

# **Yukon River Canadian-origin Chinook Salmon 2022 Run Forecast and Preseason Harvest Considerations**

Joint Technical Committee presentation to  
Yukon River Panel

April 6, 2022

Agenda item #7a

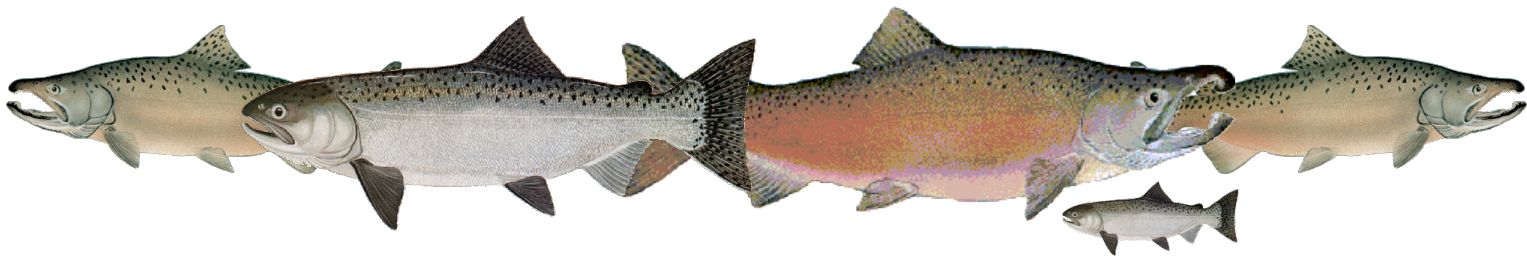
Fred West (ADF&G)

Oliver Barker (DFO)



# Outline

- Background on JTC forecast methods
- Efforts to improve forecast utility
- 2022 forecast
- What does the forecast imply about possible harvest in 2022.



# Forecast Background

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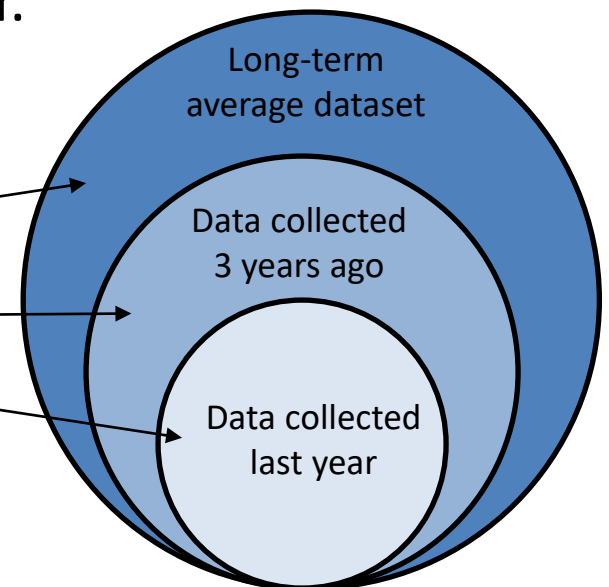
The JTC has used three models to forecast the run size of Canadian-origin Chinook salmon

Each of these models provides unique but complimentary information about the likely run size next year.

#1: Stock production “Ricker” model

#2: Juvenile abundance model

#3: Age-class “sibling” relationship model



Each of the three model predictions about next years run size is combined and weighted by our level of “trust”, which is based on how closely each model would have predicted prior year run sizes.<sup>3</sup>

# Improvements to forecast methods

Worked well, but...

- Subset of models required “corrections”
- Models were weighted **subjectively**
- Forecast uncertainty was not adequately described
- Forecast range provided no information about most likely run sizes

Successfully developed a fully Integrated Bayesian Forecast Model for the 2022 Forecast

- Uses a Bayesian statistical framework to combine and weight models **objectively**
- The full **forecast uncertainty is described**
- The **probability of different run sizes is estimated**; allows for dramatically improved discussions about preseason harvest planning.

Additional future improvements include....

