# 2014

**PRELIMINARY Outlook and Forecast for Chinook Salmon Run Timing**
**Lower Yukon River (ADFG Management Area Y-1), May 9, 2014**

## Outlook

Due to very warm weather so far this Spring, the run timing outlook and forecast is being issued early in a preliminary form to give everyone concerned with Yukon River chinook the maximum lead time. This outlook could change as more environmental data are gathered in the month of May. **A final run timing outlook will be issued May 31, 2014.** The preliminary outlook for Yukon River Chinook timing in 2014 calls for an early return to the Yukon delta area. The second warmest April in 54 years makes it highly likely that the first Chinook will be crossing the delta before the end of May, with the first significant pulse (15% point) of Chinook crossing the delta **before June 14.** It is also highly likely that the half-way point (50%) in the run will be reached **before June 21**. April mean air temperature at Nome was an amazing 28.3F (-2.1C), which is 9.1F (5.1C) above the average of the previous 53 years. A note of caution is sounded for this preliminary run timing outlook as air temperature alone is not the best indicator of timing. Spring ice cover in marine areas of the northern Bering Sea during and after April influences timing, but its impacts can't be fully measured until the end of May. Ice cover since the equinox (March 20) has been trending toward an end point on May 31 that should be well below average. The date of break-up of river ice at Alakanuk, 18 river miles from the Bering Sea, should be watched as a precursor of movement across the delta. The relation between historical date of breakup at Alakanuk and Chinook run timing on the Yukon Delta is shown in the Statistical Analysis section below. **Alakanuk break-up within the next two weeks (by May 23) should put the first pulse (15%) of Chinook across the delta before June 14 (see Figure below).** River ice may be followed on NOAA National Weather Service site **(http://aprfc.arh.noaa.gov/).**

For more information, data and updates go to http://www.aoos.org/2014-yukon-chinook-forecasting/

## Preliminary Forecast Based on April Mean Air Temperature at Nome 1961 - 2013

Given the historical relationship between the three percentiles (15%, 25%, 50%) and April Mean Air Temperature (C)), predicted dates are June 9 (15%), June 11 (25%), and June 16 (50%) in ADFG Management Area Y-1.

| Predicted % Points | 2014 |
|---|---|
| Fifteen | June 9 |
| Twenty-five | June 11 |
| Fifty | June 16 |

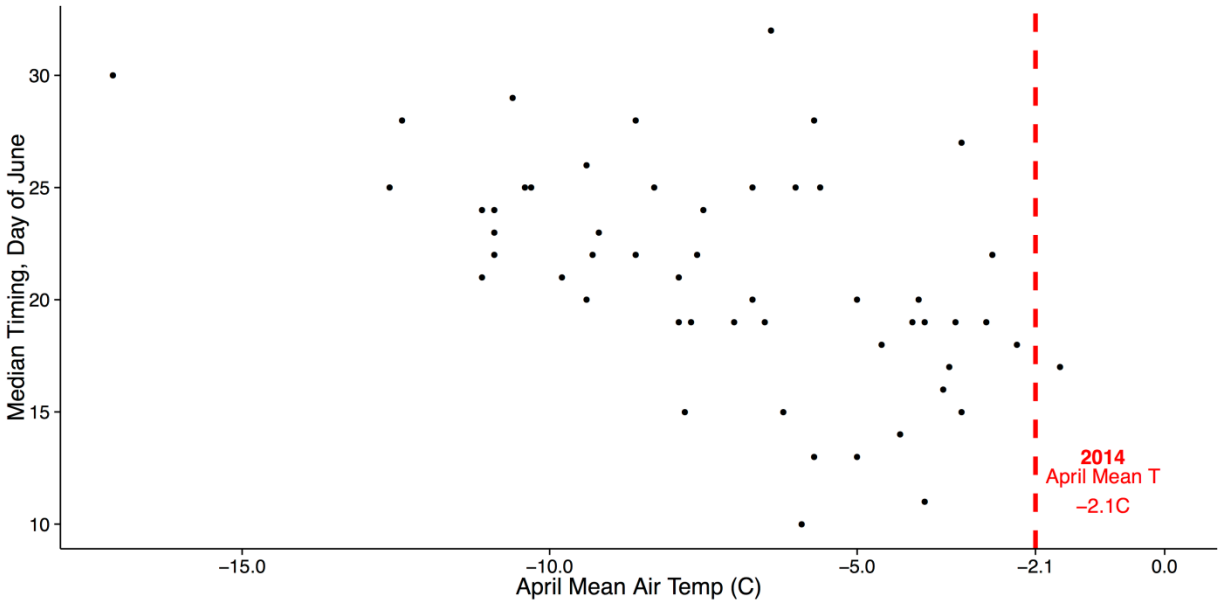
April mean air temperature is the earliest reasonably reliable indicator of Yukon chinook timing. The strength of its effect in any given year is conditioned on marine sea ice cover and sea surface temperatures, SST, in May. As will be described in the Final 2014 Outlook and Forecast, **May 31, 2014**, below average ice cover and above average SST could make the above estimates later than actual, whereas persistent ice and low SST would make the estimates earlier than actual.

**Brief Statistical Analysis**

More information will be presented in the Final 2014 Outlook and Forecast issued on May 31. Here we present historical performance of timing as long term averages with standard deviations of dates of three percentage points of migration for Yukon chinook for the years 1961 – 2013.

| N = 53 | 15% | 25% | 50% |
|---|---|---|---|
| **Mean** | **June 14** | **June 16** | **June 21** |
| **s.d.** | 4.905 | 4.965 | 4.888 |
| **Latest** | June 23 | June 26 | July 2 |
| **Earliest** | June 5 | June 6 | June 10 |

The following is a scatter plot of median run timing, expressed as days of June, against April Mean Air Temperature, AMATC (°C). Dashed line and text in red mark the 2014 measurement of AMATC. Note that as air temperatures gets warmer, the variability in its relation with timing gets larger. Air temperature is a more reliable indicator of timing at and below its long term mean (-7.1C) than at warmer temperatures such as seen in 2014 (-2.1C).




