



# FISH PASSAGE CENTER

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## MEMORANDUM

TO: Diane Deal, ODFW

FROM: Brandon R. Chockley

DATE: December 13, 2013

RE: Lookingglass Hatchery Report (1997–2013)

The Fish Passage Center has been marking fish from the Lookingglass Fish Hatchery facility over the last several years as part of the Smolt Monitoring Program (SMP) and the Comparative Survival Study (CSS). For purposes of these studies data are collected on either the juvenile life stage, or both the juvenile and adult life stages. The SMP provides information for in-season management of the hydrosystem and post-season analyses to the federal, state, and tribal fishery agencies. The CSS is a multi-year program that estimates survival rates over different life stages for spring and summer Chinook produced in major hatcheries. We would like to share with you an update of some of the information we developed under these studies for the Chinook used from the Lookingglass Hatchery facilities (Imnaha and Catherine Creek Acclimation Ponds).

Under the Smolt Monitoring Program, information is collected on the timing and migration speed from the hatchery to Lower Granite Dam (LGR). In addition, as part of the CSS study, juvenile survival estimates are developed for the hydrosystem between Lower Granite and Bonneville Dams, as well as survival to adulthood of different passage histories.

The tables below provide estimates of minimum, median, and maximum travel times from release to Lower Granite Dam for the Imnaha River (Table 1) and Catherine Creek Acclimation Pond (Table 2) releases. In 2012 and 2013, two release sites were used for the Imnaha River releases. The release sites were the Imnaha Weir (IMNAHW) and the Imnaha River (IMNAHR). Travel times for the Imnaha River releases (Table 1) are for both of these release sites combined and are estimated based on the release date. There were also two release

sites and strategies used for Catherine Creek releases in 2012. These two release types were a volitional release from Catherine Creek Acclimation Pond (CATHEP) and a direct stream release into Catherine Creek (CATHEC). For the CATHEP release, travel times were estimated as the date of arrival at LGR minus the date of detection at the acclimation pond detection site (CCP). For the direct release (CATHEC), travel times were estimated as the date of arrival at LGR minus the release date. In 2013, releases into Catherine Creek were only made from the CATHEP site. Given this, travel times for 2013 were estimated as the date of arrival at LGR minus the date of detection at the acclimation pond detection site (CCP). The tables below also provide the 95% confidence limits around the estimated median travel times.

**Table 1.** Imnaha River – Spring Chinook Travel Time to Lower Granite Dam

Release Date(s)	Migration Year	Travel Time (Days)			95% Confidence Limits	
		Min	Med	Max	Lower	Upper
Apr-7	1997	9.1	28.1	79.7	27.9	28.7
Apr-6	1998	8.3	26.2	60.8	26.0	26.3
3/16, 4/5	1999	5.1	54.7	175.6	54.4	54.9
22-Mar	2000	15.7	42.8	66.3	42.5	43.1
21-Mar	2001	8.8	42.1	93.0	41.7	42.2
21-Mar	2002	8.2	45.2	66.0	44.9	45.4
1-Apr	2003	7.2	34.6	76.6	34.5	34.7
26-Mar	2004	9.9	38.5	84.4	38.5	38.6
3/26, 3/29	2005	9.3	36.1	78.7	35.9	36.3
3/21, 3/30	2006	6.3	40.6	74.2	40.2	41.0
3/21, 3/31	2007	17.0	41.3	103.5	41.2	41.4
25-Mar	2008	17.4	43.8	163.0	43.7	43.9
30-Mar	2009	13.8	44.6	69.3	44.6	44.8
1-Apr	2010	17.1	41.6	79.5	40.4	41.8
30-Mar	2011	5.7	40.7	66.7	40.6	40.8
30-Mar	2012	1.4	28.6	75.8	28.5	28.7
30-Mar	2013	6.5	38.5	50.7	38.0	38.6

