IDAHO COOPERATIVE FISH AND WILDLIFE RESEARCH UNIT
COLLEGE OF NATURAL RESOURCES
UNIVERSITY OF IDAHO
P.O. BOX 441141
MOSCOW, ID 83844-1141

(208) 885-2750
Fax (208 885-9080)

To: Marvin Shutters and Dave Clugston, USACE
From: Chris Peery, Mike Jepson University of Idaho
Re: Preliminary Summary of Juvenile Bypass System Fallbacks: 2000-2001.
25 July 2002

The following is a preliminary summary of our monitoring efforts of radio-tagged adult salmon and steelhead in the juvenile bypass systems (JBS) of Bonneville, John Day, McNary and Ice Harbor dams in 2000 and 2001.

Methods:

Bonneville Dam - We deployed 2, 4-element Yagi aerial antennas in the Powerhouse 2 JBS to monitor the movements of radio-tagged adult chinook salmon and steelhead. The first antenna (upstream to downstream) was installed 20 m upstream of the juvenile collection channel exit, just before fish exit the collection channel and enter a 1.14 m (inside diameter) pipe. The second was installed near the exit of the 2.9 km pipe ending on Hamilton Island, immediately before the upstream switch gate used to divert migrating fish to the monitoring facility.

John Day Dam - We deployed 4 underwater antennas in the JBS at John Day Dam. The first antenna was installed downstream of the hydraulic jump area in the elevated chute. The second antenna was at the outlet from the dewatering section, at a location where fish first enter the transport flume pipe. The third antenna was installed 20 m upstream of the exit from the transport flume into the separators/sampling building entrance channel. The fourth antenna was located in the sampling building discharge channel, approximately 250 m upstream of where fish are returned to the tailrace.

McNary Dam - We deployed 6 underwater antennas in the JBS of McNary Dam. The first was installed approximately 100m from the north end of the juvenile collection channel and the second, third and forth antennas were deployed 200, 250 and 305m from the north end, respectively. The fifth antenna was located near the exit of the collection channel where the channel depth decreases. The sixth antenna was deployed at the exit of the collection channel, before the site where fish are diverted to a separator/monitoring facility prior to being returned to the tailrace.

Ice Harbor Dam - We deployed 3 underwater antennas in the JBS collection channel of Ice Harbor Dam. The first antenna was installed 111.2 m from the outlet of the juvenile collection channel, before the entrance to the pipe leading to the separator/monitoring facility. The second and third antennas were installed 80.8 and 50.3 m from the outlet, respectively.

Results:

The following tables summarize our tagging (Table 1) and monitoring efforts of radio-tagged adult salmon and steelhead in the juvenile bypass systems (JBS) of Bonneville, John Day, McNary and Ice Harbor dams in 2000 and 2001(Tables 2 - 7). Summaries of Bonneville Dam JBS data are based on fish released downstream of the dam only. Results for upstream dams are based on Bonneville Dam forebay and downstream releases combined. Additionally, please note that the fallback and JBS fallback data presented for steelhead do not include kelts that may have fallen back in the spring.

Table 1. Number of adult spring, summer and fall chinook salmon (CK) and A-group and B-group steelhead (SH) released with transmitters at Bonneville Dam in 2000 and 2001.

	Spring CK	Summer CK	Fall CK	A-group SH	B-group SH	Total
2000						
Downstream	728	245	745	539	305	**2,562**
Forebay	73	86	373	193	123	**848**
Total:	**801**	**331**	**1,118**	**732**	**428**	**3,410**
2001						
Downstream	641	241	561	536	266	**2,245**
Forebay	251	75	431	233	114	**1,104**
Total:	**892**	**316**	**992**	**769**	**380**	**3,349**

Table 2. Number of unique spring and summer chinook salmon (CK) with transmitters that passed and fell back (FB), the number that fell back via the juvenile bypass systems (JBS) and their residence times in the JBS in 2000 at Bonneville, John Day, McNary and Ice Harbor dams.

2000 CK	Bonneville	John Day	McNary	Ice Harbor
No. Unique Fish Passing Dam	951	681	627	249
No. Unique Fish that Fell Back	124	41	27	24
No. Fallback Events	160	44	34	34
No. JBS Fallback Events	2	3	0	0
No. JBS Fallback Events/No. FB Events(%)	1.2	6.8	0	0
No. JBS Fallbacks/ No. Unique Fish Passing Dam (%)	0.2	0.4	0	0
No. JBS FB Fish Re-ascending Dam	2	3	0	0
Mean Residency Time (h)	164	335	-	-
Residency Time Range (h)	12 – 316	0.5 –527	-	-

Table 3. Number of unique spring and summer chinook salmon (CK) with transmitters that passed and fell back (FB), the number that fell back via the juvenile bypass systems (JBS) and their residence times in the JBS in 2001 at Bonneville, John Day, McNary and Ice Harbor dams.

2001 CK	Bonneville	John Day	McNary	Ice Harbor
No. Unique Fish Passing Dam	857	948	905	545
No. Unique Fish that Fell Back	33	22	12	7
No. Fallback Events	54	23	14	7
No. JBS Fallback Events	3	6	6	3
No. JBS Fallback Events/No. FB Events(%)	5.5	26.1	42.9	42.9
No. JBS Fallbacks/ No. Unique Fish Passing Dam (%)	0.4	0.6	0.7	0.6
No. JBS FB Fish Re-ascending Dam	2	5	4	0
Mean Residency Time (h)	19.6	18.9	15.7	13.5
Residency Time Range (h)	14.6 –26.7	1.5 - 60.6	0.03-57.3	0.3 - 35.0

Table 4. Number of unique fall chinook salmon (FACK) with transmitters that passed and fell back (FB), the number that fell back via the juvenile bypass systems (JBS) and their residence times in the JBS in 2000 at Bonneville, John Day, McNary and Ice Harbor dams.

