FISH PASSAGE CENTER

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MEMORANDUM

TO: Liz Hamilton, NSIA

FROM: Michele DeHart, Fish Passage Center

DATE: February 10, 2012

RE: Summer migration, Columbia River

In response to your request the Fish Passage Center staff has summarized available data regarding anadromous fish summer migration through the Columbia River and conditions that effect their migration. Juvenile migration data has been collected through the Columbia/Snake River basin since 1985. An analysis of anadromous fish summer migration has continued through the Smolt Monitoring Program and also through the basinwide Comparative Survival Study, which began in 2000.

Summer Migrants – Who are they?

- The NOAA Biological Opinion developed under the auspices of the Endangered Species Act, designates the summer migration period in the Columbia River at McNary Dam, **from July 1 through August 31,** although monitoring data shows that juvenile salmon continue to migrate through the Columbia River well into the fall months. The NOAA Biological Opinion has established a minimum target flow at McNary Dam of 200 Kcfs, from July 1 through August 31, for summer migrants based upon many years of monitoring data that showed that flow (Water Transit Time) is important for a successful fall Chinook migration.
- The summer migration period is dominated by juvenile Fall Chinook salmon of wild and hatchery origin from the Columbia, and Snake River basins. Wild fall Chinook have an extended and protracted migration. Steelhead and spring/summer Chinook are also present during the summer period in smaller numbers.

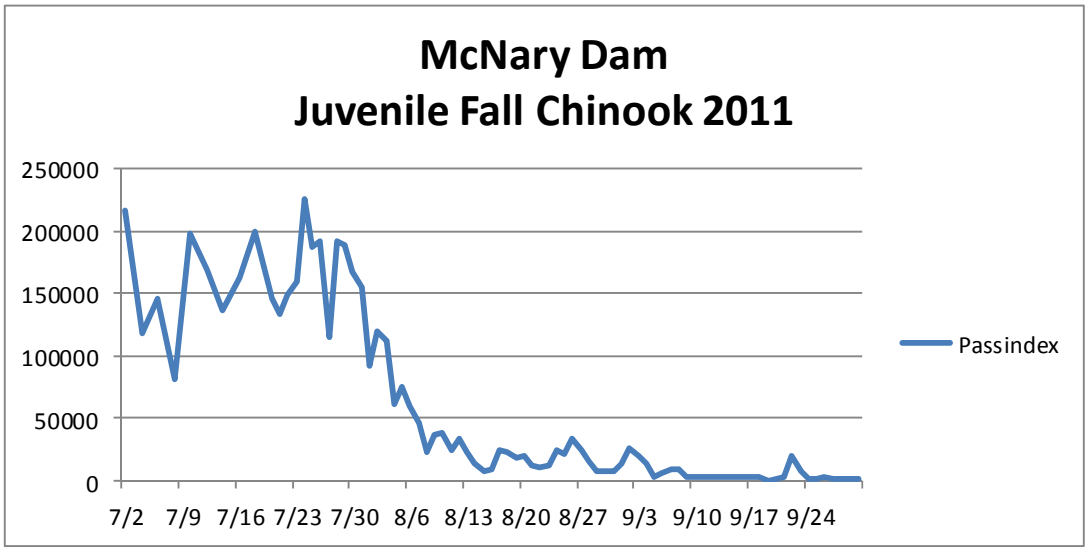
- Fall Chinook represent a major component of the sport, commercial and tribal fisheries in fresh and salt water area of Washington and Oregon.