- Adjust stock production model to account for time-varying productivity

Prior Years

2021 Forecast

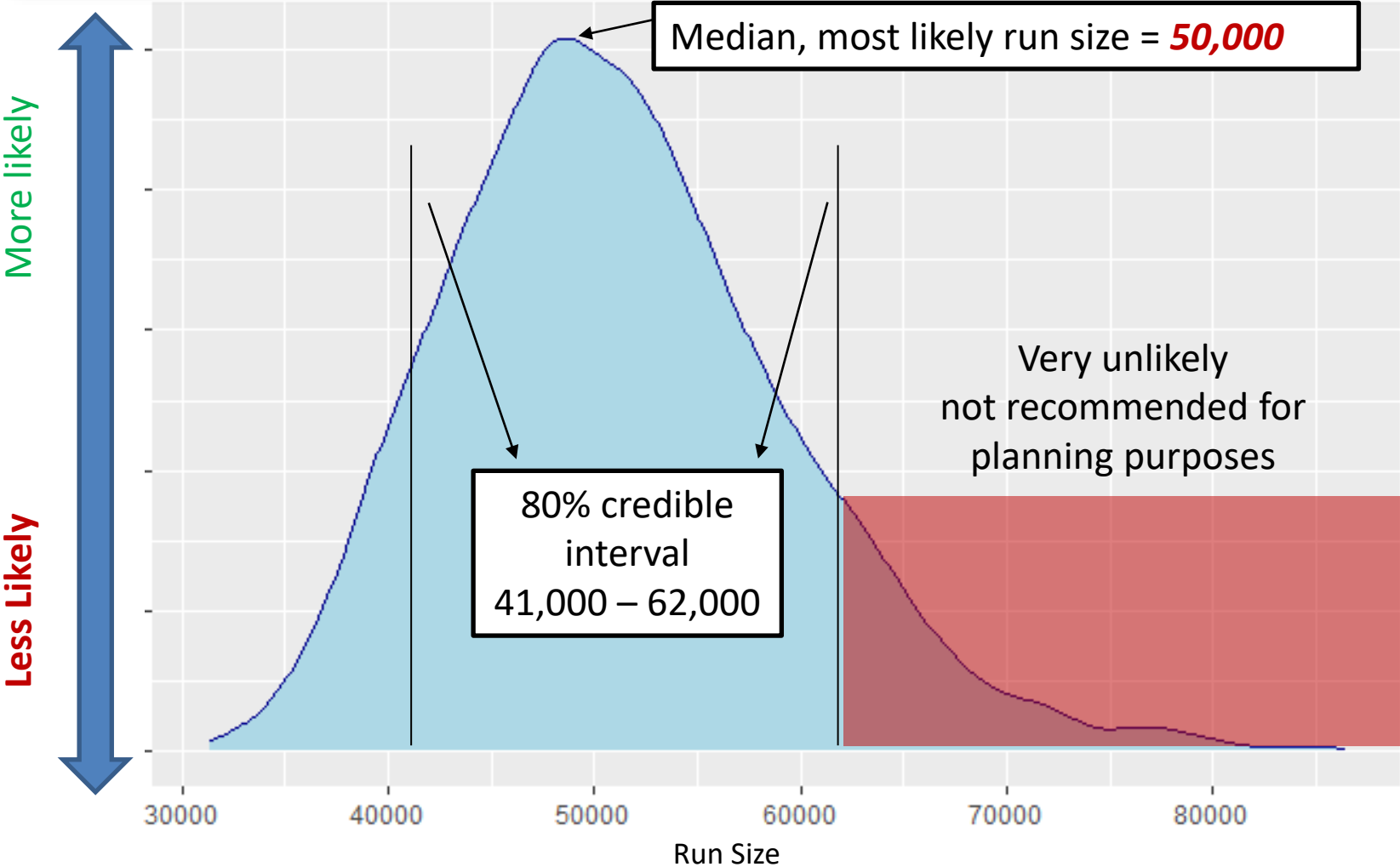
2022 Forecast

Partial implementation of new method:

- Models weighted **objectively**
- Provided **probability of different run sizes**

The 2022 forecast is still a combination of all three models (Ricker, Juvenile, Sibling)

# 2022 Forecast



# Prior-year approach to pre-season TAC calculations

- In the past, preseason expectations about Total Allowable Catch (TAC) had been determined by subtracting the Interim Management Escapement Goal (IMEG) from the forecast range. The result has been used as a harvest outlook for preseason planning purposes only. However....
- Because some run sizes are more likely to occur than others, simple preseason TAC calculations can give a **VERY MISLEADING** impression about the likely number of fish that could be harvested and still have a reasonable assurance of achieving the IMEG.

Forecast indicates a large run size is VERY UNLIKELY and planning for large harvests would be VERY RISKY

Forecast	IMEG
41,000	42,500
62,000	55,000

**Misleading TAC Example: 0 – 19,500**

# Introducing a new approach to pre-season TAC calculations

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- It is preferable to consider the possibility of different run sizes occurring to develop a set of realistic preseason TAC expectations.
- The TAC associated with different run size probabilities provides information about the possibility that the IMEG will be met or exceeded given a range of harvest plans one might consider.
- Similar approaches are common in other fisheries.
- This approach is possible for 2022, because JTC has produced a “probability-based” forecast.

# Total Allowable Catch Considerations preseason planning

Probability of meeting a particular run size and available harvest given current IMEG range

Probability	Forecasted Run Size	Total Allowable Catch (TAC) within IMEG range		
		42500	48750	55000
99	35,415	-	-	0
95	38,993	-	-	0
90	41,084	-	-	0
85	42,746	246	-	0
80	44,142	1,642	-	0
75	45,338	2,838	-	0
70	46,477	3,977	-	0
65	47,498	4,998	-	0
60	48,361	5,861	-	0
55	49,399	6,899	649	0
50	50,396	7,896	1,646	0



# Utility of JTC forecast

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- Important to remember these forecasts and probabilities are based on preseason information and are useful for setting realistic expectations and guiding preseason planning discussions.
- There is a considerable possibility of low or no harvest given the 2022 preseason run size forecast probabilities.
- The lower end of the 2022 outlook range suggests a possible run size similar to the record low run size observed in 2021
- The upper end would be smaller than the recent 10-year average (2012-2021) of 64,000 and well below the 1982-1997 historical average run size of 153,000
- Additional information about the actual 2022 run size will become available as inseason data are collected by agencies.

# Comments or Questions?

## Acknowledgements

### Chinook forecast subcommittee

- JTC Members:
  - Oliver Barker (DFO)
  - Jim Murphy (NOAA)
  - Zachary Liller (ADF&G)
  - Fred West (ADF&G)
- Other agency staff:
  - Michael Folkes (DFO)
  - Dr. Curry Cunningham (UAF)