



FISH PASSAGE CENTER

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MEMORANDUM

TO: Pete Hassemer (IDFG)

FROM: Michele DeHart

DATE: June 6, 2011

RE: Juvenile and adult passage timing of Salmon River spring/summer Chinook (2006-2010).

In response to your request, the FPC staff has conducted an analysis of PIT-tag data for Salmon River spring/summer Chinook. Specifically, the FPC staff used hatchery spring/summer Chinook juveniles that were reared and PIT-tagged at the Pahsimeroi (PAHP) (summer Chinook), McCall (MCCH) (summer Chinook), Rapid River (RAPH) (spring Chinook), and Sawtooth (SAWH) (spring Chinook) hatcheries in migration years 2006-2010. The FPC staff used detections of these PIT-tagged juveniles at Lower Granite Dam (LGR) to describe passage timing and travel time for each of these release groups. Since many of these PIT-tagged juveniles are part of the Comparative Survival Study, we are providing in-river survival estimates (LGR-BON) for each group from the 2010 CSS report. Finally, the FPC staff analyzed adult PIT-tag detections at Bonneville Dam (BON) for each of these hatchery groups in order to describe the adult passage timing. Below is a brief summary of our findings, followed by a more detailed discussion.

- There does not seem to be a difference in the passage timing of spring Chinook juveniles from RAPH and SAWH when compared to summer Chinook juveniles from MCCH and PAHP.
- Since migration year 2008, in-river survivals (LGR-BON) for summer Chinook from MCCH have been lower than that for spring Chinook from RAPH.

- At BON all Chinook adults counted prior to June 1st are considered spring Chinook. Chinook adults counted at BON from June 1st to July 31st are considered summer Chinook. However, according to the U.S. vs. Oregon Technical Advisory Committee (TAC), summer Chinook are those adult Chinook counted at BON after June 15th.
- Based on PIT-tags, spring Chinook adults from RAPH and SAWH typically pass BON earlier than summer Chinook adults from MCCH and PAHP.
 - Over the past 5 years, the average 50% passage date for PIT-tagged RAPH spring Chinook adults is May 27th. Over the past 3 years, the average 50% passage date for PIT-tagged SAWH spring Chinook adults is May 31st.
 - Over the past 5 years, the average 50% passage date for PIT-tagged MCCH (Knox Bridge release) summer Chinook adults is June 25th. Over the past 4 years, the average 50% passage date for PIT-tagged MCCH (Johnson Creek release) summer Chinook adults is June 17th. Pahsimeroi Hatchery summer Chinook adults tend to pass BON even later, with an average 50% passage date of July 6th, over the past 3 years.

Background:

Rapid River (RAPH) and Sawtooth (SAWH) hatcheries both rear spring Chinook juveniles that are released into the Salmon River Basin. Rapid River Hatchery (RAPH) has been PIT-tagging spring Chinook juveniles as part of the Comparative Survival Study (CSS) since 1997. These PIT-tagged juveniles are volitionally released from the hatchery, typically in mid-March. Juveniles reared at SAWH are typically released directly from the hatchery in mid-April. Occasionally, PIT-tagged spring Chinook from SAWH are released into Yankee Fork, a tributary of the Salmon River. Some level of PIT-tagging has taken place at SAWH over the years. Beginning in 2009, the PIT-tagging effort at SAWH was increased with additional numbers of PIT-tags from the Lower Snake River Compensation Plan (LSRCP) and the first use of PIT-tags from the CSS.

McCall (MCCH) and Pahsimeroi (PAHP) hatcheries both rear summer Chinook juveniles that are released into the Salmon River Basin. McCall Hatchery (MCCH) has been PIT-tagging summer Chinook juveniles as part of the CSS since 1997. Over the past five years, these PIT-tagged juveniles have been released at Knox Bridge, typically in mid-March. In addition to the Knox Bridge releases, several thousand PIT-tagged juveniles from McCall Hatchery are released into Johnson Creek, a tributary of the South Fork Salmon River. These releases typically take place in mid-March. Summer Chinook juveniles reared at PAHP are typically released directly from the hatchery in late March or early April. As with Sawtooth Hatchery spring Chinook, some level of PIT-tagging has taken place at PAHP over the years. However, in 2009, the PIT-tagging effort at PAHP was increased with additional PIT-tags from the LSRCP and the CSS.

