2015 Yukon Chinook Salmon Forecast

Supplementary statistical analysis

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Quick Summay

Using values of -5.89 °C (AMATC), -1.69 °C (MSSTC), and 0.5571 (PICE), the 2015 forecasted dates of the three percentiles of cumulative CPUE (15, 25, 50) are June 15, 17, and 23 (respectively). Compared to the historical range of values seen for AMATC, MSSTC, and PICE, their 2015 values are fairly close to their historical averages and corresponds with the near-average forecasted 50%-point of June 23.

Data

I added the 2015 values for the three environmental variables to my master data sheet. The values are as follows:

Year	AMATC (C)	MSSTC (C)	PICE
2015	-5.89	-1.69	0.5571

Historical Comparisons

To better understand how the values for 2015's environmental variables and the resulting forecast percentiles compare to each variable's historical range, I produced a few plots.

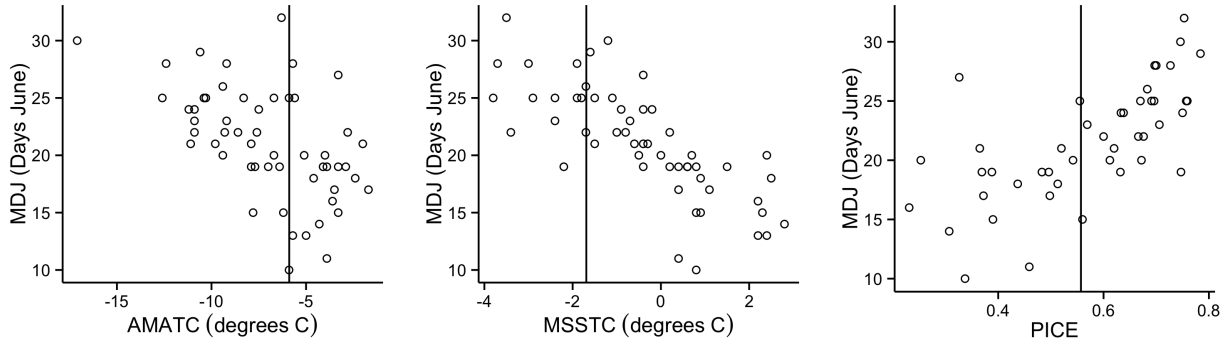

Figure 1: Historical values of MDJ versus the three environmental variables. Solid vertical line indicates the 2015 value.

