

Fall Chinook Salmon Spawning Ground Surveys in the Snake River Basin upriver of Lower Granite Dam

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**Fall Chinook Salmon Spawning Ground Surveys in the Snake River Basin Upriver
of Lower Granite Dam, 2003**

ANNUAL REPORT

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Introduction

Redd counts were used to document the spawning distribution of fall chinook salmon (*Oncorhynchus tshawytscha*) in the Snake River basin upriver of Lower Granite Dam. The first reported redd counts were from aerial searches conducted intermittently between 1959 and 1978 (Irving and Bjornn 1981, Witty 1988; Groves and Chandler 1996)(Appendix 1). In 1986, the Washington Department of Fish and Wildlife began an annual monitoring program that, in addition to the Snake River, included aerial searches of the Grande Ronde River the first year (Seidel and Bugert 1987), and the Imnaha River in subsequent years (Seidel et al. 1988; Bugert et al. 1989-1991; Mendel et al. 1992). The U. S. Fish and Wildlife Service and Idaho Power Company began contributing to this effort in 1991 by increasing the number of aerial searches conducted each year and adding underwater searches in areas of the Snake River that were too deep to be searched from the air (Connor et al. 1993; Garcia et al. 1994a, 1994b, 1996-2003; Groves 1993; Groves and Chandler 1996). The Nez Perce Tribe added aerial searches in the Clearwater River basin beginning in 1988 (Arnsberg et. al 1992) and the Salmon River beginning in 1992. Currently searches are conducted cooperatively by the Nez Perce Tribe, Idaho Power Company, and U. S. Fish and Wildlife Service.

Our objective for this report was to consolidate the findings from annual redd searches into a single document containing detailed information about the searches from the most recent spawning season, and summary information from previous years. The work conducted in 2003 was funded by the Bonneville Power Administration (Projects 199801003, 199801004, 199403400, 198335003), Idaho Power Company, and Bureau of Land Management.

Study Area

The study area included the free-flowing Snake River between Lower Granite and Hells Canyon dams and portions of the major tributaries that enter therein (Figure 1). We refer to locations using river miles

(RM) and river kilometers (RK) based on navigation charts of the Snake River (USACE 1990) and U.S. Geological Survey topographical maps. Searches focused on ten river reaches: (1) the Snake River from the head of Lower Granite Reservoir (RM 147; RK 237) to Hells Canyon Dam (RM 247; RK 397), (2) the Clearwater River to the North Fork Clearwater River (RM 41; RK 66), (3) the North Fork Clearwater River to Dworshak Dam (RM 2; RK 3), (4) the Clearwater River to the South Fork and Middle Fork Clearwater river confluence (RM 74; RK 119); (5) the South Fork Clearwater River to Butcher Creek (RM 12; RK 19), (6) the Middle Fork Clearwater to the confluence of the Lochsa and Selway rivers (Clearwater RM 98; RK 158), (7) the Selway River to Meadow Creek (RM 19; RK 31), (8) the Grande Ronde River to Wildcat Creek (RM 53; RK 85), (9) the Salmon River to French Creek (RM 105; RK 169), and (10) the Imnaha River to the Cow Creek Bridge (RM 4; RK 6). The number of searches per reach varied between reaches and years. Searches were conducted in other portions of the aforementioned Snake River tributaries, though not as routinely as in the other reaches. Fall chinook salmon redds that were observed incidentally in the Potlatch River and Asotin Creek were included in this report.

Methods

Redd searches were conducted from a helicopter flown at an altitude of about 700-ft. or less. At minimum, observations were made by a primary observer and the pilot, though typically at least one additional observer was present. Redd locations were determined by referencing navigation charts of the Snake River (USACE 1990), or U. S. Geological Survey topographical maps, or using the Global Positioning System (GPS) coupled with mapping software. From 1991 to 2003, searches in the Snake, Clearwater, Grande Ronde, and Imnaha rivers were scheduled to be conducted at 7-d intervals starting around mid-October and ending around mid-December. In previous years, and in the other rivers, searches were generally conducted less frequently. In most years some scheduled searches were canceled or shortened due to poor visibility or inclement weather. Redds observed in the Snake River that could not clearly be distinguished from the air were examined from the ground beginning in 1991. This practice was also performed in the other rivers though less consistently. Only the number of new

redds observed on each search were recorded.

Redd searches in the Snake River were also conducted using underwater search methods in areas too deep to be effectively searched from the air. In 1991 and 1992, the U. S. Fish and Wildlife Service conducted underwater searches using methods developed by Swan (1989) that involved direct observation of the river bottom by scuba divers (Connor et al. 1993; Garcia et al. 1994a). From 1993-2002, the U. S. Fish and Wildlife Service and Idaho Power Company conducted underwater searches using a video system consisting of a video recorder, submersible camera (with a 110 degree lens and 65-ft camera cable), and monitor. The camera was either enclosed in an aluminum sheath mounted on a 90-lb lead weight, or attached to an aluminum frame mounted between two 30-lb lead weights, and could be adjusted 45 to 90 degrees down from horizontal (Groves and Garcia, 1998). The camera was suspended from a boat using a wire rope passed through a roller on the bow and attached to a sounding-reel/depth-indicator mounted in the boat cabin. In 2003, the Idaho Power Company conducted all underwater redd searches.

Searches using submersible cameras were accomplished by passing the camera over the river bottom in parallel paths spaced roughly 30 ft. apart. Camera position was determined by sight estimation, measuring cord laid along the shore, or GPS. The distance between the camera and river bottom, and the angle of the camera, was adjusted to maximize the amount of viewable area without losing the ability to observe details of the bottom substrates. If a redd was observed, the distance between passes in the search pattern was reduced, and in most cases, the entire area was searched at least two times in the course of the spawning season.

Underwater observations of redds were recorded on video tape beginning in 1993. When large groups of redds were found, coordinates were recorded using electronic surveying equipment or GPS. The numbers of redds in large groups were verified by reviewing video tape while referencing a plot of redd coordinates. In areas where redds overlapped and could not be identified individually, the perimeter of

the redd group was surveyed and the overall area divided by 45.8-m² per redd based on measurements of fall chinook salmon redds in the Snake and Columbia rivers (Groves and Chandler 2001). This produced an index count of the total number of redds in the group.

Underwater searches were limited to areas greater than about 10-ft deep with a dominant bottom substrate particle size (Bovee 1982) ranging from 1- to 6-in. diameter (Raleigh et al. 1986). In 1991 and 1992, a few pilot searches were conducted at known spawning sites. From 1993 to 2002, search crews attempted to annually search about 90 areas that fit the substrate size and the depth criteria (based on Hells Canyon Dam discharged of about 9,000 cfs). In 2003, search crews attempted to search all deep-water sites where redds were observed in previous years.

Results and Discussion

Snake River

In 2003, a total of 1,512 redds were observed in the Snake River (Table 1), of which 1,118 were observed during seven aerial searches (Table 2) and 394 during searches of 47 deep-water sites (Tables 3 and 4). Visibility ratings were reported as either “good” or “excellent” during aerial searches in 2003 (Table 5). The locations of all redds counted in the Snake River study area during aerial searches since 1986 are given in Appendix 2. The numbers of searches conducted in the Snake and other rivers are given in Table 6. The locations of all redds observed using submersible cameras are given in Table 7. The locations of all redds counted (aerial and underwater counts combined) in the Snake River study area since 1986 are given in Appendix 3. Redds counted in the Snake River amounted to roughly 68% of all redds observed upriver of Lower Granite Dam in 2003, compared to 60% in 2002, 54% in 2001, 65% in 2000, 64% in 1999, 61% in 1998, and 31% in 1997. The percentage of redds counted using submersible cameras from 1993 to 2003 averaged 28.4%±10.1% for the Snake River, and 16.6%±6.6% for all redds counted above Lower Granite Dam. In 2003, the greatest number of new redds were observed on

November 10 (Table 2 and Figure 2). On average, redd counts in the Snake River peak between November 10 and November 16 (Table 8 and Figure 3).

Clearwater River basin

A total of 572 redds were observed in the Clearwater River basin in 2003, 571 in the Clearwater and North Fork Clearwater rivers (Tables 1 and 9) during nine aerial searches for fall chinook salmon redds (Table 6), and 1 in the Potlatch River during searches for coho salmon redds (Table 1; Scott Evans, NPT, personal communication). Observation conditions varied widely during aerial searches of the Clearwater River in 2003 (Table 10). The locations of all redds counted in the Clearwater River are given in Appendix 4. Redds counted in the Clearwater River basin amounted to 26% of all redds observed upriver of Lower Granite Dam in 2003, compared to 28% in 2002, 26% in 2001, 32% in 2000, 32% in 1999, 26% in 1998, and 38% in 1997. In 2003, the greatest numbers of new redds (RM 0–45) were observed on November 6 (Table 9 and Figure 2). On average, redd counts in the Clearwater River (RM 0–45) peaked between November 17 and November 23 (Table 11 and Figure 3).