Juvenile Timing and Survival:

To investigate the juvenile passage timing of spring Chinook from RAPH and SAWH compared to that of summer Chinook from MCCH and PAHP, we relied on PIT-tag detections at Lower Granite Dam (LGR). Based on these juvenile PIT-tag detections, we estimated the 10%, 50%, and 90% passage date at LGR, for each of the different release groups, for migration years

2006-2010 (Table 1). Juvenile passage timing graphs were also constructed for each migration year (Figure 1). Finally, based on the release date, we estimated the fish travel time (FTT) from release to LGR. A median FTT was then estimated for each release group over the past five years (2006-2010) (Table 1).

Where applicable, we are including the survival estimates from the most recent CSS annual report (2010 CSS Report). This 2010 CSS Report included juvenile survivals through migration year 2009 for spring Chinook from RAPH and summer Chinook from MCCH and survival estimates for SAWH spring Chinook and PAHP summer Chinook for migration year 2009. We estimated juvenile survival for all groups for migration year 2010 using CSS methodology. Confidence intervals are expressed as the 90% nonparametric bootstrap confidence interval for juvenile survival. Furthermore, we estimated juvenile survival for SAWH and PAHP for past migration years, where applicable. All estimates of survival followed CSS methodology and should be considered preliminary. More finalized estimates of survival for migration year 2010 (and past years for SAWH and PAHP) will be included in the 2011 CSS Annual Report, which will be posted on the FPC website in draft form on August 31st.

Spring Chinook releases from RAPH and SAWH typically take place in March and April, while most summer Chinook releases from MCCH and PAHP take place in mid-March. Despite the differences in release dates between the two stocks, there does not seem to be a clear pattern in the passage timing of PIT-tagged juveniles at LGR (Table 1, Figure 1). It appears that spring and summer Chinook juveniles from the Salmon River are passing LGR at the same time. Furthermore, median fish travel times from release to LGR appear to be similar between spring Chinook and summer Chinook juveniles, particularly when accounting for differences in release dates (Table 1).

The longest time-series of LGR-BON smolt survival estimates generated from the CSS are available for RAPH (spring Chinook) and MCCH (summer Chinook). Estimates for these two are similar for 2006 (Table 1). In migration year 2007, summer Chinook from MCCH had higher in-river survival (LGR-BON) than spring Chinook from RAPH (Table 1). More recently, since migration year 2008, spring Chinook from RAPH have had higher in-river survival (LGR-BON) estimates than summer Chinook from MCCH (Table 1). Where estimates are available, in-river survival (LGR-BON) for summer Chinook from MCCH and PAHP have been similar to those for spring Chinook from SAWH (Table 1).

It should be noted that survival estimates in 2008 should be interpreted with caution. Estimates of survival in the MCN-JDA reach are questionable, due to high mortality in the JDA tailrace (see 2008 FPC Annual Report for more detailed discussion). Furthermore, estimates of survival in the JDA-BON reach are questionable, due to the removal of screens at Bonneville Dam in May 2008.

Table 1 – Juvenile passage timing (10%, 50%, and 90%), fish travel time, and survival (LGR-BON) of PIT-Tagged Chinook released into the Salmon River basin (2006-2010). Reach survival estimates are from the 2010 CSS report (90% confidence intervals in parentheses) and use reach survival estimates of combined T and R groups.

