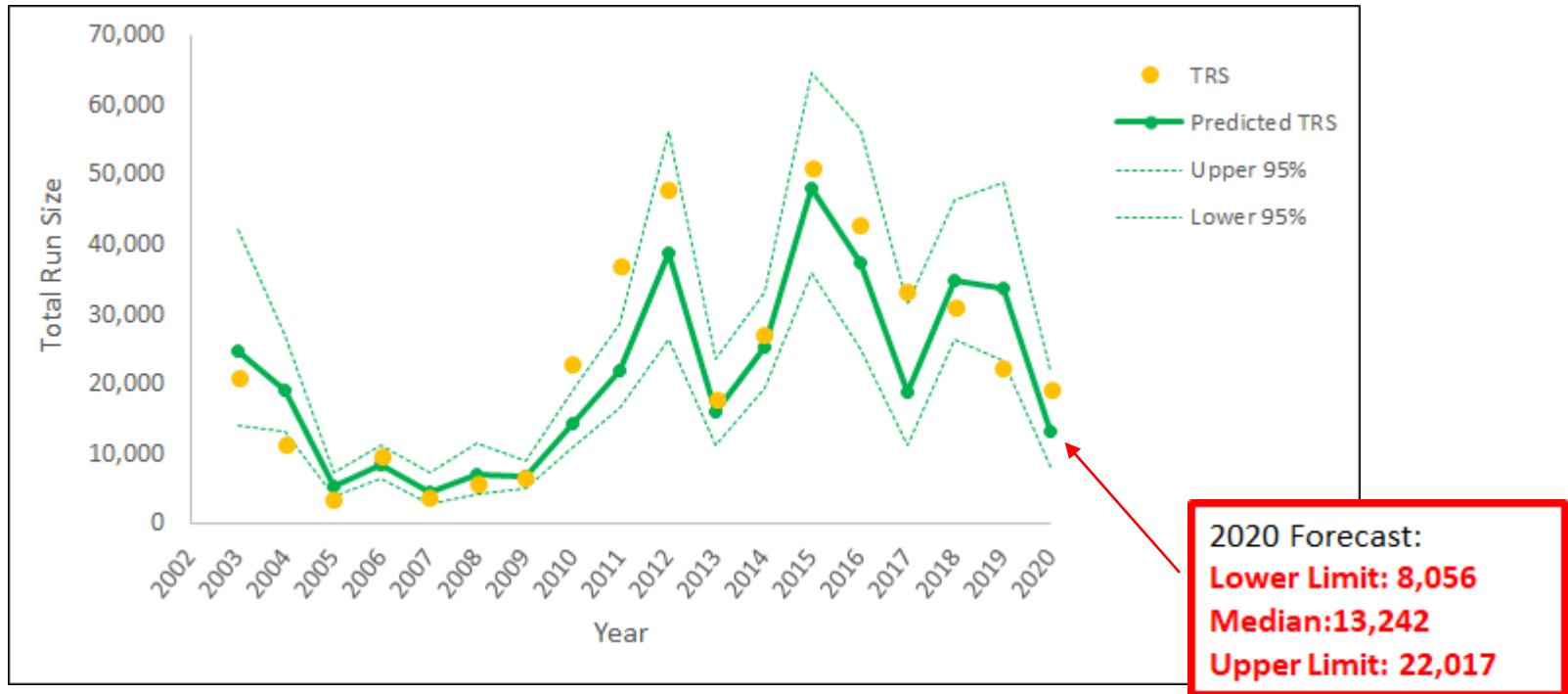
Pre-Season Management/Science

Baker River Forecast Model

- Evaluated run size relationship with climate-based predictors (i.e., **North Pacific Gyre Oscillation**)
- Identified February NPGO as strongest predictor of early marine survival
- Used sibling-based relationship model with NPGO to predict 2020 return



Pre-Season Management/Science



- Applying an NPGO based model resulted in a 15-30% decrease in performance **error** when hindcasted over the past 5 years
- 2020 Run Reconstructed run size: **19,157**