Asotin Creek

A total of three redds were observed in Asotin Creek in 2003. No surveys of Asotin Creek were planned before the field season began. However, the crew surveyed the lower five miles of Asotin Creek (RM 0–5) on December 1, 2003, after a potential redd was observed by chance while the helicopter was returning to the hanger. On December 2, a ground check was made and two redds were identified and one adult fall chinook salmon was observed (Table 1). On December 8, 2003, Asotin Creek was surveyed by helicopter from RM 14 to RM 0 (Table 6). One additional redds was observed.

Grande Ronde River

A total of 93 redds were observed during eight searches of the Grande Ronde River in 2003 (Tables 1, 6, and 12). Observation conditions varied from fair to excellent (Table 13). Redds counted in the Grande Ronde River amounted to 4% of all redds observed upriver of Lower Granite Dam in 2003, compared to 6% in 2002, 15% in 2001, 1% in 2000, 2% in 1999, 8% in 1998, and 29% in 1997. The locations of all redds counted in the Grande Ronde River are given in Appendix 5. In 2003, the greatest numbers of new redds were observed on October 28 (Table 12 and Figure 2). On average, redd counts in the Grande Ronde River peaked between October 20 and November 2 (Table 14 and Figure 3).

Salmon River

A total of 18 redds were observed during three searches of the Salmon River in 2003 (Tables 1, 6, and 15). River discharge at RM 53.7 ranged from 3,410-3,469, and observation conditions were reported as good to excellent. Redds counted in the Salmon River amounted to 1% of all redds observed upriver of Lower Granite Dam in 2003, compared to 2% in 2001 and 2002, 0% in 2000, 0% in 1999, 1% in 1998, and 1% in 1997. The locations of all redds counted in the Salmon River are given in Appendix 6. Not enough searches were conducted in the Salmon River to indicate a peak count (Table 6).

Imnaha River

A total of 43 redds were observed during eight searches of the Imnaha River in 2003 (Tables 1, 6, and 16). Observation conditions were reported as excellent on all flights (Table 17). Redds counted in the Imnaha River amounted to 2% of all redds observed upriver of Lower Granite Dam in 2003, compared to 4% in 2002, 3% in 2001, 2% in 2000, 2% in 1999, 4% in 1998, and 2% in 1997. The locations of all redds counted in the Imnaha River are given in Appendix 7. In 2003, the greatest number of new redds were observed on November 4. However, this likely does not reflect timing of construction since the November

25 search covered more river miles than the previous searches. On average, redd counts in the Imnaha did not have a defined peak (Table 18 and Figure 3).

Summary

A total of 2,241 fall chinook salmon redds were observed upriver of Lower Granite Dam in 2003 (Figure 4). This was the greatest number of redds counted since annual searches began in 1986. The increase in the number of redds counted corresponded with an increase in the number of adult fall chinook salmon counted in the Lower Granite Dam fish ladder (Table 19 and Figure 4). The number of adult fish counted passing Lower Granite Dam per redd counted upstream averaged 23.9 ± 35.5 from 1986 to 1992, 4.7 ± 0.8 from 1993 to 2003, and was 5.0 in 2003 (Table 19). Most of the redds were observed in the Snake River (68%) and the Clearwater River basin (26%).

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Figures and Tables

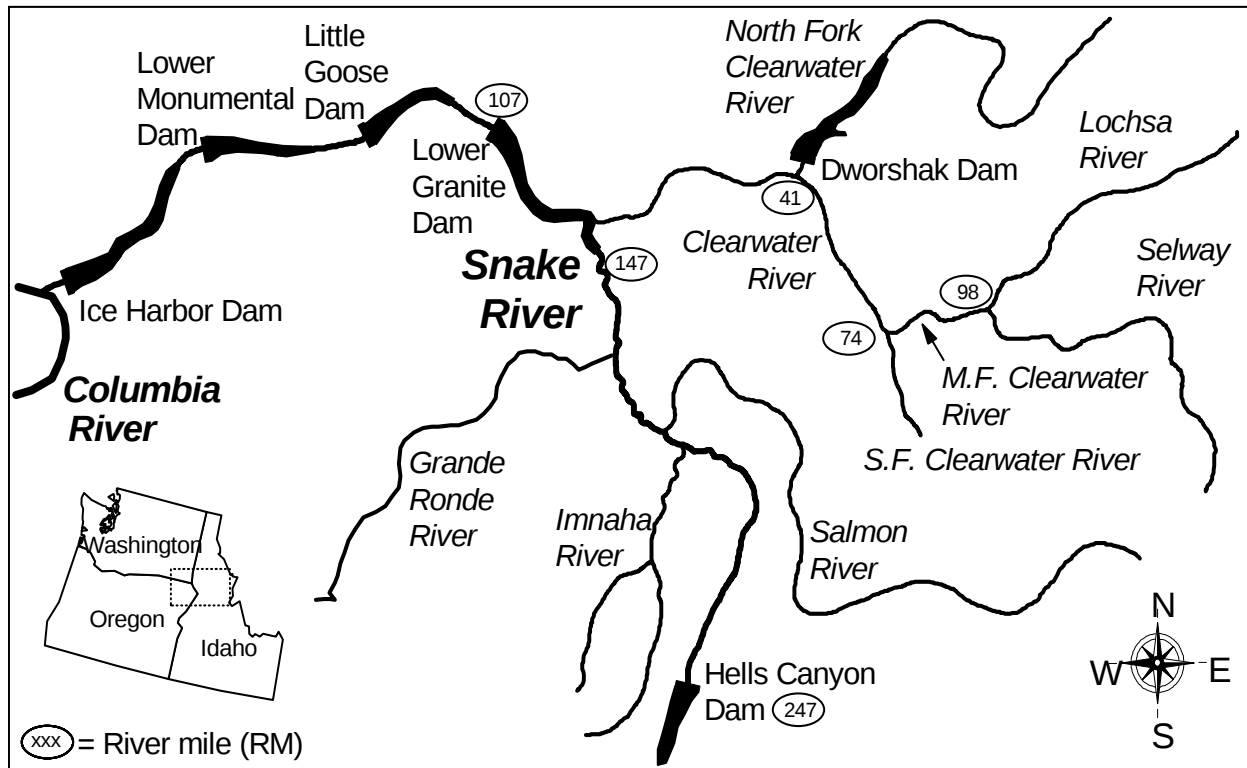


Figure 1. Map of the Snake River drainage in Oregon, Washington, and parts of Idaho.