Migration Year	Hatchery –Release Site	Run	PIT-tag Release Date	PIT-Tag Passage Dates			Median Fish Travel Time (days)	LGR-BON Survival
				10%	50%	90%		
2006	McCall H. - Johnson Creek	Su	3/13/06	5/3	5/14	5/20	62.44	N/A
	McCall H. - Knox Bridge	Su	3/21/06	4/26	5/6	5/15	46.14	0.60 ^A (0.54-0.67)
	Pahsimeroi H.	Su	3/17/06	4/26	5/2	5/11	45.98	N/A
	Sawtooth H. - Sawtooth	Sp	4/19/06	5/3	5/8	5/16	18.82	N/A
	Sawtooth H. - Yankee Frk	Sp	4/21/06	5/4	5/11	5/18	19.60	N/A
	Rapid River H.	Sp	3/17/06 - 3/18/06 & 3/21/06	4/26	5/5	5/13	49.16 ^B	0.55 ^A (0.50-0.61)
2007	McCall H. - Johnson Creek	Su	3/12/07-3/14/07	5/2	5/10	5/19	59.39	N/A
	McCall H. - Knox Bridge	Su	3/19/07	4/28	5/5	5/15	47.00	0.82 (0.73-0.92)
	Pahsimeroi H.	Su	4/9/07	5/2	5/5	5/11	25.75	N/A
	Sawtooth H.	Sp	4/11/07	5/2	5/8	5/13	26.56	N/A
	Rapid River H.	Sp	3/15/07	4/30	5/4	5/12	50.35 ^B	0.63 (0.56-0.72)
2008	McCall H. - Johnson Creek	Su	3/10/08 - 3/12/08	5/5	5/14	6/2	47.56	N/A
	McCall H. - Knox Bridge	Su	3/17/08	5/4	5/11	5/19	54.68	0.36 (0.29-0.46)
	Pahsimeroi H.	Su	3/31/08	5/1	5/8	5/15	38.17	N/A
	Sawtooth H. - Sawtooth	Sp	4/23/08	5/10	5/14	5/18	20.36	N/A
	Rapid River H.	Sp	3/17/08 & 3/19/08	5/4	5/10	5/17	52.61 ^B	0.56 (0.46-0.72)
2009	McCall H. - Johnson Creek	Su	3/16/09 - 3/18/09	5/8	5/21	5/28	64.42	N/A
	McCall H. - Knox Bridge	Su	3/24/09	4/26	5/13	5/21	50.14	0.57 (0.50-0.67)
	Pahsimeroi H.	Su	3/30/09	4/19	4/24	5/4	24.76	0.68 (0.54-0.89)
	Sawtooth H. - Sawtooth	Sp	4/14/09	4/28	5/6	5/16	21.97	0.62 (0.47-0.91)
	Rapid River H.	Sp	3/16/09	4/25	5/12	5/20	57.37 ^B	0.71 (0.61-0.85)
2010	McCall H. - Johnson Creek	Su	3/15/10 - 4/6/10	5/5	5/20	5/30	47.56	N/A
	McCall H. - Knox Bridge	Su	3/23/10	4/29	5/12	5/22	49.50	0.59 (0.53-0.67)
	Pahsimeroi H.	Su	3/30/10	4/24	4/19	5/5	30.55	0.52 (0.39-0.75)
	Sawtooth H. - Sawtooth	Sp	4/9/10 & 4/20/10	5/1	5/8	5/20	29.32	0.55 (0.44-0.72)
	Sawtooth H. - Yankee Fork	Sp	4/20/10	5/14	5/20	5/24	29.95	N/A
	Rapid River H.	Sp	3/15/10	4/29	5/11	5/20	57.10 ^B	0.71 (0.61-0.79)

^A Per/mile survival rate applied for JDA-BON reach (25% of reach)

^B Uncorrected first date of volitional release period used in estimation of median FTT.

Adult Timing:

For adult counts at the dams, the determination of spring and summer Chinook is based on date of passage. At Bonneville Dam, all Chinook adults counted prior to June 1st are considered spring Chinook. Chinook adults counted at BON from June 1st to July 31st are considered summer Chinook and Chinook adults counted at BON on or after August 1st are considered fall Chinook. This determination based on date of passage means that early summer Chinook may be counted as spring Chinook and late spring Chinook maybe counted as summer Chinook. Therefore, dam count data should be considered with caution. It should be noted that the U.S. vs. Oregon Technical Advisory Committee (TAC) uses a June 15th BON cut-off date to separate spring Chinook adults from summer Chinook adults.

