FISH PASSAGE CENTER

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MEMORANDUM

TO: Paul Wagner (NOAA)

FROM: Michele DeHart

DATE: Amended Date: November 16, 2009
Original Date: November 5, 2009

RE: Adult spring Chinook timing at Bonneville Dam and environmental factors

In response to your request, the Fish Passage Center staff has reviewed adult count data for spring Chinook at Bonneville and environmental conditions over a 16 year period (1994-2009). Below is a brief summary of our findings, followed by a more detailed explanation of the analyses we conducted.

- The 10% passage date for spring Chinook adults at Bonneville Dam in 2009 was April 29th. This is the second latest 10% passage date among the years we analyzed. Return year 2006 had a later 10% passage date of May 2nd.
- Linear regression analyses revealed a significant relationship between temperature (Mar. 15-Apr. 1) and the 10% passage date for adult spring Chinook at Bonneville Dam. Later 10% passage dates were associated with lower average temperatures during these times.
- There was not a significant relationship between average flow (Mar. 15-Apr. 1) and the 10% passage date.

Methods and Results:

Fish Passage Center (FPC) staff reviewed the adult count data for spring Chinook adults at Bonneville Dam (BON) over a 16 year period (1994-2009). For this analysis, we relied on the historical count start date of March 15th. Therefore, any Chinook passing BON before March 15th were not included in this analysis. From March 15th to May 31st,

any adult Chinook passing BON are considered spring Chinook. From these counts, we estimated the 10% passage date for each of the return years analyzed. Spring Chinook jacks were included in this analysis. The 10% passage dates where then converted to Julian Dates (i.e., day of the year) for linear regression analyses.

In addition to adult count data, FPC staff also collected temperature data for the period of March 15th to May 31st for each of the return years we analyzed. For this portion of the analysis, we relied on temperature data that were collected at the Warrendale Total Dissolved Gas gauge, which is found approximately 6 miles downstream of BON. Temperature data from the Warrendale gauge were only available from 1994 to 2009. Flow data from BON were also collected over the same periods of time. In order to describe the temperatures and flow conditions that spring Chinook might encounter in the beginning of the run, we estimated an average temperature and average flow from March 15th to April 1st. All of the estimates of 10% passage date and each of the environmental variables can be found in Table 1.

Table 1. Estimated 10% passage date for spring Chinook at Bonneville Dam from 1994 to 2009. Average temperature, cumulative degree days, and average flow are for the period of March 15th to April 1st of each year.

Return Year	10% Passage Date	10% Passage Date (Julian)	Average Temperature (°F)	Average Flow (Kcfs)
1994	11-Apr	101	45.6	139.6
1995	9-Apr	99	46.9	188.1
1996	19-Apr	110	44.4	304.3
1997	12-Apr	102	44.4	333.1
1998	10-Apr	100	46.6	206.3
1999	18-Apr	108	44.2	273.1
2000	10-Apr	101	44.8	190.0
2001	5-Apr	95	44.5	126.8
2002	16-Apr	106	42.6	133.2
2003	3-Apr	93	46.3	180.3
2004	17-Apr	108	46.0	155.7
2005	23-Apr	113	44.8	136.3
2006	2-May	122	43.5	163.7
2007	20-Apr	110	44.5	247.9
2008	21-Apr	112	43.6	153.0
2009	29-Apr	119	42.1	148.9

The relationship between 10% passage date (Julian) and each of these environmental variables was investigated using linear regression analyses. Linear regression analysis revealed a significant relationship between average temperature (Mar. 15-Apr. 1) and 10% passage date ($p = 0.006$) (Figure 1). Later 10% passage dates were associated with lower average temperatures during the period of March 15th and April 1st. There was no significant relationship between average flow (Mar. 15-Apr. 1) and 10% passage date (($p = 0.886$) (Figure 2).