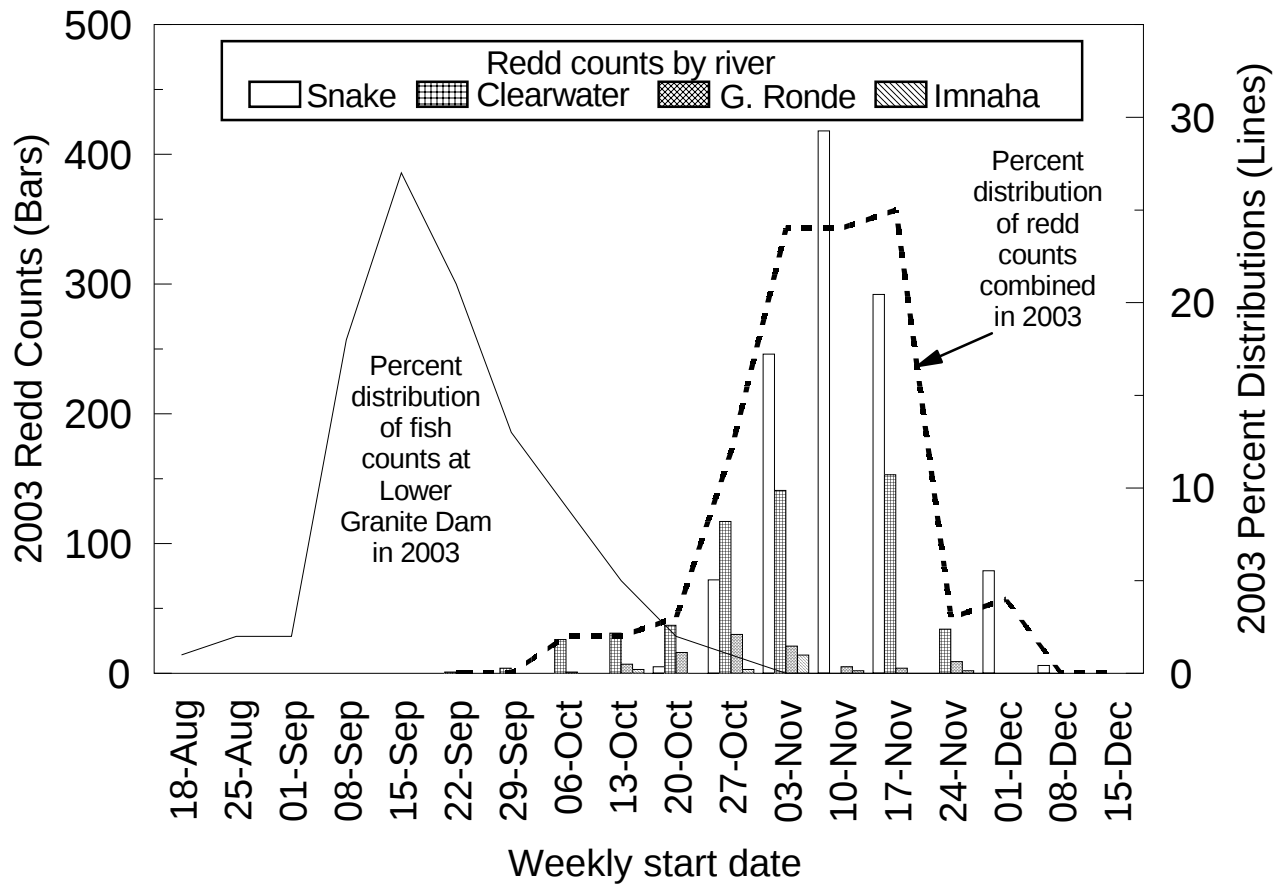


Figure 2. Weekly redd counts in 2003 for the Snake (RM 147-247), Clearwater (RM 0-45), Grande Ronde (RM 0-53), and Imnaha (RM 0-4) rivers, their combined percent distribution, and the percent distribution of adult fall chinook salmon passage at Lower Granite Dam in 2003 (USACE, unpublished data).

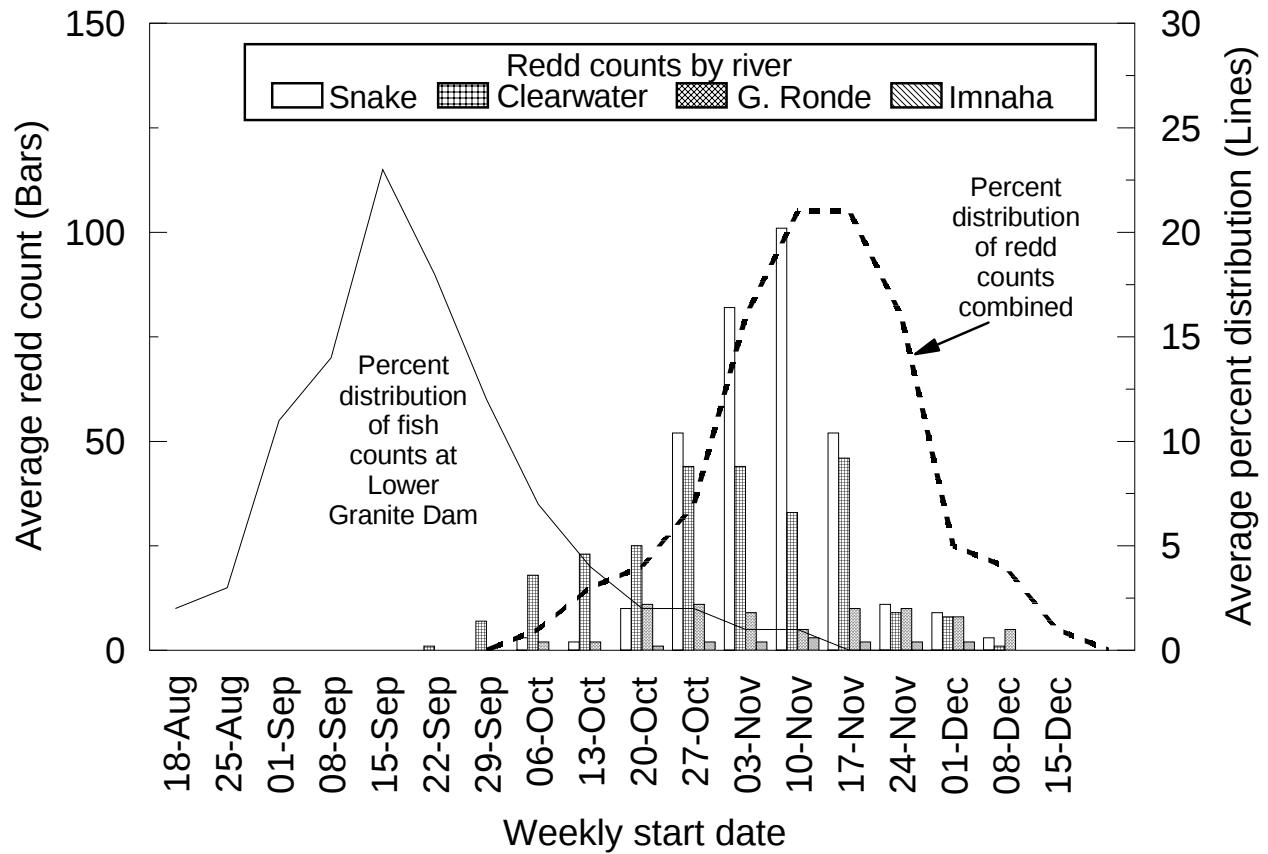


Figure 3. Weekly average redd counts (1994-2003) for the Snake (RM 147-247), Clearwater (RM 0-45), Grande Ronde (RM 0-53), and Imnaha (RM 0-4) rivers, their combined percent distribution, and the average percent distribution of adult fall chinook salmon passage at Lower Granite Dam (1994-2003)(USACE, unpublished data).

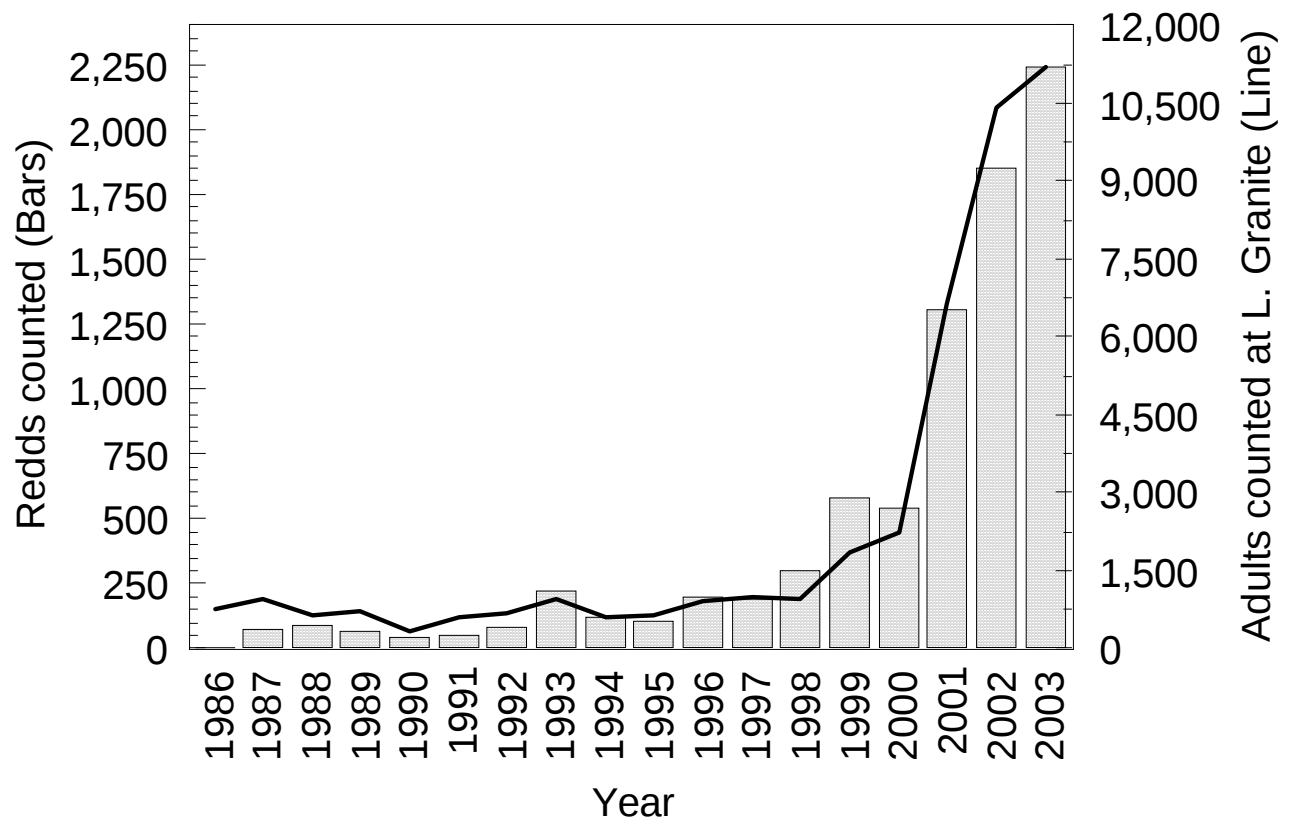


Figure 4. Number of adult fall chinook salmon counted at Lower Granite Dam, and number of redds counted above the dam, 1986-2003 (Fish counts from USACE 1986-2003, and D. Milks, WDFW, unpublished data).