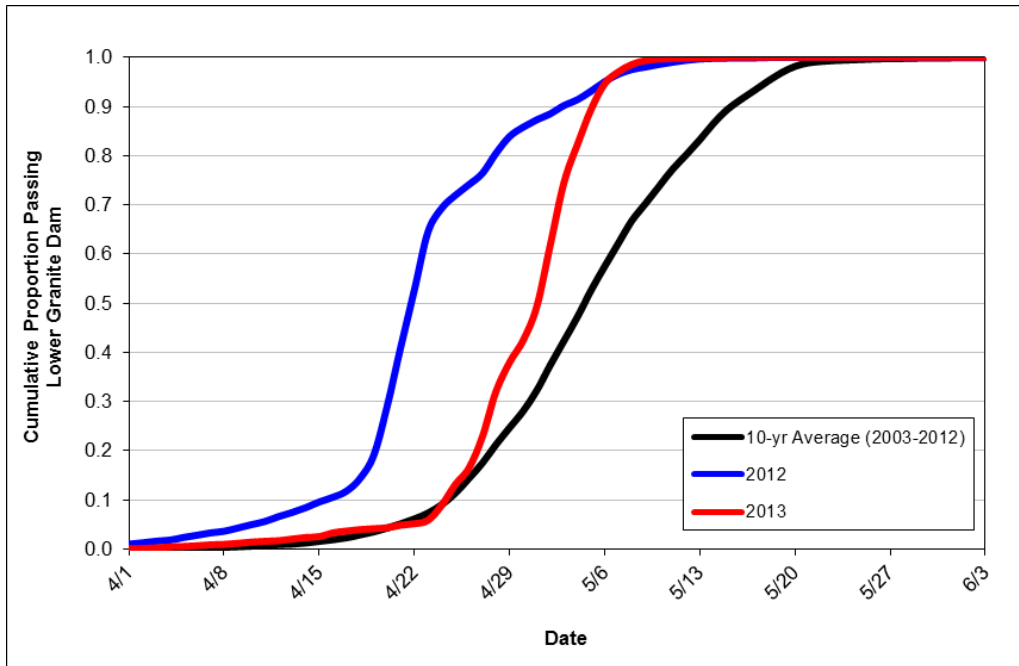
**Table 2.** Catherine Creek – Spring Chinook Travel Time to Lower Granite Dam.

Release Date(s)	Migration Year	Travel Time (Days)			95% Confidence Intervals	
		Min	Median	Max	Lower	Upper
4/2	2001	8.3	28.2	62.8	28.1	28.3
4/1-4/2	2002	12.7	33.9	75.5	33.6	34.2
3/12, 3/23, 3/31	2003	8.2	32.3	74.4	31.6	33.0
3/15, 3/30	2004	11.1	37.5	98.8	37.1	38.4
3/14, 4/4	2005	14.1	34.0	72.7	33.2	34.6
3/27	2006	11.6	31.1	78.8	30.4	31.6
3/26	2007	15.9	30.2	59.5	29.5	30.6
3/24	2008	11.5	28.1	102.8	27.9	28.4
3/16, 3/24	2009	15.5	38.4	101.0	38.0	39.1
3/29	2010	15.0	32.2	64.3	31.5	32.8
3/21,3/30,4/5	2011	11.3	38.8	95.0	38.1	39.4
3/22-4/14; 4/16	2012	9.8	30.8	61.3	30.5	31.2
3/21-4/14	2013	17.5	34.3	54.2	33.7	34.5

As with last year, we are providing you with tables that present the estimated 10%, 50%, and 90% passage dates at Lower Granite Dam for the yearling spring Chinook juveniles that are released from each of these sites (Table 3 for Imnaha River and Table 4 for Catherine Creek). We are also providing two figures to illustrate the 2013 passage timing for Lookingglass Hatchery yearling spring Chinook released for the CSS study. The first of these figures illustrates the passage timing of the 2013 releases to the Imnaha River, compared to those in 2012 and the 10-year average (2003–2012) (Figure 1). The second is a comparison of the passage timing of the 2013 release from Catherine Creek Acclimation Pond, compared to that in 2012 and the 10-year average (2003–2012) (Figure 2).