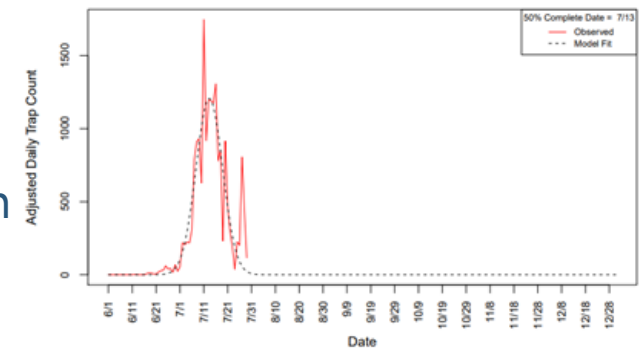
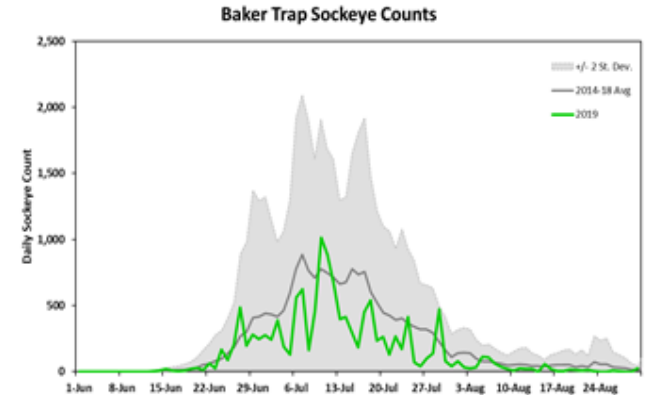
In-Season Management/Science

Baker Trap Counts

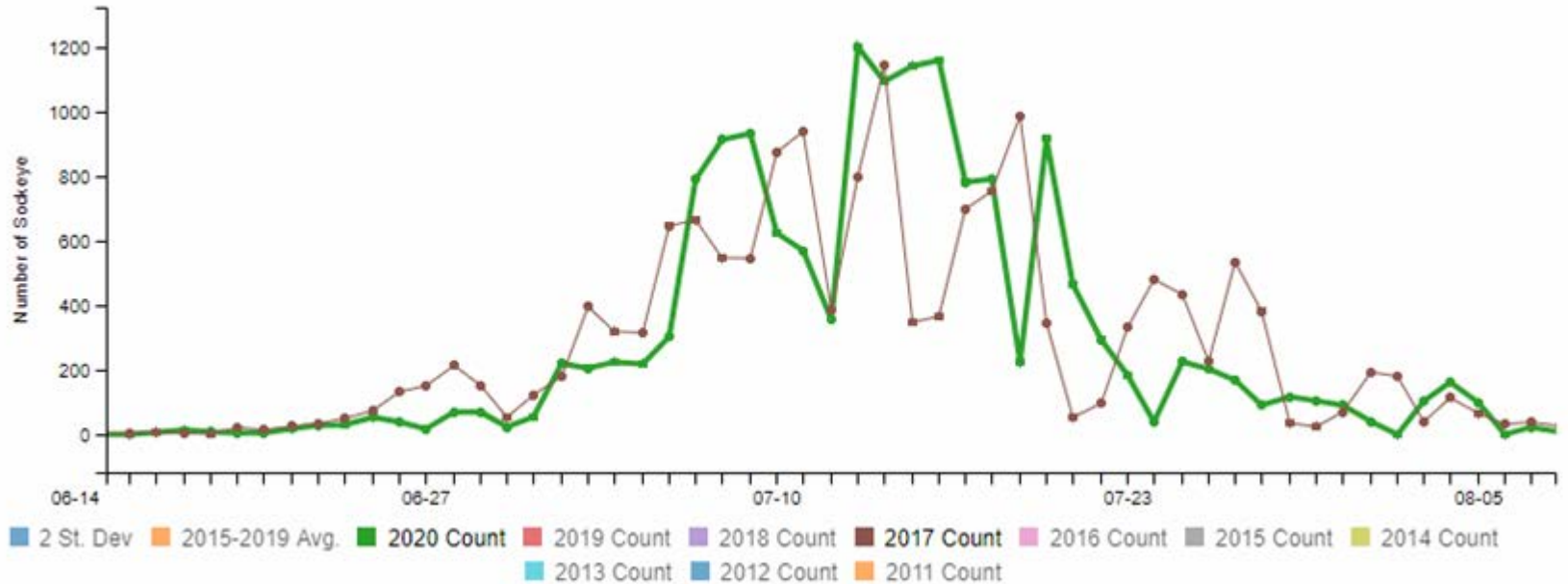
- Flow Dependent
- ~10-day migration to Baker Trap