Table 1. Number of fall chinook salmon redds counted in the Snake River and tributaries between Lower Granite and Hells Canyon dams, 1986-2003. An empty cell indicates no searches were conducted in the corresponding river and year. Some of the data is broken down into method, and river mile (RM) sections. Data collected by the Washington Department of Fish and Wildlife, Nez Perce Tribe, Idaho Power Company, and the U.S. Fish and Wildlife Service.

River	Year																	
	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Snake (helicopter) ^a	7	66	64	58	37	41	47	60	53	41	71	49	135	273	255	535	878	1,118
Snake (video) ^b						5	0	67	14	24	33	9	50	100	91	174	235	394
Lower Clearwater (RM 0-41)			21	10	4	4	25	36	30	20	66	58	78	179	164	290	520	544
Potlatch													7		0	24	3	1
N. F. Clearwater ^c			0	0	0	0	0	0	7	0	2	14	0	1	0	1	0	8
Clearwater River (RM 42-74)							1	0	0	0	0	0	0	2	8	16	4	19
S. F. Clearwater							0	0	0	0	1	0	0	2	1	5	0	0
M.F. Clearwater (RM 75- 98)									0	0	0	0	0	0	0	0	0	0
Selway									0	0	0	0	0	0	0	0	0	0
Asotin Creek ^d				0	0	0	0											3
Grande Ronde	0	7	1	0	1	0	5	49	15	18	20	55	24	13	8	197	111	93
Salmon							1	3	1	2	1	1	3	0	0	22	31	18
Imnaha		0	1	1	3	4	3	4	0	4	3	3	13	9	9	38	72	43
Totals	7	73	87	69	45	54	82	219	120	109	197	189	303	586	536	1,302	1,854	2,241

^a The targeted search area was the entire reach from the head of Lower Granite Reservoir to Hells Canyon Dam.

^b The targeted search areas were discrete sites composed mainly of 1-6 in. bottom substrates in water over 10 ft. deep. The number of sites searched varied. Searchers recorded a 170 m² patch of disturbed substrates in 1995, 238 m² in 1996, 1,226 m² in 2001, 1,282 m² in 2002, and 1,122 m² in 2003 at RM 179.6 (RK 289), and 1,184 m² in 2003 at RM 212.2. In this report we used a conversion factor of 45.8 m² per redd to estimate the numbers of redds within these patches.

^c Searches covered from the mouth to the Ahsahka boat ramp in 2002. Searches covered from the mouth to Dworshak Dam in previous years.

^d A total of nine potential redds were observed in 2003. Two were confirmed as fall chinook salmon redds (one fall chinook salmon was observed while ground truthing).

Table 2. New fall chinook salmon redds counted during aerial searches of the Snake River in 2003 (Data collected by Idaho Power Company and the U.S. Fish and Wildlife Service). Counts are presented by river mile (RM), river kilometer (RK), and date. A dash (-) indicates n redds were observed on the corresponding location and date.

RM	RK	New redds counted by flight date							Total
		20-Oct	27-Oct	03-Nov	10-Nov	20-Nov	01-Dec	08-Dec	
148.3	238.6	-	-	-	1	-	-	-	1
148.5	238.9	-	-	5	12	5	-	-	22
148.9	239.6	-	-	-	-	3	1	-	4
149.2	240.1	-	-	5	5	3	2	-	15
149.4	240.4	-	-	-	-	1	-	-	1
151.5	243.8	-	-	-	2	-	2	-	4
151.9	244.4	-	-	4	11	10	6	-	31
152.1	244.7	-	-	-	4	1	1	-	6
152.3	245.2	-	1	-	1	5	12	-	19
153.2	246.5	-	-	-	-	1	-	-	1
157.6	253.6	-	-	-	2	-	-	-	2
158.0	254.2	-	-	-	3	4	2	-	9
159.3	256.3	-	-	-	1	-	-	-	1
159.6	256.8	-	-	-	1	-	1	-	2
159.7	257.0	-	1	-	-	-	-	-	1
160.5	258.2	-	-	-	2	-	-	-	2
161.0	259.0	-	4	5	6	5	-	-	20
162.5	261.5	-	-	-	1	1	-	-	2
163.7	263.4	-	-	-	7	-	7	-	14
164.7	265.0	-	1	5	12	5	2	-	25
165.3	266.0	-	3	5	9	2	-	-	19
165.8	266.8	-	10	17	25	17	-	-	69
168.6	271.3	-	-	1	7	-	-	-	8
168.7	271.4	-	1	5	27	28	-	1	62
169.7	273.0	-	-	-	-	14	7	-	21
169.9	273.4	-	-	-	1	-	-	-	1
172.5	277.6	-	-	-	1	-	-	-	1
173.9	279.8	-	1	-	1	-	-	-	2
175.7	282.7	-	-	-	1	-	-	-	1
176.5	284.0	-	1	-	1	-	-	-	2
178.5	287.2	-	-	-	8	5	-	-	13

Table 2 (Continued)

RM	RK	New reds counted by flight date							Total
		20-Oct	27-Oct	03-Nov	10-Nov	20-Nov	01-Dec	08-Dec	
178.9	287.9	-	1	7	2	-	-	-	10
179.6	289.0	-	2	5	2	7	-	-	16
181.7	271.4	-	-	-	2	-	7	-	9
182.3	293.3	-	-	-	-	8	-	-	8
183.4	295.1	-	-	-	1	-	-	-	1
183.5	293.6	-	-	4	4	3	-	-	11
187.7	302.0	-	-	2	-	5	-	-	7
190.0	305.7	-	-	-	-	1	-	-	1
190.2	306.0	-	-	-	1	2	-	-	3
190.7	306.8	-	-	-	-	3	-	-	3
190.8	307.0	-	1	-	4	-	1	-	6
191.0	307.3	-	-	-	-	2	-	-	2
191.7	308.4	-	1	1	2	7	-	-	11
193.0	310.5	-	-	-	1	1	-	-	2
193.2	310.9	-	-	-	1	-	-	-	1
193.4	311.2	-	-	-	2	-	1	-	3
193.6	311.5	-	-	-	2	6	1	-	9
194.0	312.1	-	3	12	5	-	-	-	20
194.1	312.3	-	1	-	-	-	-	-	1
196.0	315.4	-	2	9	12	8	1	2	34
198.2	318.9	-	1	3	21	-	-	-	25
198.8	319.9	1	4	10	8	10	-	2	35
201.0	323.4	-	-	1	3	1	1	-	6
203.1	326.8	-	-	-	-	8	-	-	8
205.3	330.3	-	-	-	14	3	-	-	17
205.4	330.5	-	-	3	1	-	-	-	4
205.7	331.0	-	-	-	-	2	-	-	2
206.5	332.3	-	2	5	1	1	1	-	10
206.6	332.4	-	-	-	3	2	-	-	5
207.5	333.9	-	-	1	1	1	-	-	3
207.8	334.4	-	-	2	1	-	-	-	3
208.0	334.7	1	10	11	17	9	-	-	48
210.8	339.2	-	-	1	-	-	-	-	1

Table 2 (Continued)

RM	RK	New reddts counted by flight date							Total
		20-Oct	27-Oct	03-Nov	10-Nov	20-Nov	01-Dec	08-Dec	
211.9	340.9	-	2	11	9	8	-	-	30
212.2	341.4	-	-	-	1	-	-	-	1
212.3	341.6	-	-	1	-	-	1	-	2
213.3	343.2	-	-	1	3	-	-	-	4
213.6	343.7	-	-	2	4	-	-	-	6
213.7	343.8	-	-	1	-	-	-	-	1
214.5	345.1	-	-	2	-	1	-	-	3
215.4	346.6	-	-	1	2	-	-	-	3
216.1	347.7	-	1	2	2	-	1	-	6
216.9	349.0	-	-	7	9	5	-	-	21
217.3	349.6	-	2	15	9	13	3	-	42
217.8	350.4	-	-	-	2	-	-	-	2
218.5	351.6	-	-	-	6	3	1	-	10
218.7	351.9	-	2	2	9	7	-	-	20
219.0	352.4	-	-	4	3	-	-	-	7
219.3	352.9	-	1	8	3	-	-	-	12
220.7	355.1	-	-	-	-	4	-	-	4
222.7	358.3	-	1	2	3	-	2	-	8
222.9	358.6	-	1	7	9	1	1	-	19
224.7	361.5	-	4	3	2	3	-	-	12
225.1	362.2	-	-	3	-	-	-	-	3
231.3	372.2	-	-	-	-	1	-	-	1
235.0	378.1	-	2	-	-	4	4	-	10
235.7	379.2	3	-	7	-	3	3	-	16
236.0	379.7	-	-	-	1	1	-	-	2
237.0	381.3	-	1	6	11	2	-	-	20
238.4	383.6	-	-	-	1	-	-	-	1
238.6	383.9	-	1	8	11	3	-	-	23
240.4	386.8	-	-	4	3	4	-	-	11
240.6	387.1	-	1	13	7	3	-	-	24
241.0	387.8	-	-	-	7	1	-	-	8
242.8	390.7	-	-	-	2	4	4	1	11
243.5	391.8	-	-	-	6	6	1	-	13