To investigate the adult passage timing of spring Chinook from RAPH and SAWH compared to that of summer Chinook from MCCH and PAHP, we relied on adult PIT-tag detections at Bonneville Dam (BON). Based on these adult PIT-tag detections, we estimated the 10%, 50%, and 90% passage date at BON, for each of the different release groups, for return years 2006-2010 (Table 2). Adult passage timing graphs were also constructed for each migration year (Figure 2).

Table 2. Adult passage timing (10%, 50%, and 90%) of PIT-Tagged Salmon River Chinook detected at Bonneville Dam in 2006-2010.

Return Year	Hatchery – Release Site	Run	PIT-tag Passage Date			Number Detections
			10%	50%	90%	
2006	Rapid River H	Sp	5/5	6/29	7/18	286
	McCall H - Knox Bridge	Su	6/8	7/11	7/31	651
2007	Rapid River H	Sp	4/23	5/10	7/14	248
	McCall H - Knox Bridge	Su	5/25	6/20	7/22	467
	McCall H - Johnson Creek	Su	5/16	6/11	7/9	29
2008	Rapid River H	Sp	4/27	6/29	7/19	1,154
	Sawtooth H - Sawtooth	Sp	5/16	6/15	7/23	66
	McCall H - Knox Bridge	Su	5/27	7/12	8/2	1,343
	McCall H - Johnson Creek	Su	5/26	7/9	8/3	112
	Pahsimeroi H	Su	7/12	7/29	8/15	116
2009	Rapid River H	Sp	4/27	5/9	6/4	1,009
	Sawtooth H - Sawtooth	Sp	5/7	6/4	7/25	150
	McCall H - Knox Bridge	Su	5/19	6/13	7/19	913
	McCall H - Johnson Creek	Su	5/27	6/14	6/30	82
	Pahsimeroi H	Su	6/14	7/9	7/29	268
2010	Rapid River H	Sp	4/15	4/27	5/14	1,589
	Sawtooth H - Sawtooth	Sp	4/29	5/12	6/22	67
	McCall H - Knox Bridge	Su	5/16	6/7	7/13	516
	McCall H - Johnson Creek	Su	5/14	6/2	6/21	60
	Pahsimeroi H	Su	5/15	6/10	6/28	102

Over the past five return years (2006-2010), PIT-tagged spring Chinook adults from RAPH and SAWT routinely pass BON earlier than PIT-tagged summer Chinook adults from MCCH and PAHP (Table 2, Figure 2). For example, over the past five years, the average 50% passage

date for adult PIT-tagged RAPH spring Chinook at BON is approximately May 27th. The average 50% passage date for adult PIT-tagged MCCH summer Chinook adults at BON is almost a month later, approximately June 25th. In general, PIT-tagged adult spring Chinook from SAWH are detected at BON earlier than summer Chinook from MCCH and PAHP but later than spring Chinook from RAPH (Table 2, Figure 2). Finally, PIT-tagged summer Chinook adults from PAHP generally exhibit the latest timing at BON (Figure 2), with an average 50% passage date of July 6th, over the past three years.