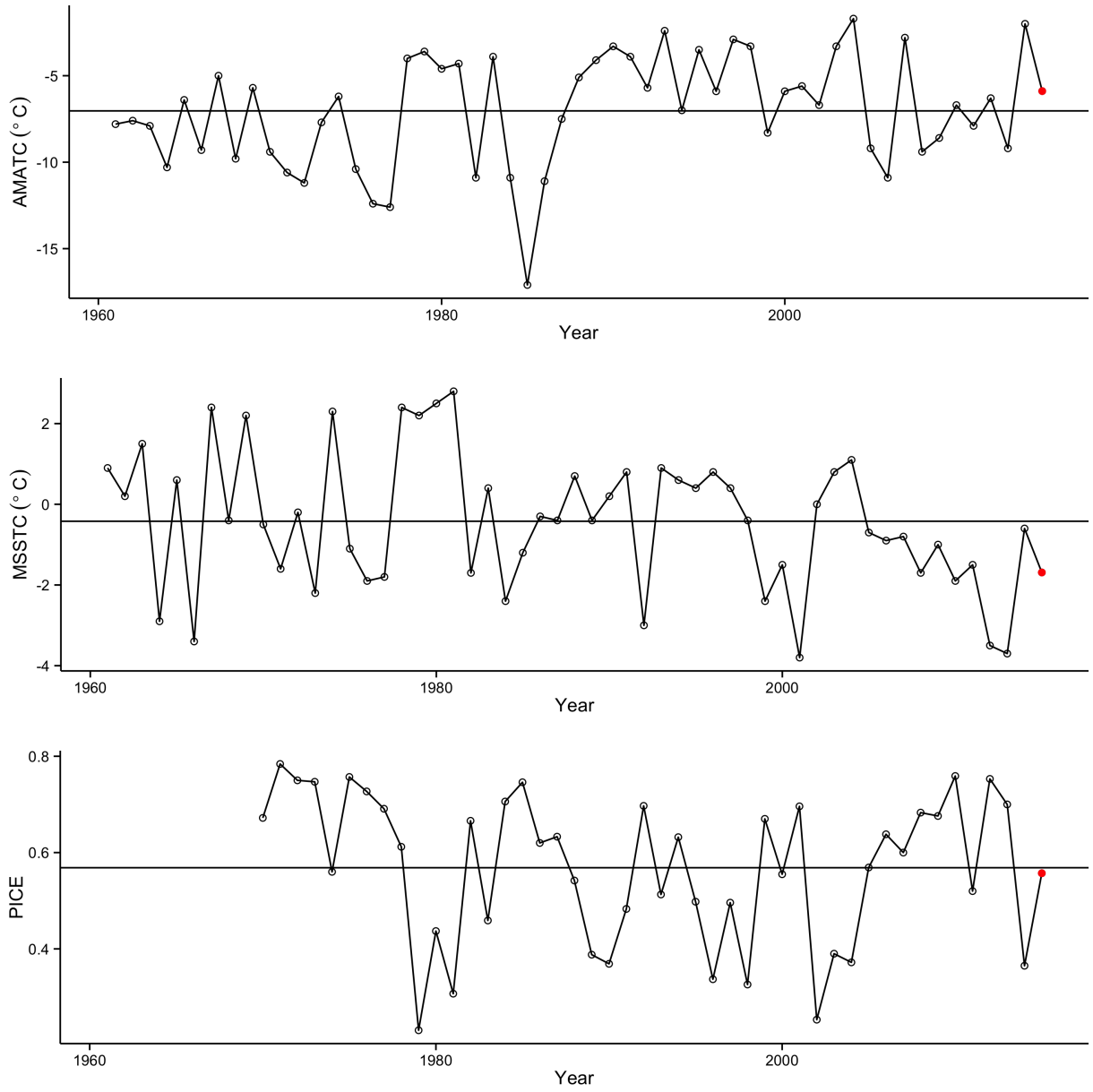

Figure 2: Historical values of AMATC, MSSTC, and PICE. Solid horizontal lines indicate the long term average value.

The 2015 values are pretty close to the long-term averages and it seems very reasonable to expect an average run timing.

Hindcast Model Performance

I hindcasted three models for each percentile (15, 25, 50) against all three environmental variables (my previous best hindcasting-selected model). Generally, the results are similar to last year. One thing I've noted is that, if I extend the hindcast years to the 90s, accuracy goes down. This is tricky and I'd like to think about why this might be in the future.

In the following table, MAPE refers to mean absolute prediction error, SD(MAPE) refers to the standard

deviation of the latter values, INTWIDTH is the approximate (2SE) confidence interval generated by using each linear model's model standard error, and PROPIN is the proportion of hindcast-predicted run timings (FIFDJ, QDJ, or MDJ) within the latter confidence interval.

Percentile	MAPE (days)	SD(MAPE) (days)	INTWIDTH (days)	PROPIN
FIFDJ	2.00	1.36	4.47	0.53
QDJ	1.33	1.18	4.20	0.8
MDJ	1.80	1.32	4.51	0.73