Table 2 (Continued)

RM	RK	New reds counted by flight date							Total
		20-Oct	27-Oct	03-Nov	10-Nov	20-Nov	01-Dec	08-Dec	
243.8	392.3	-	-	-	-	2	-	-	2
244.5	393.4	-	2	7	13	9	-	-	31
244.7	393.7	-	-	-	2	-	-	-	2
245.3	394.7	-	-	-	9	-	-	-	9
245.7	395.3	-	-	-	-	2	-	-	2
245.8	395.5	-	-	-	6	-	-	-	6
247.5	398.2	-	-	-	-	2	2	-	4
		5	72	246	418	292	79	6	1,118

Table 3. Record of fall chinook salmon redds counted in the Snake River using submersible cameras in 2003 (Data collected by the Idaho Power Company). Counts are presented by river mile (RM) and river kilometer (RK). At RM 179.6, 69 individual redds could be counted, plus an area of 1,122 m² of disturbed substrate equaling 25 redds using a conversion factor of 45.8 m² per redd. At RM 212.2, 7 individual redds could be counted, plus an area of 1,184 m² of disturbed substrate equaling 26 redds using a conversion factor of 45.8 m² per redd.

RM	RK	Redds
166.6	268.1	1
158.0	254.2	4
163.7	263.4	10
165.8	266.8	48
168.7	271.4	28
169.7	273.0	10
178.5	287.2	25
179.6	289.0	94
184.7	297.2	6
188.2	302.8	3
193.0	310.5	16
194.4	312.8	5
198.2	318.9	13
198.8	319.9	4
203.1	326.8	2
208.0	334.7	14
212.2	341.4	33
212.3	341.6	2
213.3	343.2	8
216.9	349.0	2
218.7	351.9	1
228.0	366.9	1
235.0	378.1	56
239.4	385.2	6
242.9	390.8	2
		394

Table 4. List of the 34 sites searched for fall chinook salmon redds in the Snake River, 2003, by river mile (RM).

RM	RM
175.3	212.2
175.8	212.3
178.5	212.4
179.6	213.3
184.7	216.9
188.2	218.5
188.5	218.7
193.0	221.0
193.6	222.3
194.4	222.8
198.2	227.9
198.8	228.0
199.4	235.0
203.1	235.7
208.0	239.4
208.3	241.8
211.9	242.8

Table 5. Flight information, river flow, and visibility rating for aerial redd surveys of the Snake River in 2003.

Category	Flight date						
	20-Oct	27-Oct	03-Nov	10-Nov	20-Nov	01-Dec	08-Dec
River Mile Start	147	147	147	147	147	147	147
River Mile End	247	247	247	247	247	247	247
Aircraft	H. Soloy	H. Soloy	H. Soloy	H. Soloy	H. Soloy	H. Soloy	H. Soloy
Pilot	J. Pope Jr.	J. Pope Jr.	J. Pope Jr.	J. Pope Jr.	J. Pope Jr.	J. Pope Jr.	J. Pope Jr.
Primary Observer	P. Groves	P. Groves	P. Groves	P. Groves	P. Groves	P. Groves	P. Groves
Secondary Observer	S. Bradbury	S. Bradbury	S. Bradbury	S. Bradbury	S. Bradbury	S. Bradbury	S. Bradbury
Weather	PtlyCldy	MstlyCldy	Cldy/Snow	Cloudy	Clear	Cloudy	Cloudy
Flow (cfs) at RM 67.5	12,600	12,200	12,300	12,300	13,000	13,200	14,300
Flow (cfs) at RM 247.0	8,333	8,479	8,485	8,514	8,384	8,434	8,283
Visibility rating (VR): Asotin to G. Ronde River	Excellent	Excellent	Good	Excellent	Good	Good	Good
VR: Grande Ronde River to Salmon River	Excellent	Excellent	Good	Excellent	Good	Excellent	Good
VR: Salmon River to Hells Canyon Dam	Excellent	Excellent	Good	Excellent	Good	Excellent	Excellent

Table 6. Number of redd searches conducted in the Snake River and tributaries between Lower Granite and Hells Canyon dams, 1986-2003. Data for underwater searches indicates the number of discrete patches of gravels searched, whereas all other data indicates the number of helicopter flights over portions of the corresponding river.

River	Year																	
	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Snake (helicopter)	1	2	2	2	3	9	8	8	8	7	7	8	8	9	9	10	7	7
Snake (video)						1	3	50	73	42	32	63	48	73	60	67	60	47
Lower Clearwater (RM 0-41)			1	2	2	2	2	5	5	3	4	9	5	10	11	8	9	9
Potlatch ^b														1	5	3	3	2
N.F. Clearwater							2	4	5	3	5	9	5	7	11	4	9	9
Clearwater (RM 42-74)									5	2	1	7	5	8	11	4	3	9
S.F. Clearwater							2	4	4	1	3	7	5	8	6	7	3	3
M.F. Clearwater (RM 75-98)									1	2	2	2	5	3	4	5	1	1
Selway									1	2	2	2	5	3	5	6	1	1
Asotin Creek ^a			1	1	2	1												2
Grande Ronde	1	3	2	1	1	3	6	8	7	3	4	8	6	7	7	9	7	8
Salmon							2	3	3	1	4	3	3	3	2	1	2	3
Imnaha	1	2	2	2	1	9	6	8	8	6	5	7	6	9	9	9	7	8

^a Information on surveys of Asotin Creek were not reported under this project prior to this report. Asotin Creek was surveyed by foot in 1988 (Bugert et al. 1988), by helicopter (RM 0-9) in 1989 (Bugert et al. 1989), by foot (RM 0-9) in 1990 (Bugert et al. 1991), and by foot (RM 0-3) in 1991(Mendel et al. 1992).

^b Fall chinook salmon redds were observed in the Potlatch River in 2002 and 2003 during ground searches for coho redds and carcasses.

Table 7. Numbers of fall chinook salmon redds counted using submersible cameras in the Snake River, 1991-2003. Counts are presented by river mile (RM) and river kilometer (RK). A zero indicates the site was searched but no redds were observed. An empty cell indicates the site was not searched in the corresponding year.

		Year												
RM	RK	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
148.5	238.9			0	0		0	0		0	0	1	3	
156.4	251.6												18	0
158.0	254.2			0	0		0	0	0	0	0	0	1	4
162.4	261.3	5	0	0	0		2	0	0	0	0	6	1	0
163.7	263.4				0		0	0		0	0	0	0	10
165.3	266.0			0	0							4	0	
165.7	266.6			28	0		0	0	0	0	0	6	8	48
166.2	267.4			11	0		0	0	0	0	0	0	1	0
166.6	268.1			21	0		0	0	6	0	1	0	9	1
168.7	271.4													28
169.7	273.0			0	0		0	0						10
178.5	287.2													25
179.6 ^a	289.0			2	8	19	24	5	16	30	48	67	75	94
181.8	292.5			0	0			0		1		0	0	
183.1	294.6			0	0			0	0	2	0	0	4	
184.7	297.2			0	0			0		0	0	0	0	6
188.2	302.8									0	0	2	0	3
193.0	310.5												21	16
193.5	311.3			0	0	0	0	0	0	0	0	4	2	
193.7	311.7		0		0	0	0	0	0	0	0	1	1	
193.8	311.8			1	0	0	0	0	0	0	0	0	1	
194.1	312.3				5	0	0	0	0			0	0	
194.4	312.8				0	0		0		0	0	0	1	5
198.2	318.9				0	0	2	0	0	6	5	19	11	13
198.8	319.9				0	0	0	0	0	4	4	2	2	4
199.4	320.8			1	0	0	5	0	0	2	1	2	0	0
203.1	326.8			0	0	0	0	0	10	0	0	0	0	2
208.0	334.7			0	0	0	0	4	0	11	0	0	1	14
208.3	335.2			0	0	0	0	0	0	4	0	4	0	0
211.9 ^b	340.9			0						1				0
212.2	341.4			0	0	2	0	0	17	24	28	37	37	33
212.3	341.6					0			0	2	3	8	5	2
213.3	343.2			0	0	0		0	0	0	0	4	8	8
216.9	349.0									4	0	1		2
218.5	351.6									0	1	0	11	1
218.7	351.9					3		0	0	1		4	2	0
219.0 ^b	352.4									1			0	
221.0	355.6									0	0	0	1	0
222.8	358.5			3	0	0				0	0			0
223.1	359.0									3	0	0		
228.0	366.9				0	0	0	0	0	2	0	0	0	1
235.0	378.1				0	0			0		0		9	56
236.9	381.2			0	1	0	0	0	0				0	
239.4	385.2													6
242.9	390.8								1	2		1	2	2
245.8	395.5					0				0		1		
		5	0	67	14	24	33	9	50	100	91	174	235	394

^a At RM 179.6, a 170 m² patch of disturbed substrates was observed in 1995, 238 m² in 1996, 1,226 m² in 2001, 1,282 m² in 2002 and 1,122 m² in 2003. At RM 212.2, a 1,184 m² patch of disturbed substrates was observed in 2003. The numbers of redds were estimated using 45.8 m² per redd.