**Table 3.** Imnaha River – Estimated 10%, 50%, and 90% passage dates at Lower Granite Dam.

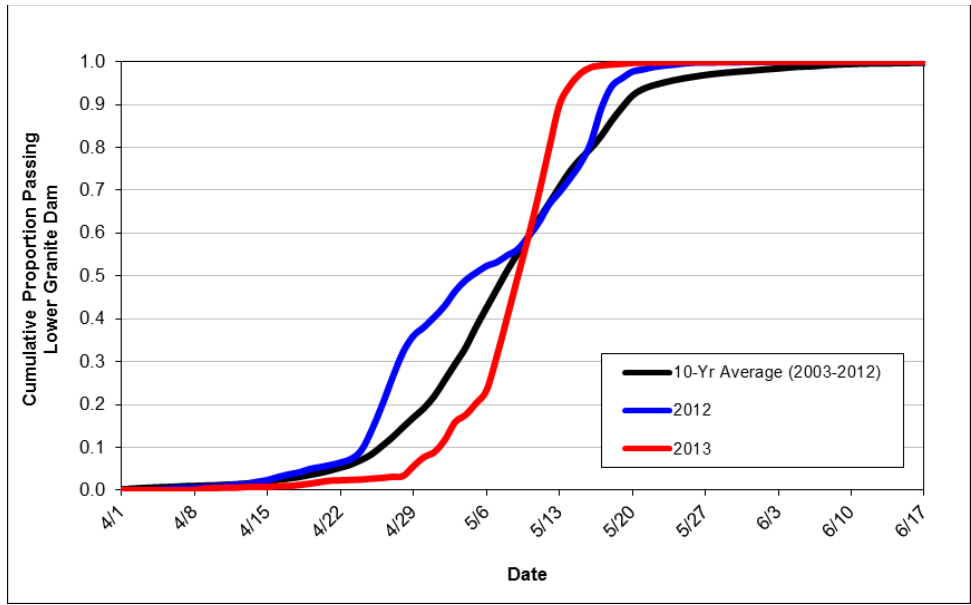
<b>Migration Year</b>	<b>Release Date(s)</b>	<b>10% Passage Date</b>	<b>50% Passage Date</b>	<b>90% Passage Date</b>
1997	7-Apr	26-Apr	6-May	15-May
1998	6-Apr	24-Apr	2-May	9-May
1999	3/16, 4/5	30-Apr	11-May	21-May
2000	22-Mar	24-Apr	4-May	12-May
2001	21-Mar	26-Apr	2-May	15-May
2002	21-Mar	16-Apr	4-May	17-May
2003	1-Apr	24-Apr	5-May	16-May
2004	26-Mar	24-Apr	4-May	9-May
2005	3/26,3/29	25-Apr	2-May	8-May
2006	3/21,3/30	22-Apr	2-May	13-May
2007	3/21,3/31	24-Apr	2-May	11-May
2008	25-Mar	30-Apr	8-May	16-May
2009	30-Mar	30-Apr	14-May	19-May
2010	1-Apr	30-Apr	11-May	20-May
2011	30-Mar	2-May	10-May	15-May
2012	30-Mar	21-Apr	27-Apr	8-May
2013	30-Mar	30-Apr	7-May	11-May



**Figure 1.** Imnaha Acclimation Pond – Cumulative passage timing to Lower Granite Dam.

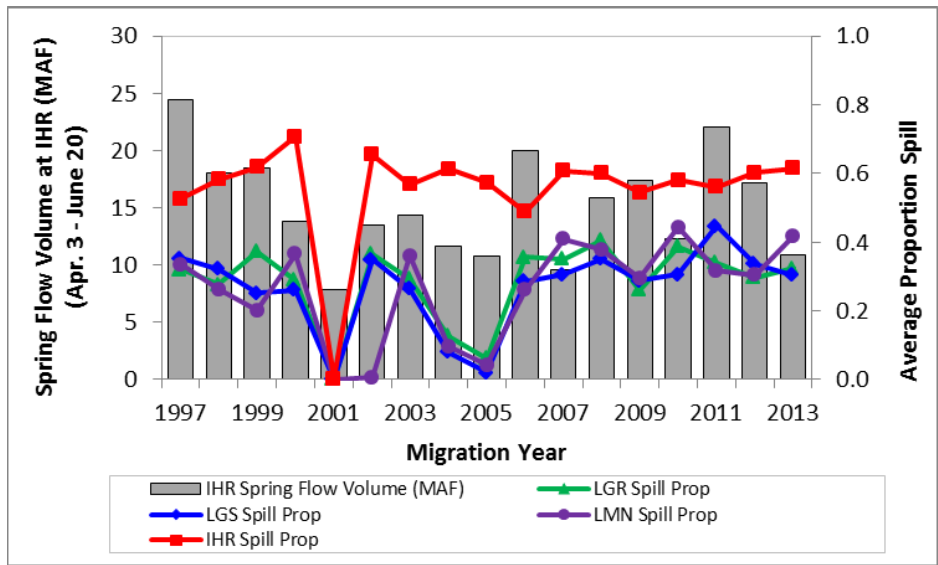
**Table 4.** Catherine Creek Releases – Estimated 10%, 50%, and 90% passage dates at Lower Granite Dam.