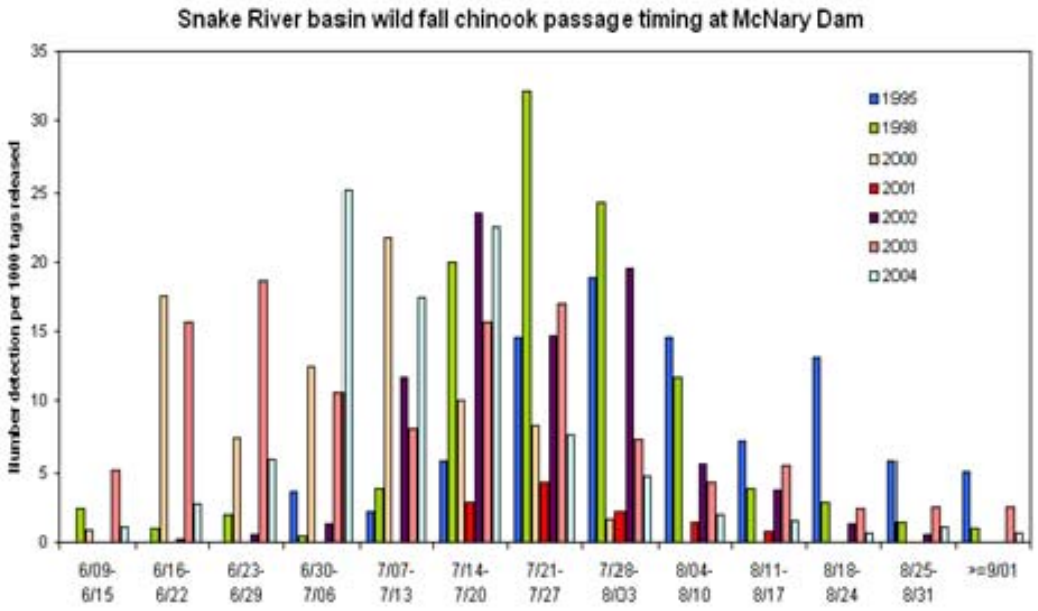
Factors limiting fall Chinook survival

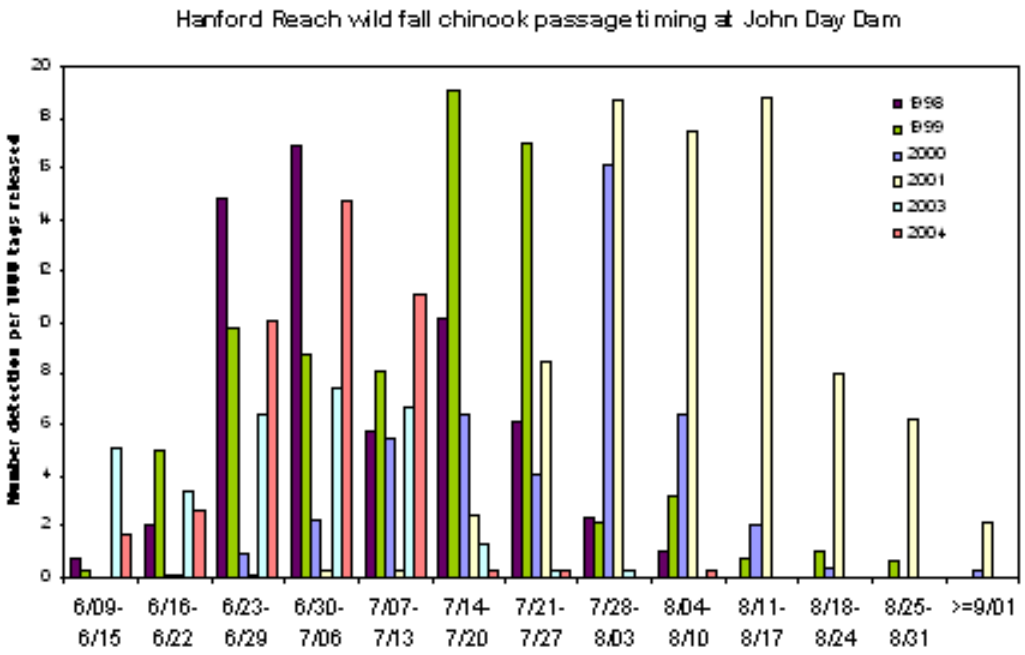
- **Migration flow targets are not being met**. Although the NOAA Biological Opinion establishes flow targets for fall Chinook at McNary Dam, of 200 Kcfs for juvenile salmon, the flow targets have only been met in extremely high run-off volume years such as 2011. The Biological Opinion flow target for the summer period has only been met in one of the last 12 years.
- **The development of the hydrosystem** has increased the cross sectional area of the Columbia River, resulting in lower water velocities. Juvenile salmon and steelhead migration travel time is dependent upon adequate velocities, in other words flow. Lower flow results in slower travel time, more exposure to predators, and higher water temperatures and disease.
- At the present time the **operation of upstream storage reservoirs for irrigation**, and power generation and water withdrawals for irrigation have limited the ability of the system to provide the Biological Opinion flow targets in the Columbia River during the summer migration period.
- The **cumulative additive effects** of many actions that alone might not seem significant have resulted in the present inability to meet Biological Opinion summer flow targets. For example; the region in 2008, elected to reduce the draft of Montana Reservoirs for fish migration, in all but the lowest flow years, reducing summer flows. In addition, the cross sectional area of the migration corridor is increased, and water velocity is decreased by operating reservoirs such as John Day at higher elevations to meet irrigation withdrawal pumping requirements. Water storage and withdrawal upstream reduces the summer flow in the lower river. The reduction in the summer draft of Montana Reservoirs in all but the lowest flow years increased the fish travel time across the reach by decreasing river flow an average of 7.3 Kcfs daily through the summer period.
- According to NOAA (2005) fish travel time depends on flow and flow changes had larger incremental effects on fish travel time at low flows than at high flows. Flows are lower in the summer so reductions or increases in flow have a larger effect.