In-Season Update (ISU) Models

- Use trap counts to predict total run size
- Reliability of model prediction increases after 50% migration (avg timing 7/15)
- Migration time limits effectiveness of in-season actions



In-Season Management/Science



- Pattern recognition and historical correlation
- 2017 Trap Count: 16,704
- 2019 Trap Count: 15,890
- 2020 Trap Count: 15,607

<https://wdfw.wa.gov/fishing/reports/counts/baker-river#returns>



How does Baker compare to other stocks in 2020

	State/Province	Forecast Return	Estimated Return	Return Relative to Forecast
Baker River	Washington	13,242	19,157	+ 30%
Lake Washington	Washington	20,166	22,951	+ 12%
Columbia River	Washington	244,000	342,000	+ 28%
Bristol Bay	Alaska	49,000,000	57,860,000	+ 15%
Nass	British Columbia	386,000	301,000	- 22%
Skeena	British Columbia	880,000	1,149,000	+ 23%
Sakinaw	British Columbia	75	85	+ 11%
Somass	British Columbia	169,000	304,000	+ 44%
Fraser River	British Columbia	941,000	293,000	- 69%



Forecasting Future: Exploring Other Factors

We will continue to look through the following factors when assessing forecast model performance now and in the future!

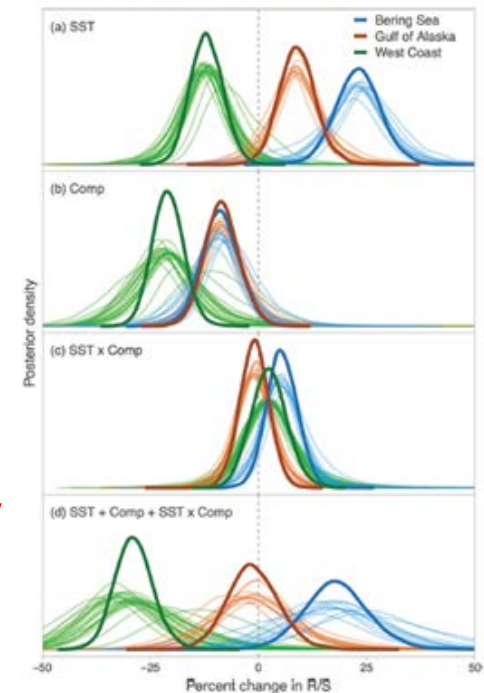
- Pink Competition – Density Dependent Effect (Connors et al., 2020)
- Stream flow and temperature
- Smolt density and size
- Time-varying relationships with climate (Malick, 2020)



Sockeye Salmon Scientific Literature

- Connors, B., et al. (2020). Climate and competition influence sockeye salmon population dynamics across the Northeast Pacific Ocean. *Canadian Journal of Fisheries and Aquatic Sciences*, 77(6): 943-949.
- Malick, M. J. (2020). Time-varying relationships between ocean conditions and sockeye salmon productivity. *Fisheries Oceanography*, 29(3), 265-275.
- Warming climate and competition both have a negative effect on southern sockeye population productivity
- Opposite effect for Northern populations

Fig. 2. Posterior probability distributions of the predicted effect of (a) SST, (b) competitors, (c) an interaction between the two, and (d) the combined effect from all covariate terms, on sockeye salmon survival. Overall hyperdistribution of the covariate effects are in bold lines, with individual stock-specific distributions illustrated by the light lines. Covariate effects are standardized (i.e., per standard deviation unit increase in each covariate), which equates to 1.5 °C SST and 119 million pink salmon. [Colour online.]