^b RM 211.9 and 219 are not deep-water sites. Cameras were used in for ground truthing due to poor observation conditions.

Table 8. Numbers of redds counted during aerial searches of the Snake River, by week of the year, 1993-2003. An empty cell indicates no searches were conducted in the corresponding week and year.

Week	Calendar Days												2002	2003
	Perpetual	Leap years	1993	1994	1995	1996	1997	1998	1999	2000	2001			
41	6 Oct. - 12 Oct.	7 Oct. - 13 Oct.							0	1	9			
42	13 Oct. - 19 Oct.	14 Oct. - 20 Oct.							5	4	0	0		
43	20 Oct. - 26 Oct.	21 Oct. - 27 Oct.	1	1	4	2	1	0	41	18	4	30	5	
44	27 Oct. - 02 Nov.	28 Oct. - 03 Nov.	18	4	9	26	16	28	80	80	70	172	72	
45	03 Nov. - 09 Nov.	04 Nov. - 10 Nov.	13	18	18	23	8	43		79	82	291	246	
46	10 Nov. - 16 Nov.	11 Nov. - 17 Nov.	15	9	6	20	13	35	143	52	213	190	418	
47	17 Nov. - 23 Nov.	18 Nov. - 24 Nov.	5	10	3	0	10	20	1	16	85	125	292	
48	24 Nov. - 30 Nov.	25 Nov. - 01 Dec.	5	10	1	0	0	4	0	5	31	67		
49	01 Dec. - 07 Dec.	02 Dec. - 08 Dec.	1	1	0	0	1	5	3	0	10	3	79	
50	08 Dec. - 14 Dec.	09 Dec. - 15 Dec.	2	0			0	0			8		6	

Table 9. New fall chinook salmon redds counted in the Clearwater River and North Fork Clearwater River in 2003. Counts are presented by river mile (RM) and date. A dash (-) indicates no redds were observed on the corresponding location and date. An empty cell indicates no search was conducted at the corresponding river mile (Data collected by the Nez Perce Tribe).

New redds counted by flight date											
RM	RK	23-Sep	30-Sep	07-Oct	13-Oct	20-Oct	27-Oct	06-Nov	18-Nov	24-Nov	Totals
Clearwater River											
18.0	29.0	-	-	-	3	4	11	10	4	4	36
18.5	29.8	-	-	-	-	-	-	6	-	-	6
19.1	30.7	-	-	-	-	-	2	6	-	-	8
19.5	31.3	-	-	-	-	-	-	3	-	8	11
21.7	35.0	-	-	-	-	-	5	-	-	2	7
22.0	35.4	-	3	9	7	2	21	28	31	6	107
22.2	35.7	-	-	-	-	8	16	-	16	9	49
23.3	37.5	-	-	1	-	-	1	-	1	-	3
25.5	40.8	-	-	-	-	-	-	5	-	-	5
26.3	42.3	-	-	-	-	-	-	2	-	-	2
26.5	42.7	-	-	-	-	-	2	2	-	-	4
27.5	44.2	-	-	2	-	3	-	2	-	-	7
28.0	45.1	-	-	8	6	2	2	1	-	1	20
30.1	48.3	-	-	-	-	-	-	2	2	1	5
31.5	50.7	-	-	1	1	-	1	-	-	-	3
32.5	52.3	-	-	1	5	2	15	11	-	3	37
32.8	52.8	-	-	-	-	-	-	-	-	-	0
34.0	54.7	1	1	-	1	5	7	5	-	-	20
35.4	56.9	-	-	2	6	6	10	5	24	-	53
35.7	57.5	-	-	-	-	1	4	-	2	-	7
36.2	58.2	-	-	-	-	-	1	-	3	-	4
37.8	60.8	-	-	-	-	-	1	-	-	-	1
39.1	58.2	-	-	1	-	-	-	-	-	-	1
39.6	58.2	-	-	-	1	-	-	-	-	-	1
40.3	58.2	-	-	1	1	4	18	53	70	-	147
43.2	69.3	-	-	-	1	-	-	-	-	-	1
45.0	72.4	-	-	-	-	-	2	-	-	-	2
49.4	79.5	-	-	-	-	-	-	1	-	-	1
52.8	85.0	-	-	-	-	-	-	3	-	-	3
57.2	92.0	-	-	-	-	-	-	9	-	-	9
62.4	100.4	-	-	-	-	-	-	1	-	-	1
66.0	106.1	-	-	-	-	-	-	-	-	-	0
70.2	113.0	-	-	-	-	-	-	2	-	-	2
North Fork Clearwater River											
0.6	1.0	-	-	-	-	-	-	-	-	8	8
		1	4	26	32	37	119	157	153	42	571

Table 10. Flight information, river flow, and visibility rating for aerial redd surveys of the Clearwater River in 2003 (Data provided by the Nez Perce Tribe).

Category	Flight date								
	23-Sep	30-Sep	07-Oct	13-Oct	20-Oct	27-Oct	06-Nov	18-Nov	24-Nov
Start (RM)	4	4	4	4	4	4	4	18	4
End (RM)	45	45	75	45	45	45	75	45	75
Flow (cfs) at RM 11.6	2,868	2,850	2,850	3,190	3,300	2,930	3,000	3,820	3,469
Flow (cfs) at RM 37.4	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600
Flow (cfs) at RM 44.6	1,150	1,010	949	1,280	1,400	1,130	1,010	1,860	1,480
Visibility rating	Excel	Fair	Poor	Poor	Bad	Poor	Poor	Poor	Poor

Table 11. Numbers of redds counted during aerial searches of the Clearwater River (RM 0-45), by week of the year, 1993-2003. An empty cell indicates no searches were conducted in the corresponding week and year.

Week	Calendar Day												Year											
	Perpetual	Leap year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003											
39	22 Sep. - 28 Sep.	23 Sep. - 29 Sep.								0			1											
40	29 Sep - 5 Oct.	30 Sep. - 06 Oct.							12	1	4	15	4											
41	6 Oct. - 12 Oct.	7 Oct. - 13 Oct.						14	20	6	0	40	26											
42	13 Oct. - 19 Oct.	14 Oct. - 20 Oct.					9		13	7		55	31											
43	20 Oct. - 26 Oct.	21 Oct. - 27 Oct.			5	28	17	18	22	4	34	75	37											
44	27 Oct. - 02 Nov.	28 Oct. - 03 Nov.	8		11	27	22	35	35	53		90	117											
45	03 Nov. - 09 Nov.	04 Nov. - 10 Nov.		10		9	5	13	29	39	22	127	141											
46	10 Nov. - 16 Nov.	11 Nov. - 17 Nov.	12			2	4	11	24	38	84	90												
47	17 Nov. - 23 Nov.	18 Nov. - 24 Nov.	16	11	4				24	5	112		153											
48	24 Nov. - 30 Nov.	25 Nov. - 01 Dec.	0				0		0	12		6	34											
49	01 Dec. - 07 Dec.	02 Dec. - 08 Dec.	0	3			0		0	0	34	22												
50	08 Dec. - 14 Dec.	09 Dec. - 15 Dec.					1				1													

Table 12. New fall chinook salmon redds counted during aerial searches of the Grande Ronde River in 2003 (Data collected by the Nez Perce Tribe). Counts are presented by river mile (RM), river kilometer (RK), and date. An empty cell indicates no survey was conducted over the corresponding river mile, and a dash (-) indicates no redd were observed on the corresponding location and date.