Migration Year	Release Date(s)	10% Passage Date	50% Passage Date	90% Passage Date
2001	4/2	4-May	15-May	22-May
2002	4/1-4/2	5-May	17-May	21-May
2003	3/12,3/23,3/31	13-Apr	29-Apr	15-May
2004	3/15,3/30	21-Apr	4-May	16-May
2005	3/14,4/4	26-Apr	5-May	10-May
2006	3/27	30-Apr	7-May	19-May
2007	3/26	2-May	10-May	15-May
2008	3/24	5-May	13-May	20-May
2009	3/16,3/24	2-May	15-May	23-May
2010	3/29	1-May	13-May	20-May
2011	3/21,3/30,4/5	5-May	11-May	31-May
2012	3/22-4/14, 4/16	25-Apr	5-May	18-May
2013	3/21-4/14	2-May	10-May	18-May

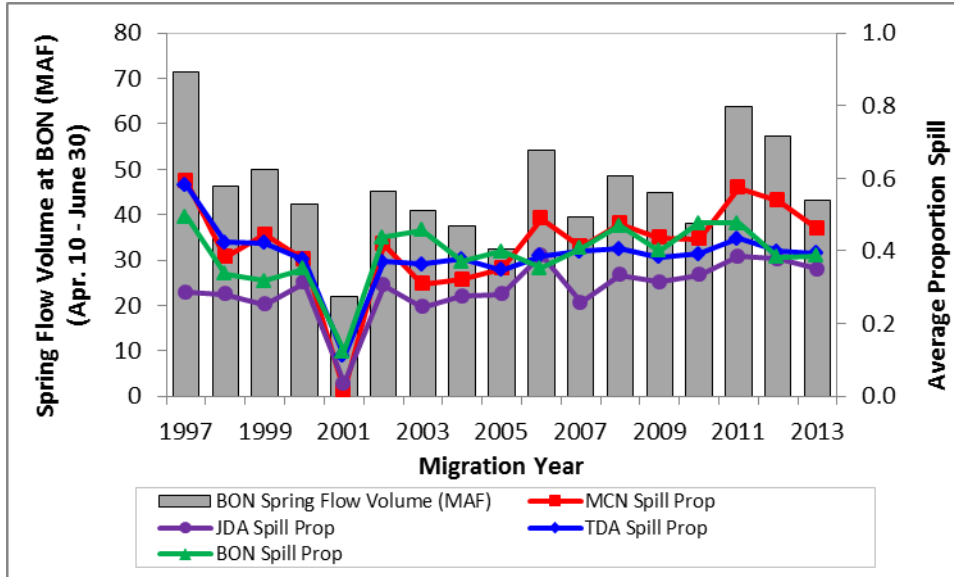


**Figure 2.** Catherine Creek Releases – Cumulative passage timing to Lower Granite Dam.

Figures 3 and 4 are provided below to illustrate the out-migration conditions that these spring migrants may have experienced in the Snake and Lower Columbia rivers over the years. Figure 3 provides the total spring flow volume (April 3–June 20) for the Snake River (as measured at Ice Harbor), along with the average spring spill proportions at each of Lower Granite, Little Goose, Lower Monumental, and Ice Harbor dams, for each migration year. Figure 4 provides the total spring flow volume (April 10–June 30) for the Lower Columbia (as measured at Bonneville), along with the average spring spill proportions at each of McNary, John Day, The Dalles, and Bonneville dams, for each migration year.



**Figure 3.** Total spring flow volume in the Snake River (at Ice Harbor Dam) and average spill proportion at Lower Granite, Little Goose, Lower Monumental, and Ice Harbor dams. Spring period in the Snake River is April 3–June 20.



**Figure 4.** Total spring flow volume in the Lower Columbia River (at Bonneville Dam) and average spill proportion at McNary, John Day, The Dalles, and Bonneville dams. Spring period in the Lower Columbia River is April 10–June 30.