**Understanding Uncertainty: How reliable is April mean air temperature as an indicator of chinook timing?**

In order to understand uncertainty we have (1) used hind-casting to arrive at a more accurate measurement of model performance, and (2) used mean absolute prediction error (MAPE) instead of normal 95% confidence intervals to calculate prediction intervals for these predictions. MAPE is the average difference between the forecasted and observed run timings over the set of years included in the hindcast. Hind-casting refers to calculating historical predictions using only the data that would have been available at the time that prediction was made. The years 2000 through 2014 were hindcast in

order to calculate MAPE. MAPE for this approach is 3.2 (15%), 3.3 (25%), and 3.4 (50%) days. The figure following shows model performance from 2000 onward for predicting the 50% point of run timing.

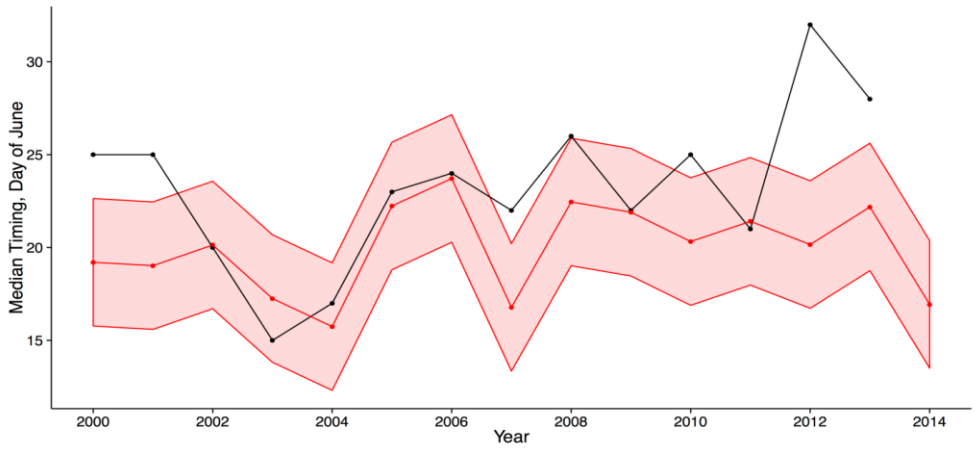
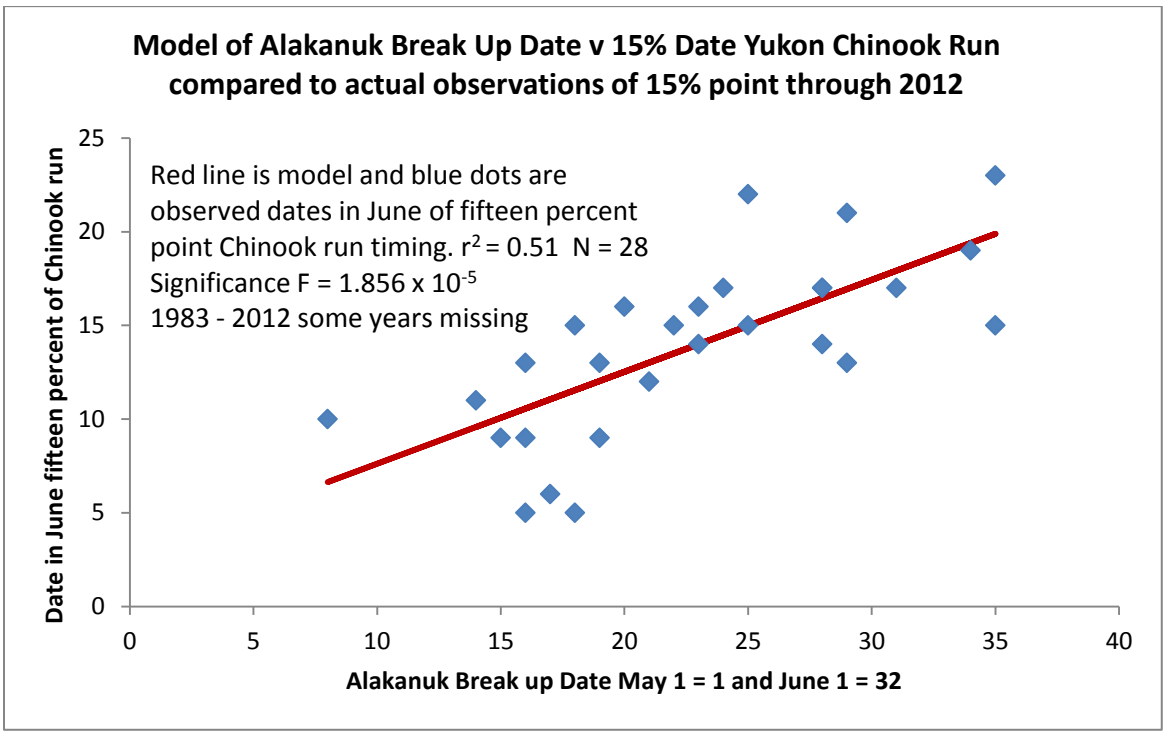



Figure above. Historical observations of median run timing (black) and predicted run timing (red). The ribbon corresponds to the prediction interval generated using MAPE. Note that 2012 was the coldest Spring ever observed and 2013 was only slightly warmer.

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