RM	RK	New redds counted by flight date								Totals
		08-Oct	14-Oct	21-Oct	28-Oct	04-Nov	12-Nov	20-Nov	24-Nov	
0.1	0.1	-	-	-	-	-	-	-	2	2
0.5	0.8	-	-	-	1	-	1	-	-	2
1.0	1.6	-	-	-	3	-	1	-	-	4
2.1	3.4	-	-	-	1	1	-	-	-	2
3.2	5.1	-	-	-	1	1	-	-	-	2
3.5	5.6	-	-	-	1	-	-	-	-	1
3.6	5.8	-	-	-	1	3	-	-	-	4
4.4	7.1	-	-	-	3	1	-	2	-	6
4.5	7.2	-	-	-	-	2	1	-	-	3
4.6	7.4	-	-	-	-	1	-	-	-	1
6.5	10.5	-	-	-	-	1	-	-	-	1
8.1	13.0	-	-	-	1	-	-	-	-	1
8.9	14.3	-	-	-	-	-	-	-	1	1
11.0	17.7	-	-	-	1	-	-	-	-	1
11.8	19.0	-	-	-	-	2	-	-	-	2
12.5	20.1	-	-	1	-	2	-	1	-	4
13.8	22.2	-	-	-	1	-	-	-	2	3
15.0	24.1	-	-	-	1	-	-	-	-	1
16.3	26.2	-	-	-	-	1	-	-	-	1
17.6	28.3	-	-	3	-	-	-	-	2	5
18.0	29.0	-	-	2	-	2	-	-	2	6
19.2	30.9	-	-	-	1	1	-	-	-	2
20.0	32.2	-	-	-	1	-	-	-	-	1
21.0	33.8	-	-	-	1	-	-	-	-	1
21.5	34.6	-	-	-	2	-	-	-	-	2
26.5	42.6	-	-	-	1	-	-	-	-	1
26.9	43.3	-	-	-	5	-	-	-	-	5
27.3	43.9	-	-	2	-	-	-	-	-	2
29.2	47.0	-	-	-	-	1	-	-	-	1
33.3	53.6	-	-	-	2	-	-	1	-	3
37.6	60.5	-	1	3	-	-	-	-	-	4
37.8	60.8	-	-	-	-	2	-	-	-	2
42.5	68.4	-	-	-	1	-	-	-	-	1
43.3	69.7	-	-	1	-	-	-	-	-	1
44.9	72.3	1	3	-	-	-	-	-	-	4
47.7	76.8	-	3	4	1	-	2	-	-	10
		1	7	16	30	21	5	4	9	93

Table 13. Flight information, river discharge, and visibility rating for aerial redd surveys of the Grande Ronde River in 2003. All surveys were conducted from a Jet Ranger helicopter. Flights conducted by NPT.

Category	Flight date							
	08-Oct	14-Oct	21-Oct	28-Oct	04-Nov	12-Nov	20-Nov	24-Nov
Start (RM)	0	0	0	0	0	0	0	0
End (RM)	53	53	53	53	53	53	53	53
Flow (cfs) at RM 45.2	561	603	612	620	612	776	1000	887
Visibility rating	Excel	Good	Excel	Good	Excel	Fair	Good	Good

Table 14. Numbers of redds counted during aerial searches of the Grande Ronde River (RM 0-53), by week of the year, 1993-2003. An empty cell indicates no searches were conducted in the corresponding week and year.

Week	Calendar Day		Year											
	Perpetual	Leap year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	
41	6 Oct. - 12 Oct.	7 Oct. - 13 Oct.						0	6	0	1		1	
42	13 Oct. - 19 Oct.	14 Oct. - 20 Oct.					0	0	1	3	3		7	
43	20 Oct. - 26 Oct.	21 Oct. - 27 Oct.	11	1	10	3	12	11	4	1	19	37	16	
44	27 Oct. - 02 Nov.	28 Oct. - 03 Nov.	11		3	3	11	7	0	2	7	31	30	
45	03 Nov. - 09 Nov.	04 Nov. - 10 Nov.	1	8	5	10	1	6		0	31	8	21	
46	10 Nov. - 16 Nov.	11 Nov. - 17 Nov.	7	0		4	13		2	2	0	11	5	
47	17 Nov. - 23 Nov.	18 Nov. - 24 Nov.	12	1		0	10	0	0	0	62	10	4	
48	24 Nov. - 30 Nov.	25 Nov. - 01 Dec.	4	5			6				25	13	9	
49	01 Dec. - 07 Dec.	02 Dec. - 08 Dec.	2	0			2				35	1		
50	08 Dec. - 14 Dec.	09 Dec. - 15 Dec.	1	0							14			

Table 15. Fall chinook aerial spawning ground surveys conducted in the Salmon River, 2003 (Data collected by the Nez Perce Tribe). Counts are presented by river mile (RM), river kilometer (RK), and date. An empty cell indicates no survey was conducted over the corresponding river mile, and a dash (-) indicates no redd were found on the corresponding location and date.

RM	RK	New redds counted by flight date			Totals
		29-Oct	13-Nov	26-Nov	
4.0	6.4	0	0	1	1
5.5	8.8	1	0	0	1
5.6	9.0	0	0	1	1
20.3	32.7	0	0	1	1
20.6	33.1	0	0	2	2
30.9	49.7	3	1	1	5
31.1	50.0	0	0	1	1
64.0	103.0	2	0	0	2
68.5	110.2	0	0	2	2
91.0	146.4	0	0	1	1
100.7	162.0	0	0	1	1
		6	1	11	18

Table 16. New fall chinook salmon redds counted during aerial searches of the Imnaha River in 2003 (Data collected by the Nez Perce Tribe). Counts are presented by river mile (RM), river kilometer (RK), and date. An empty cell indicates no survey was conducted over the corresponding river mile, and a dash (-) indicates no redd were observed on the corresponding location and date.

RM	RK	New redds counted by flight date								Totals
		10/08	10/14	10/21	10/29	11/04	11/12	11/20	11/26	
0-4	0-6	0	3	0	3	14	2	0	2	24
4-30	4-48	-	-	-	-	-	19	0	0	19
		0	3	0	3	14	21	0	2	43

Table 17. Flight information, river flow, and visibility rating for aerial redd surveys of the Imnaha River in 2003.

Category	Flight date							
	10/08	10/14	10/21	10/29	11/04	11/12	11/20	11/26
Start (RM)	0	0	0	0	0	0	0	0
End (RM)	4	4	4	4	4	19	19	19
Flow (cfs) at RM19.3	103	105	119	126	127	125	127	130
Visibility rating	Excel	Excel	Excel	Excel	Excel	Excel	Excel	Excel

Table 18. Numbers of redds counted during aerial searches of the Imnaha River (RM 0-4), by week of the year, 1993-2003. An empty cell indicates no searches were conducted in the corresponding week and year.

Week	Calendar Day		Year											
	Perpetual	Leap year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	
41	6 Oct. - 12 Oct.	7 Oct. - 13 Oct.							0	0	0		0	
42	13 Oct. - 19 Oct.	14 Oct. - 20 Oct.						0	0	0	0		3	
43	20 Oct. - 26 Oct.	21 Oct. - 27 Oct.	2	0	0	0	0	2	1	1	0	9	0	
44	27 Oct. - 02 Nov.	28 Oct. - 03 Nov.	2	0	1	2	0	5	0	1	4	4	3	
45	03 Nov. - 09 Nov.	04 Nov. - 10 Nov.	0	0	0	0	0	1		5	1	10	14	
46	10 Nov. - 16 Nov.	11 Nov. - 17 Nov.		0	1	1	1	0	4	1	11	5	2	
47	17 Nov. - 23 Nov.	18 Nov. - 24 Nov.	0	0	2	0	2	0	2	0	8	16	0	
48	24 Nov. - 30 Nov.	25 Nov. - 01 Dec.	0	0	0		0			0	7	9	2	
49	01 Dec. - 07 Dec.	02 Dec. - 08 Dec.	0	0			0		2	0		0		
50	08 Dec. - 14 Dec.	09 Dec. - 15 Dec.	0	0							7			

Table 19. Annual count of adult fall chinook salmon in the Lower Granite Dam fish ladder (Raw count), the number removed (Adult take), the number estimated to have passed the dam (Adults passed), the number of redds counted upstream of the dam, and number of adult fall chinook salmon counted per redd counted upstream, 1986-2003. Raw counts are from USACE annual fish passage reports (USACE 186-2003), and values for adult take are from the Washington Department of Fish and Wildlife (D. Milks, personal communication).