2000 FACK	Bonneville	John Day	McNary	Ice Harbor
No. Unique Fish Passing Dam	659	570	456	33
No. Unique Fish that Fell Back	26	15	9	1
No. Fallback Events	34	15	9	1
No. JBS Fallback Events	0	0	1	0
No. JBS Fallback Events/No. FB Events (%)	0	0	11.1	0
No. JBS Fallbacks/ No. Unique Fish Passing Dam (%)	0	0	0.2	0
No. JBS FB Fish Re-ascending Dam	0	0	0	0
Mean Residency Time (h)	-	-	0.1	-
Residency Time Range (h)	-	-	-	-

Table 5. Number of unique fall chinook salmon (FACK) with transmitters that passed and fell back (FB), the number that fell back via the juvenile bypass systems (JBS) and their residence times in the JBS in 2001 at Bonneville, John Day, McNary and Ice Harbor dams.

2001 FACK	Bonneville	John Day	McNary	Ice Harbor
No. Unique Fish Passing Dam	521	580	481	93
No. Unique Fish that Fell Back	25	12	15	11
No. Fallback Events	36	13	17	11
No. JBS Fallback Events	2	0	1	0
No. JBS Fallback Events/No. FB Events (%)	5.5	0	5.8	0
No. JBS Fallbacks/ No. Unique Fish Passing Dam (%)	0.4	0	0.2	0
No. JBS FB Fish Re-ascending Dam	1	0	1	0
Mean Residency Time (h)	3.4	-	7.6	-
Residency Time Range (h)	0.5 – 6.2	-	-	-

Table 6. Number of unique steelhead (STHD) with transmitters that passed and fell back (FB), the number that fell back via the juvenile bypass systems (JBS) and their residence times in the JBS in 2000 at Bonneville, John Day, McNary and Ice Harbor dams.

2000 STHD	Bonneville	John Day	McNary	Ice Harbor
No. Unique Fish Passing Dam	811	748	645	487
No. Unique Fish that Fell Back	55	35	65	23
No. Fallback Events	59	37	70	25
No. JBS Fallback Events	0	2	19	2
No. JBS Fallback Events/No. FB Events (%)	0	5.4	27.1	8.0
No. JBS Fallbacks/ No. Unique Fish Passing Dam (%)	0	0.2	2.9	0.4
No. JBS FB Fish Re-ascending Dam	0	0	6	1
Mean JBS Residency Time (h)	-	63.3	160.2	10.6
JBS Residency Time Range (h)	-	1.0 – 125.6	0.2 - 2072	2.5 – 18.7

Table 7. Number of unique steelhead (STHD) with transmitters that passed and fell back (FB), the number that fell back via the juvenile bypass systems (JBS) and their residence times in the JBS in 2001 at Bonneville, John Day, McNary and Ice Harbor dams.

2001 STHD	Bonneville	John Day	McNary	Ice Harbor
No. Unique Fish Passing Dam	774	858	780	476
No. Unique Fish that Fell Back	31	32	45	16
No. Fallback Events	33	34	48	19
No. JBS Fallback Events	2	5	13	3
No. JBS Fallback Events/No. FB Events (%)	6.1	14.7	27.1	15.8
No. JBS Fallbacks/ No. Unique Fish Passing Dam (%)	0.2	0.3	1.7	0.6
No. JBS FB Fish Re-ascending Dam	2	4	8	2
Mean JBS Residency Time (h)	10.1	14.4	23.2	30.5
JBS Residency Time Range (h)	8.7 – 11.5	2.4 – 29.6	0.1 – 103.6	9.9 – 47.2

Some Summary Statistics:

Spring/Summer Chinook Salmon – Of the 370 fallback events observed at the 4 dams combined over 2 years, a total of 23 (6.2%) were via the JBS. Approximately 70% (16/23) of the spring/summer chinook salmon that fell back via the JBS re-ascended the dam over which they fell back. Of the 7 JBS fallback fish that did not re-ascend the dam over which they fell back, 5 (71.4%) were ultimately observed at a hatchery or downstream tributary. The maximum JBS residency time observed for any spring/summer chinook salmon at any of the 4 monitored dams, in any of the 2 years of study, was 527 hours.

Fall Chinook Salmon – Of the 136 fallback events observed at the 4 dams combined over 2 years, a total of 4 (2.9%) were via the JBS. Half of the fish (2/4) that fell back via the JBS re-ascended the dam over which they fell back. Of the 2 JBS fallback fish that did not re-ascend the dam over which they fell back, 0 were ultimately observed at a hatchery or downstream tributary. The maximum JBS residency time observed for any fall chinook salmon at any of the 4 monitored dams, in any of the 2 years of study, was 7.6 hours.

Steelhead - Of the 325 fallback events observed at the 4 dams combined over 2 years, a total of 46 (14.1%) were via the JBS. Half (23/46) of the steelhead that fell back via the JBS re-ascended the dam over which they fell back. Of the 23 JBS fallback fish that did not re-ascend the dam over which they fell back, 12 (52.2%) were ultimately observed at a hatchery or downstream tributary. The maximum JBS residency time observed for any steelhead at any of the 4 monitored dams, in any of the 2 years of study, was 2,072 hours.

Future work:

Further analyses will examine the relationship between the number and timing of JBS fallback events and the prevailing flow/spill conditions. Finally, we intend to present more complete information on the fates of all radio-tagged fish that fell back through a monitored JBS in 2000 and 2001.