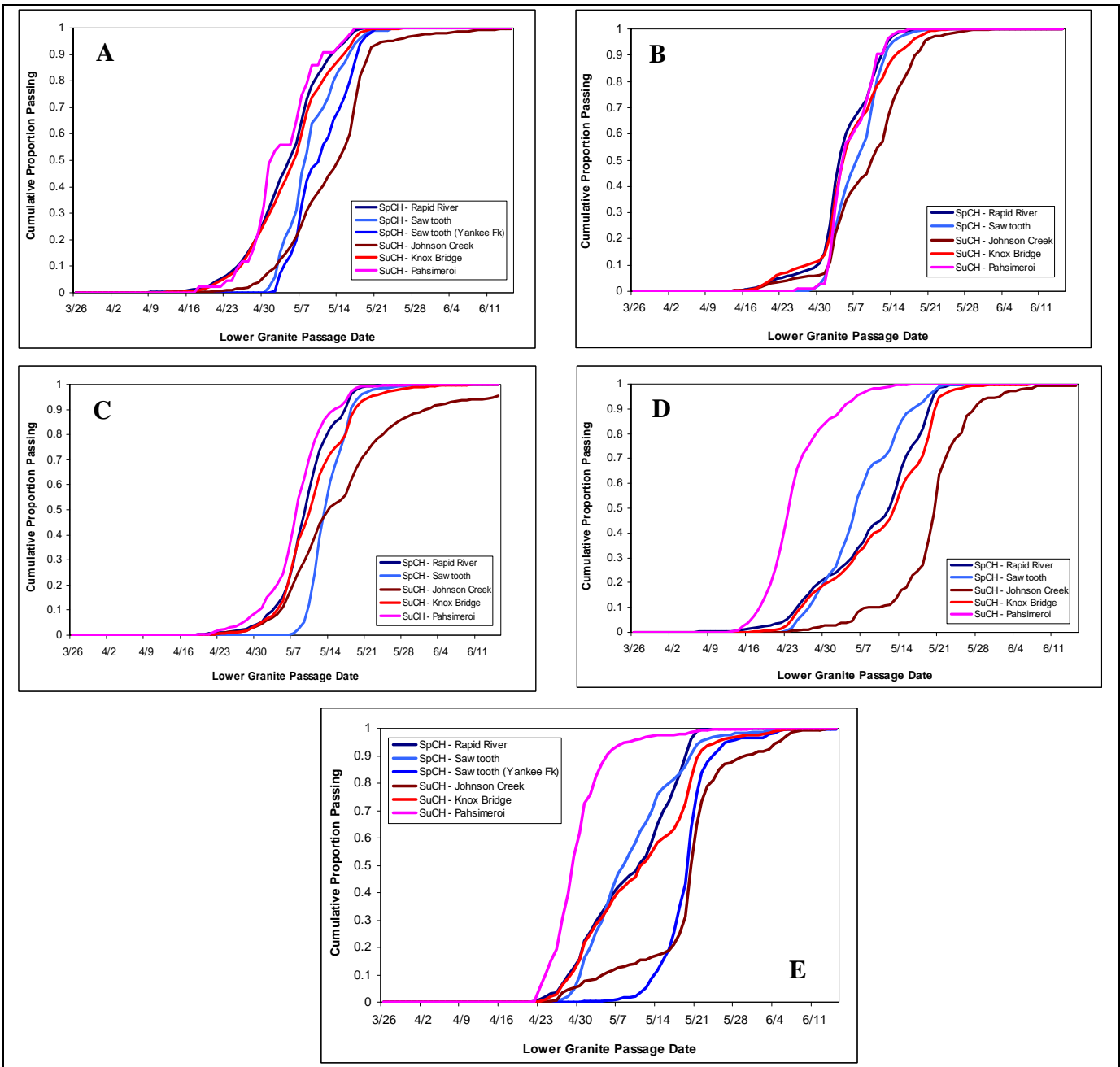


Figure 1. Cumulative juvenile passage timing of PIT-tagged spring and summer Chinook from RAPH, SAWH, MCCH, and PAHP at Lower Granite Dam in migration years 2006 (A), 2007 (B), 2008 (C), 2009 (D), and 2010 (E).