When are summer migrants present in the McNary to Bonneville river reach?

- Summer migrants, which are primarily fall Chinook, are present in the Columbia River below McNary Dam throughout the summer and fall months. The data for the run at large as well as the individual stock timing demonstrates the presence that time period.


McNary Dam
Juvenile Fall Chinook 2011
250000
200000
150000
100000
50000
0
7/2 7/9 7/16 7/23 7/30 8/6 8/13 8/20 8/27 9/3 9/10 9/17 9/24
Passindex

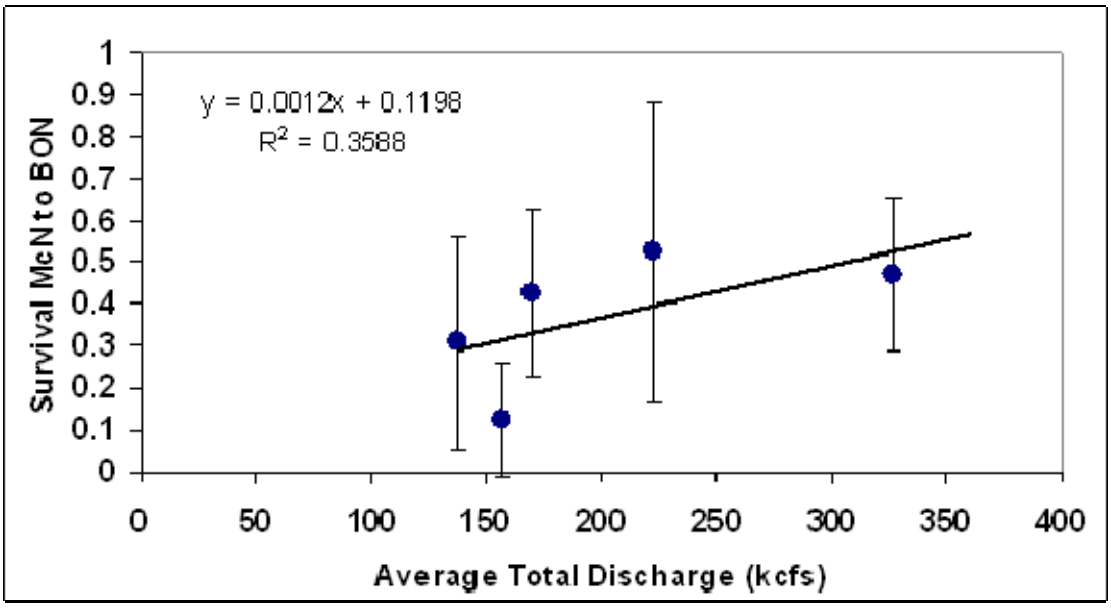

Snake River basin wild fall chinook passage timing at McNary Dam
Number detection per 1000 tags released
35
30
25
20
15
10
5
0
1995
1998
2000
2001
2002
2003
2004
6/09-6/15
6/16-6/22
6/23-6/29
6/30-7/06
7/07-7/13
7/14-7/20
7/21-7/27
7/28-8/03
8/04-8/10
8/11-8/17
8/18-8/24
8/25-8/31
>=9/01