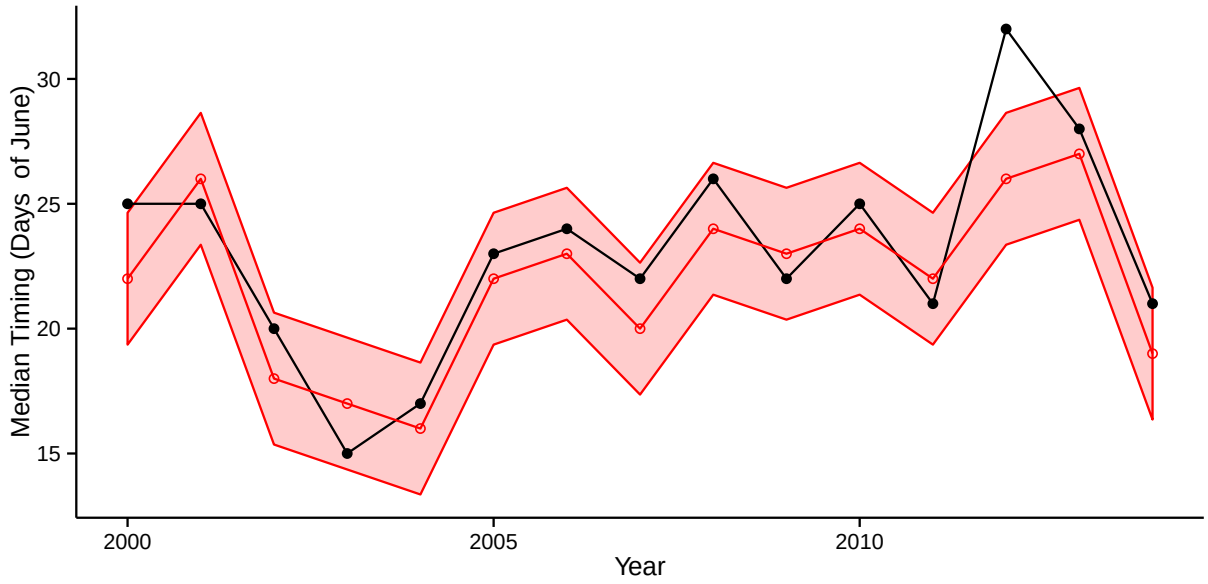

Figure 3: Hindcasted predictions (2000-2014) of MDJ. The red-colored ribbon corresponds to the approximate 95% confidence interval generated around each prediction using model standard error.

2015 Forecast

Training the model on all years prior to 2015 and predicting on the 2015 values for each environmental variable (See Data), I arrived at predictions for the three percentiles of cumulative CPUE:

Year	Percentile	Day (June)
2015	15	15
2015	25	17
2015	50	23

Fitting the above three values to a standard 2-parameter cumulative logistic curve, I forecasted daily cumulative percentiles of CPUE:

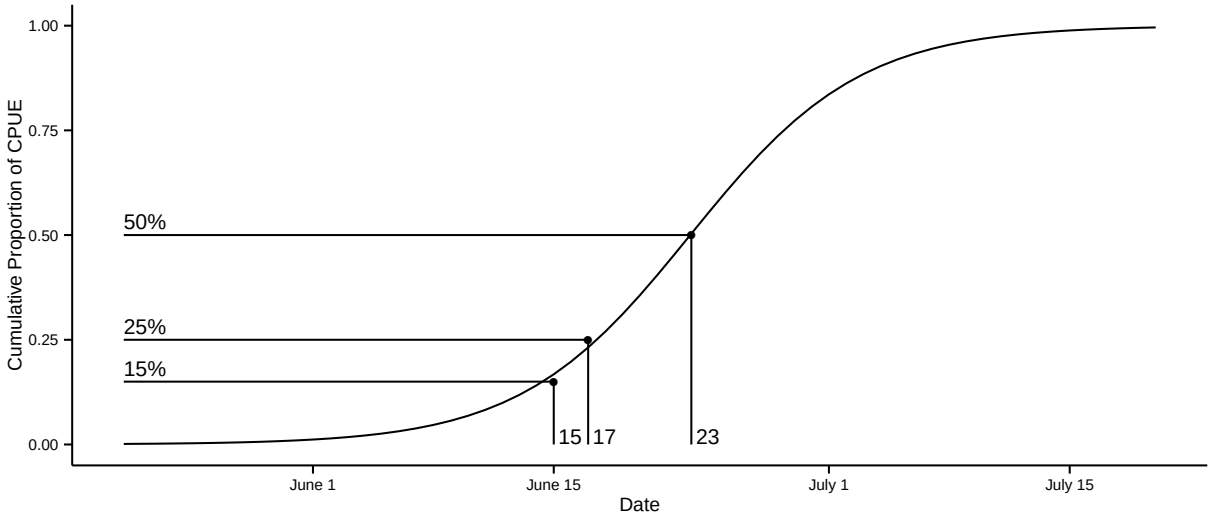

Figure 4: Result of a two-parameter cumulative logistic fit to three forecasted percentiles of cumulative CPUE. Lines indicate the percentile being forecasted and corresponding date each percentile is expected to be observed.