The tables below contain estimates calculated in the CSS study of juvenile survival in the hydrosystem between Lower Granite and Bonneville Dams and survival to adulthood of juvenile salmonids released from Imnaha River (Table 5) and Catherine Creek releases (Table 6) in several categories. Those categories are: SAR(T), SAR(C<sub>0</sub>), and Weighted SAR<sub>LGR-10-LGR</sub>, where SAR(T) represents smolts transported from Lower Granite, Little Goose, or Lower Monumental Dam, SAR(C<sub>0</sub>) represents smolts migrating in river (undetected at Snake River transportation collector sites), and SAR<sub>LGR-10-LGR</sub> is a weighted estimate that is obtained by taking the proportion of the total population of smolts (tagged and untagged) at Lower Granite Dam in each study category and multiplying by the respective study category's SAR<sub>LGR-10-LGR</sub>. In effect, the weighted SAR<sub>LGR-10-LGR</sub> is the estimated SAR for the overall hatchery release (without jacks). The data presented in Tables 5 and 6 were taken from various chapters and appendices of the 2013 CSS Annual Report, which can be downloaded from the FPC webpage (<http://www.fpc.org/documents/CSS.html>). Finally, Figure 5 is a time series of the Weighted SAR<sub>LGR-10-LGR</sub> over the years of available data for Lookingglass Hatchery spring Chinook released in the Imnaha River and Catherine Creek.

**Table 5.** Imnaha River– Spring Chinook Survival

Release Date(s)	Migration Year	Juvenile Survival (LGR-BON)	Proportion Transported	T/C Ratio	Adult Survival		
					SAR(T) %	SAR(C <sub>0</sub> ) %	Weighted SAR <sub>LGR-to-LGR</sub>
Apr-7	1997	0.31	0.52	1.36	1.16	0.86	0.98
Apr-6	1998	0.53	0.85	1.55	0.85	0.55	0.80
3/16, 4/05	1999	0.54	0.78	1.89	2.69	1.43	2.41
22-Mar	2000	0.57	0.69	1.29	3.11	2.41	2.89
21-Mar	2001	0.37	0.98	10.8	0.62	0.06 <sup>B</sup>	0.61
21-Mar	2002	0.50	0.66	1.75	0.79	0.45	0.68
1-Apr	2003	0.70	0.55	1.21	0.58	0.48	0.53
26-Mar	2004	0.56	0.89	1.64	0.38	0.23	0.36
3/26, 3/29	2005	0.58	0.86	1.77	0.28	0.16 <sup>C</sup>	0.27
3/21, 3/30	2006 <sup>D</sup>	0.50	0.67	0.62	0.77	1.25	0.80
3/21, 3/31	2007 <sup>D</sup>	0.69	0.23	1.70	1.07	0.63	0.67
25-Mar	2008 <sup>D</sup>	0.59	0.54	1.45	1.92	1.32	1.76
30-Mar	2009 <sup>D</sup>	0.51	0.50	1.83	1.39	0.76	1.04
1-Apr	2010 <sup>D</sup>	0.83	0.26	1.27	0.95	0.75	0.78
30-Mar	2011 <sup>A, D</sup>	0.55	0.56	0.83	0.26	0.31	0.24
30-Mar	2012 <sup>D, E</sup>	0.64	0.30	N/A	N/A	N/A	N/A

<sup>A</sup> Migration year 2011 is incomplete with Age 2-salt adult returns through 9/15/2013.

<sup>B</sup> Assumed SAR(C<sub>0</sub>) same as SAR(C<sub>1</sub>) for 2001.

<sup>C</sup> In-river SAR is combination of groups C<sub>1</sub> and C<sub>0</sub>.

<sup>D</sup> Estimates for migration years 2006 through 2012 reflect use of new methodology developed for random pre-assignment of “monitor mode” and “return-to-river mode” operations. See 2013 CSS Annual Report for details.

<sup>E</sup> No adult returns to date; only juvenile metrics are available.