Juvenile Survival of summer migrants

- Monitoring data and analyses show that the most important factors affecting juvenile salmon survival are flow (water travel time, velocity) and spill at hydroelectric projects. The Comparative Survival Study (CSS) is a collaborative study and analyses of the Idaho Department of Fish and Game, the Oregon Department of Fish and Wildlife, the Washington Department of Fish and Wildlife, the Columbia River Intertribal Fish Commission and the US Fish and Wildlife Service. The CSS Annual Report (2011) concluded that the most important variables affecting juvenile fall Chinook travel time and survival was flow (Water Travel Time) and spill at hydroelectric projects.
- Juvenile Fall Chinook survival increases as flow increases and as spill increases. Survival decreases when flow decreases and spill decreases. The importance of flow for juvenile fall Chinook migration was first documented in 1993, when researchers found that 65% of the variation in juvenile fall Chinook travel time was due to average river flow in the McNary to Bonneville River Reach. (Berggren and Filardo 1993).

- The available data from PIT tag recovery sites in the Lower Columbia (2008 -2009) indicate the apparent relation between flow and survival of sub-yearling fall Chinook. Survival decreases as flow decreases.

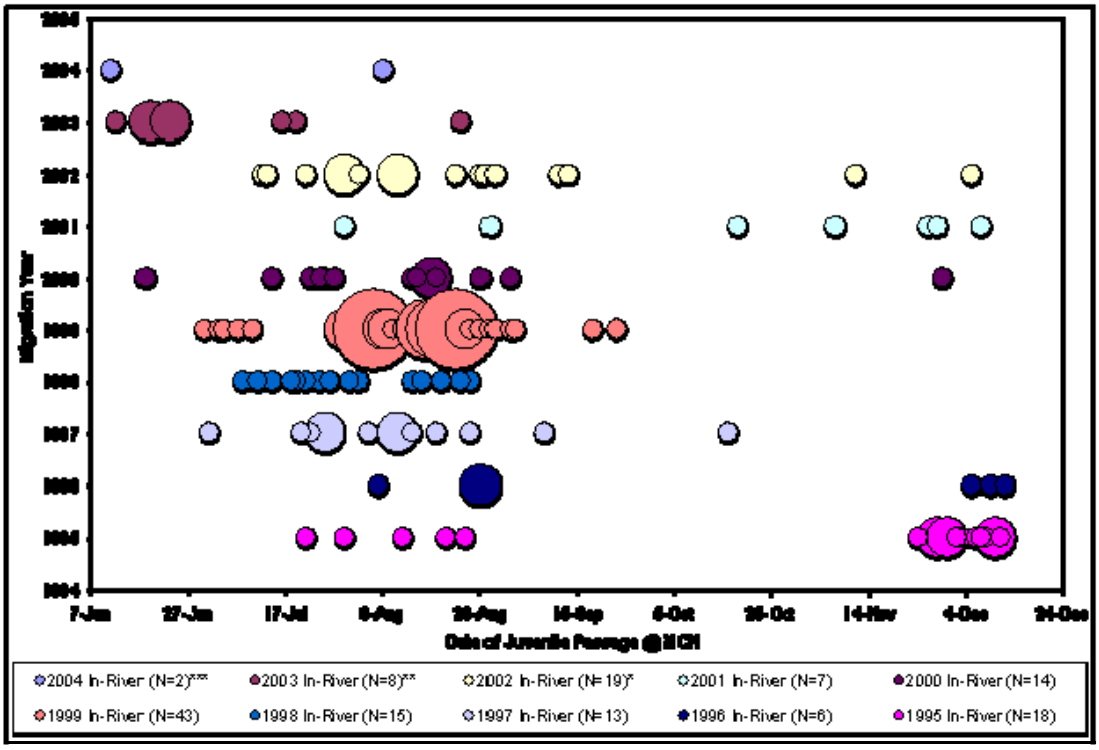


Subyearling Chinook survival in relation to average discharge from McNary Dam to Bonneville Dam during two-week intervals between June 16 and July 31, for the years 2008 and 2009.