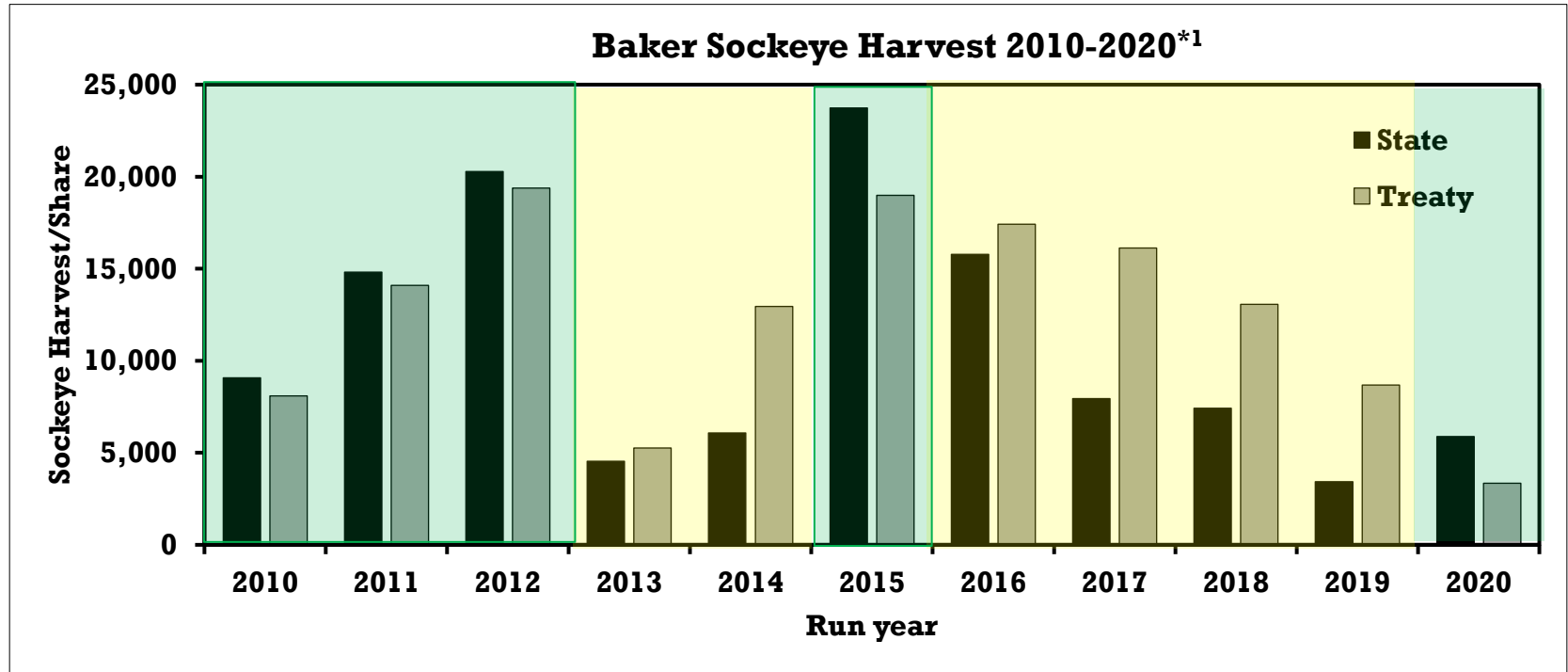


Connors et al. (2020)



Updated Harvest Sharing

Forecast performance is the greatest contributor to state/treaty harvest sharing



Recent 10-year (2010-2020*¹) Harvest/Share Equity

	State Share	Treaty Harvest
2020 Harvest	5,884	3,348
Total Harvest	118,958	137,383

*1: 2020 data is preliminary



2020 Baker Lake Sockeye Fishery



2020 Baker Lake sockeye fishery highlights

- Anglers put in an estimated 41,233 hours of total fishing effort
 - 1,293 anglers were interviewed by WDFW creel staff and 6,742 angler hours were sampled
- Estimated 7,908 angler trips
- Estimated \$458,652 economic impact (TCW Economics. 2008. aka Wegge. 2008)



Future Plans

- Prioritize Baker sockeye harvest equity in 2021 NOF season-setting process
- Continue to work with angler groups and tribes to improve connection
- Continue to update/evaluate technical tools used to manage fishery
- Hatchery improvements leading to more production/understanding.



Questions?