**Table 6.** Catherine Creek Acclimation Pond – Spring Chinook Survival

Release Date(s)	Migration Year	Juvenile Survival (LGR-BON)	Proportion Transported	T/C Ratio	Adult Survival		
					SAR(T) %	SAR(C <sub>0</sub> ) %	Weighted SAR <sub>LGR-to-LGR</sub>
4/2	2001	0.25	0.96	5.33	0.23	0.04 <sup>B</sup>	0.22
4/1-4/02	2002	0.65	0.71	1.81	0.89	0.49	0.77
3/12,3/23,3/31	2003	0.62	0.55	1.45	0.36	0.25	0.31
3/15, 3/30	2004	0.48	0.90	1.94	0.38	0.20	0.36
3/14, 4/04	2005	0.51	0.86	2.48	0.44	0.18 <sup>C</sup>	0.40
3/27	2006 <sup>D</sup>	0.49	0.68	0.48	0.45	0.93	0.49
3/26	2007 <sup>D</sup>	0.72	0.47	1.35	0.50	0.37	0.43
3/24	2008 <sup>D</sup>	0.70	0.60	1.41	2.58	1.83	2.13
3/16,3/24	2009 <sup>D</sup>	0.61	0.56	1.35	1.76	1.30	1.54
3/29	2010 <sup>D</sup>	0.68	0.29	1.41	1.18	0.78	0.88
3/21,3/30,4/5	2011 <sup>A, D</sup>	0.57	0.54	1.35	0.47	0.45	0.46
3/22-4/14, 4/16	2012 <sup>D, E</sup>	0.52	0.46	N/A	N/A	N/A	N/A

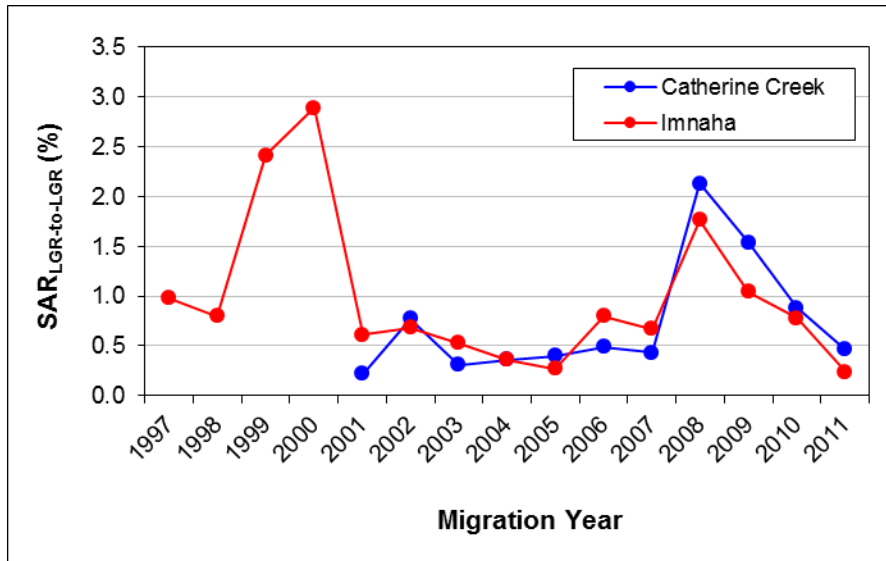
<sup>A</sup> Migration year 2011 is incomplete with Age 2-salt adult returns through 9/15/2013.

<sup>B</sup> Assumed SAR(C<sub>0</sub>) same as SAR(C<sub>1</sub>) for 2001.

<sup>C</sup> In-river SAR is combination of groups C<sub>1</sub> and C<sub>0</sub>.

<sup>D</sup> Estimates for migration years 2006 through 2012 reflect use of new methodology developed for random pre-assignment of “monitor mode” and “return-to-river mode” operations. See 2013 CSS Annual Report for details.

<sup>E</sup> No adult returns to date; only juvenile metrics are available.



**Figure 5.** Weighted  $SAR_{LGR-to-LGR}$  for Lookingglass hatchery spring Chinook released to the Imnaha River (1997–2011) and Catherine Creek (2001–2011). Migration year 2011 is incomplete with Age 2-salt adult returns through 9/15/2013

We hope that the information we have provided regarding the use and application of information from the marked groups at the hatchery over the last several years is of some use to you. If you would like any additional information regarding these releases please feel free to contact us.

cc: Pete Hassemer, IDF&G  
 Bill Tweit, WDFW  
 Jay Hesse, Nez Perce  
 Tony Nigro, ODFW  
 Howard Schaller, USFWS  
 FPAC