- The Fish Passage Center (2006) analyzed the effect of flow on juvenile fall Chinook travel time between McNary and Bonneville Dam and concluded that based on the available data our analyses suggest that Snake River origin subyearling Chinook travel time is a function of flows throughout July and August. The longer travel times observed for fish migrating in August are likely explained by lower flows during that time period. Decreasing flows lower than the BIOP flow target would be expected to translate into increasing travel times for subyearling migrants in the lower River between McNary and Bonneville dams.

Adult Returns of Summer Migrants

- PIT tag data indicates that Fall Chinook migrating through the Lower Columbia during the summer period make a significant contribution to adult returns (FPC 2007). For data from 1995 to 2004, most years (7 out of 10) showed that the majority of the returning adults that migrated in-river as juveniles were detected at McNary Dam between August and December.



Juvenile passage timing at McNary Dam for in-river subyearling fall Chinook that survived to adulthood (MY 1995-2004). Numbers of PIT-tagged adults returning for each migration year are shown in the figure legend in parentheses. Larger circles reflect larger number of PIT-tags passing on a particular date.
* 5-year ocean fish from MY 2002 have not yet returned
** 4 and 5-year ocean fish from MY 2003 and not yet returned
*** 3, 4, and 5-year ocean fish from MY 2004 have not yet returned

References:

Berggren, T.J., and Filardo, M.J. 1993. An analysis of variables influencing the migration of juvenile salmonids in the Columbia River basin. N. Amer. J. Fish. Manag. 13: 48-63.

Comparative Survival Study Annual Reports, 2000 through 2011, www.fpc.org.

Fish Passage Center, 2006. Trends in Travel Time of subyearling Chinook in the McNary Dam to Bonneville Dam during July and August. Memorandum, June 22, 2006. http://www.fpc.org/documents/memos/83-06.pdf.

Fish Passage Center, 2007. Water Travel Time through JDA Pool at Minimum Irrigation Pool and at Minimum Operating Pool at Various Flows and the Impact of the Montana Plan as Outlined in the Proposed Action, February 7, 2007. http://www.fpc.org/documents/memos/22-07.pdf .

Fish Passage Center, 2007. Juvenile passage timing at McNary Dam for in-river and transported Snake River subyearling Chinook that survived to adulthood. Memorandum, July 18, 2007, http://www.fpc.org/documents/memos/120-07.pdf.

Fish Passage Center Annual Reports, 1998 through 2011, http://www.fpc.org/documents/FPC_Annual_Reports.html.

Williams, J.G., S.G. Smith, R.W. Zabel, W.D. Muir, M.D. Scheuerell, B.P. Sandford, D.M. Marsh, R.A. McNatt, and S. Achord. 2005. Effects of the federal Columbia River power system on salmonid populations. U.S. Dept. Commer., NOAA Tech. Memo. NMFS-NWFSC-63, 150 p.

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DATA REQUEST FORM

Request Taken By: M. DeHart **Date:** 2/9/12

Data Requested By:
Name: Liz Hamilton **Phone:**
Address: NW Sportfishing Industry Assn. **Fax:**
Email: www.nsiatishing.org

Data Requested:
Summarize the current available info for anadromous fish factors affecting survival during summer months. (See attached email)

Data Format: Hardcopy ☐ Text ☑ Excel ☐

Delivery: Mail ☐ Email ☑ Fax ☐ Phone ☐

Comments:

Data Compiled By: MD/MF **Date:** 2/10/12

Request # 9

G:\STAFF\DOCUMENT\FORMS\Templates\data request form template.doc

Margaret Filardo

From: Michele Dehart
Sent: Thursday, February 09, 2012 3:46 PM
To: Margaret Filardo
Subject: FW: Data request

Here it is

From: NSIALIZ@aol.com [mailto:NSIALIZ@aol.com]
Sent: Thursday, February 09, 2012 3:39 PM
To: Michele Dehart
Subject: Data request

Michele,

Would you summarize the current available information summarizing for anadromous fish (both juvenile and adult) factors affecting their migration and survival during summer months in the Columbia?

In Service,

Liz Hamilton, Executive Director
Northwest Sportfishing Industry Assn.
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