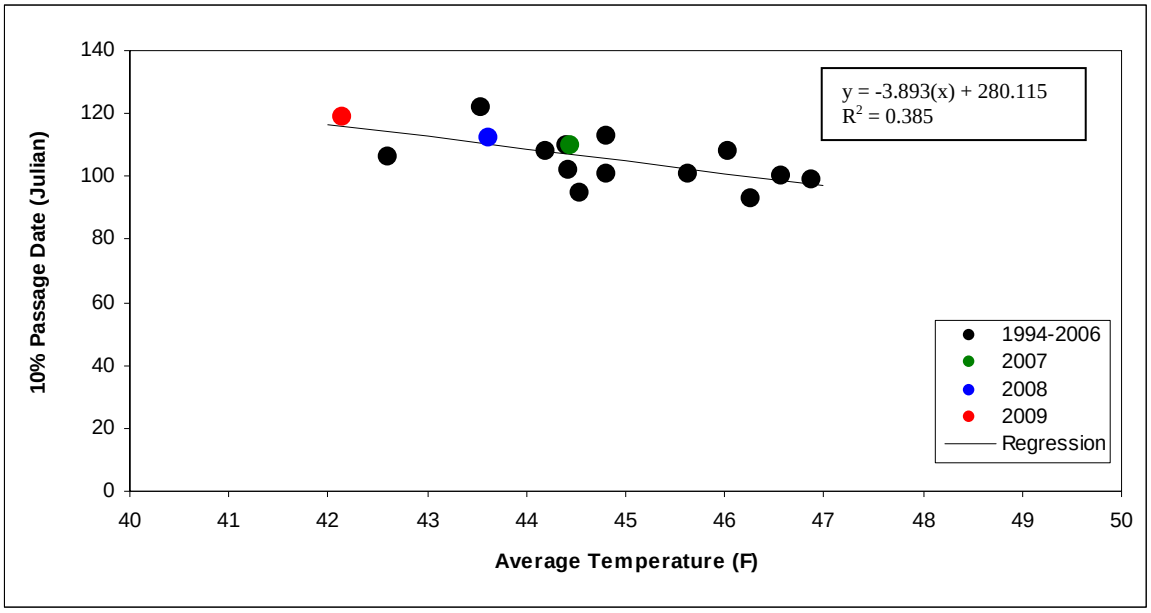

Figure 1. Linear regression of average temperature (°F) (Mar. 15-Apr. 1) and estimated 10% passage date for spring Chinook adults at BON.

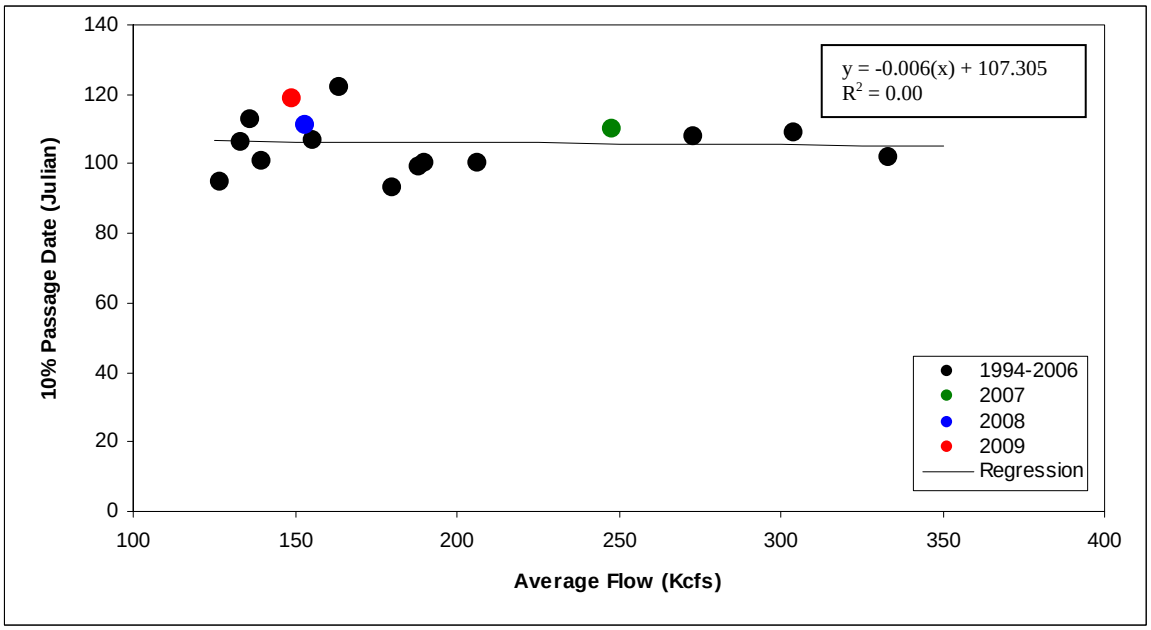

Figure 2. Linear regression of average flow (Kcfs) (Mar. 15-Apr. 1) and estimated 10% passage date for spring Chinook adults at BON.

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DATA REQUEST FORM

Request Taken By: Jerry McCann **Date:** 10/30/09

Data Requested By:
Name: PAUL WAGNER **Phone:**
Address: **Fax:**
Email:

Data Requested: SPRING CHINOOK ADULT TIMING ANALYSIS
IS ~~DOES~~ TIMING AFFECTED TEMPERATURE, FLOW??

Data Format: **Hardcopy** ☐ **Text** ☐ **Excel** ☐

Delivery: **Mail** ☐ **Email** ☑ **Fax** ☐ **Phone** ☐

Comments:
Memo attached

Data Compiled By: **Date:** 5-NOV 09

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