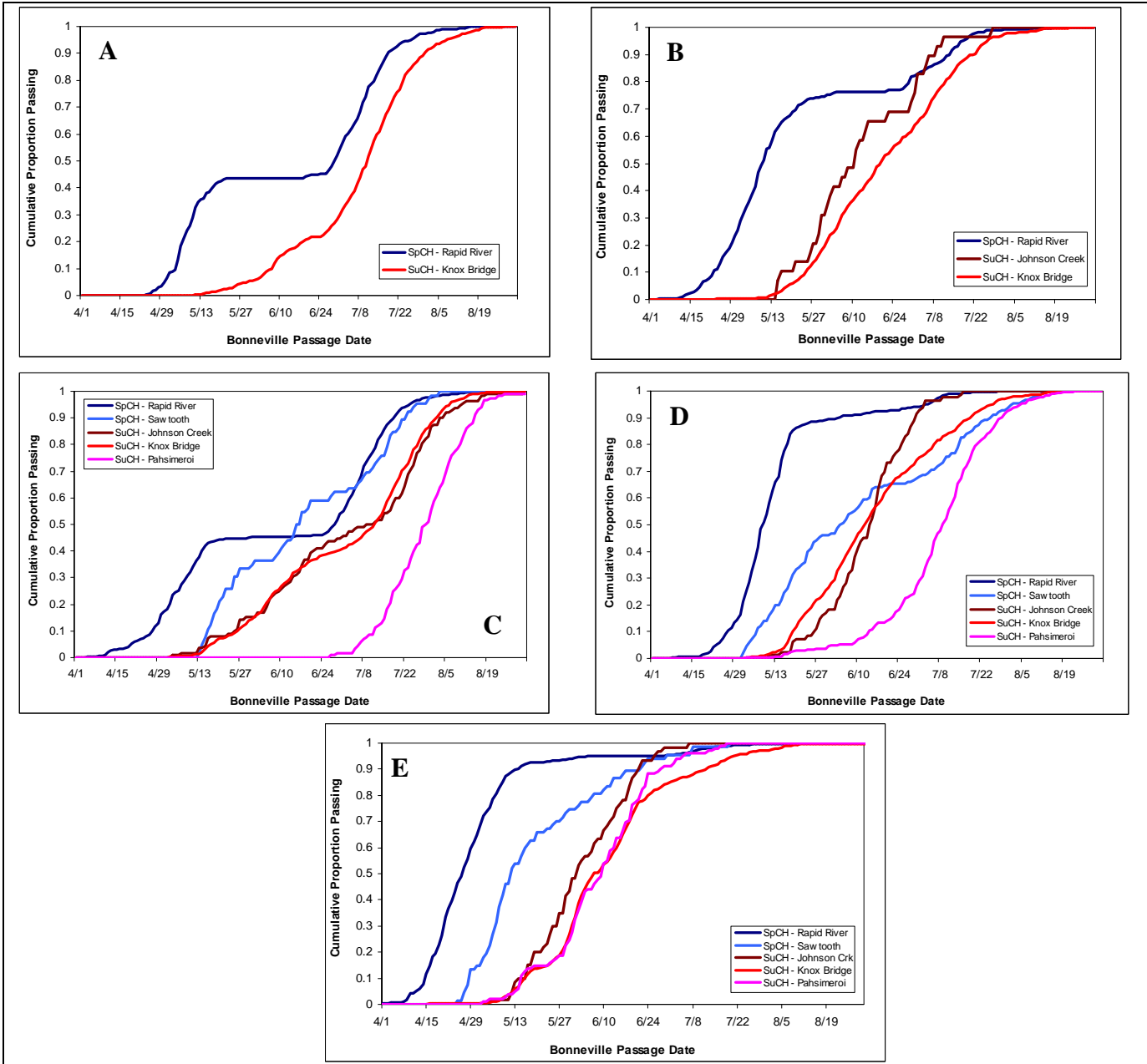


Figure 2. Cumulative adult passage timing of PIT-tagged spring and summer Chinook from RAPH, SAWH, MCCH, and PAHP at Bonneville Dam in migration years 2006 (A), 2007 (B), 2008 (C), 2009 (D), and 2010 (E).



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DATA REQUEST FORM

Request Taken By: Michele Date: 5-31-2011

Data Requested By:
 Name: Pete Hussemmer Phone: _____
 Address: IDFG Fax: _____
 Email: _____

conserve to Rapid River
 Data Requested:
 out migration conditions for Snake River
 Summer Chinook - in 08, 09, and 10,
 for Passemmeri and McCall also
 South Fork Salmon / also juvenile summer
 also plot the adult PIT tag returns
 of McCall + Passemmeri; adult summer
 Chinook -

Data Format: Hardcopy Text Excel
 Delivery: Mail Email Fax Phone

Comments:
got the Tom's plots - of adult
summer chinook return @
Bonnaville

Data Compiled By: [Signature] Date: 6-June-2011

Request # 47