Year	Raw count	Adult take	Adults passed	Redds counted upstream	No. of adults per redd
1986	784	13	771	7	110.6
1987	951	3	948	73	12.9
1988	627	2	625	87	7.0
1989	706	0	706	69	10.2
1990	385	50	335	45	7.4
1991	630	40	590	54	10.9
1992	855	187	668	82	8.1
1993	1,170	218	952	219	4.3
1994	791	185	606	120	5.1
1995	1,067	432	635	109	5.8
1996	1,308	389	919	197	4.7
1997	1,451	444	1,007	189	5.3
1998	1,909	947	962	303	3.2
1999	3,381	1,519	1,862	579	3.2
2000	3,694	1,470	2,224	543	4.3
2001	8,915	2,286	6,629	1,302	5.6
2002	12,351	1,927	10,424	1,854	5.4
2003	11,673	458	11,215	2,241	5.0

Appendices

Appendix 1

Redd counts recorded from 1959 to 1978 in the Snake River between Lewiston, Idaho, and the Hells Canyon Dam site.											
River section	Citation	Year									
		1959	1960	-	1967	-	1969	-	1974	1975	1976 - 1978
Hells Canyon Dam to Pleasant Valley Dam Site	Irving and Bjornn 1981	19	2		144		294				
Pleasant Valley Dam Site to Imnaha River	Irving and Bjornn 1981	7	2		11		94				
Imnaha River to Lewiston, ID	Irving and Bjornn 1981	2	0		33		180				
		28	4		188		568				
Hells Canyon Dam to Johnson Bar	Witty 1988						170		1	N.D.	8
Johnson Bar to Pleasant Valley	Witty 1988						124		10	N.D.	1
Pleasant Valley to Appaloosa	Witty 1988						61		3	N.D.	0
Appaloosa to Mountain Sheep	Witty 1988						33		2	N.D.	4
Mountain Sheep to State Line	Witty 1988						0		0	N.D.	0
							388		16	10	13
Hells Canyon Dam to Asotin, Washington	Groves and Chandler 1996										132
Maximum annual count		28	4	-	188	-	568	-	16	10	13 - 132

Appendix 2

Fall chinook salmon redds counted in the Snake River during aerial searches, by river mile (RM), river kilometer (RK), and year (1986-2003). A dash (-) indicates no redds were observed at the corresponding site and year.

RM	RK	Year																	
		1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
148.0	238.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-
148.3	238.6	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1
148.5	238.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	3	34	22
148.8	239.4	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	2	4
149.1	239.9	-	-	-	1	-	2	1	-	-	-	-	2	1	-	-	2	13	-
149.2	240.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	15
149.4	240.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
150.0	241.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
151.5	243.8	-	-	-	-	-	-	-	2	-	-	-	-	1	-	-	5	-	4
151.9	244.4	-	-	1	-	-	-	-	-	-	3	4	8	-	-	-	-	7	31
152.1	244.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	6
152.3	245.1	-	13	15	23	16	-	7	3	5	-	3	12	3	20	21	52	23	19
153.2	246.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	1
155.2	249.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
156.6	252.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	3	-	-
156.8	252.3	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
156.9	252.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
157.2	252.9	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
157.4	253.3	2	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1	2
157.6	253.6	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	1	9
158.0	254.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1
159.3	256.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	2
159.5	256.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	2
159.7	257.0	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	3	1
160.5	258.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	2
160.8	258.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
161.0	259.0	-	-	-	-	-	-	7	11	-	3	-	7	9	1	7	12	11	20
161.8	260.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
162.4	261.3	-	-	2	1	2	15	11	1	-	-	-	-	-	1	4	50	32	2
163.0	262.3	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
163.3	262.7	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 2 (Continued)

RM	RK	Year																	
		1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
163.7	263.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14
164.4	264.5	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
164.7	265.0	-	-	-	2	1	-	-	-	1	-	-	1	-	-	19	12	25	-
165.2	265.8	-	-	5	-	-	-	2	3	-	-	-	-	-	-	1	-	-	-
165.3	266.0	-	-	-	-	-	-	2	-	-	-	-	-	1	-	-	7	19	-
165.5	266.3	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
165.7	266.6	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-	-	-	-
165.9	266.9	-	2	14	-	-	1	3	9	-	-	3	-	2	-	-	44	69	-
166.2	267.4	-	-	-	-	-	-	6	6	-	-	-	-	-	-	32	-	-	-
166.5	267.9	-	-	-	-	-	6	-	-	-	-	-	-	-	-	-	-	-	-
167.9	270.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
168.1	270.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
168.6	271.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
168.7	271.4	-	-	-	-	-	-	-	5	6	3	-	-	-	-	7	47	62	8
169.6	272.9	-	-	-	1	-	-	-	-	1	1	1	-	-	-	-	11	21	-
169.9	273.4	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	1	-
172.5	277.6	-	1	-	-	-	-	-	-	-	-	-	-	4	1	1	11	1	-
173.9	279.8	-	1	-	-	-	-	-	-	-	-	-	-	-	1	1	-	2	-
175.2	281.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-
175.7	282.7	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	-	1
176.5	284.0	-	-	-	-	-	-	-	-	-	-	-	-	-	2	1	-	2	-
178.3	286.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
178.5	287.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13
178.9	287.9	-	-	-	1	-	-	-	-	1	-	-	-	2	7	13	3	18	10
179.6	289.0	-	-	-	-	-	-	-	4	5	2	8	-	10	8	5	17	16	16
181.7	292.4	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	3	9	-
182.3	293.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8	-
183.4	295.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
183.5	295.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11
186.7	300.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-
187.5	301.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-
187.7	302.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	7	-
188.2	302.8	-	-	-	-	-	-	-	-	-	-	-	-	-	1	2	5	1	-

Appendix 2 (Continued)

RM	RK	Year																			
		1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003		
190.0	305.7	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1		
190.1	305.9	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	2	5	3		
190.7	306.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3		
190.8	307.0	-	1	5	-	2	5	1	-	-	-	1	-	4	2	5	18	28	6		
191.0	307.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2		
191.7	308.4	2	2	4	-	-	-	-	-	-	-	-	-	-	1	-	3	10	11		
193.0	310.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7	2		
193.2	310.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1		
193.4	311.2	-	-	-	5	2	-	-	2	-	2	-	1	4	-	-	2	3	3		
193.6	311.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	9		
193.7	311.7	-	4	-	-	-	-	6	1	2	1	-	2	3	1	5	7	7	-		
193.8	311.8	-	-	-	-	-	-	-	-	1	1	-	-	-	-	2	1	-	-		
194.0	312.1	-	2	-	-	3	-	1	1	2	4	2	6	14	11	11	22	26	20		
194.1	312.3	-	-	2	-	2	-	-	2	-	-	-	-	1	-	-	1	-	1		
196.0	315.4	-	-	3	-	-	-	-	-	-	-	-	-	-	6	10	20	23	34		
196.2	315.7	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
198.2	318.9	-	-	-	-	-	-	-	-	-	-	-	-	1	11	9	17	22	25		
198.8	319.9	-	5	-	3	2	7	3	-	6	1	6	-	4	11	13	19	23	35		
201.1	323.6	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	2	3	6		
203.1	326.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	8		
204.1	328.4	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
205.3	330.3	-	-	-	-	-	3	-	-	-	1	-	-	3	6	2	-	11	17		
205.4	330.5	-	1	-	-	-	-	-	-	-	-	2	-	-	-	4	-	2	4		
205.7	331.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2		
206.4	332.1	-	1	4	-	-	1	2	1	-	2	-	-	2	4	-	2	2	10		
206.6	332.4	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	1	5		
207.5	333.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	3		
207.7	334.2	-	-	-	-	-	-	-	-	-	-	-	-	-	2	1	-	-	-		
207.8	334.4	-	-	1	-	-	-	-	-	-	-	3	2	-	5	-	-	1	3		
207.9	334.5	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
208.0	334.7	-	-	-	1	-	-	-	-	-	2	9	1	13	25	17	22	36	48		
208.1	334.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-		
209.1	336.4	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	-		

Appendix 2 (Continued)

RM	RK	Year																	
		1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
209.7	337.4	-	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-	2	-
210.8	339.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
211.9	340.9	-	-	-	-	-	-	-	2	-	-	-	-	11	9	6	14	25	30
212.2	341.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
212.3	341.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	4	2
213.3	343.2	-	-	-	2	-	-	-	-	-	-	1	-	-	-	1	2	1	4
213.5	343.5	-	-	-	-	-	-	-	-	-	-	1	-	-	2	1	2	4	6
213.7	343.8	-	-	-	-	1	-	2	-	-	-	-	-	4	1	1	6	7	1
214.5	345.1	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1	4	3
214.7	345.5	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
215.4	346.6	-	-	-	-	-	-	-	-	-	-	-	-	1	2	-	-	-	6
216.1	347.7	-	-	-	-	-	-	-	-	1	-	-	-	3	1	2	6	4	-
216.9	349.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	6	21	21
217.3	349.6	-	-	-	-	-	-	1	3	-	1	-	-	4	24	6	13	22	42
217.8	350.4	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	2
218.2	351.1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
218.5	351.6	-	-	-	-	-	-	-	-	-	-	-	-	-	3	2	-	5	10
218.7	351.9	-	-	-	-	-	-	-	-	-	1	7	-	4	12	5	11	15	20
219.0	352.4	-	-	-	-	-	-	-	-	-	3	2	-	4	4	6	3	11	7
219.3	352.9	-	-	2	-	-	-	1	-	3	-	2	3	6	8	5	7	13	12
220.7	355.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
221.5	356.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
222.3	357.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-
222.7	358.3	-	-	-	1	-	-	-	-	-	-	-	-	-	6	-	1	-	8
222.8	358.5	2	3	-	3	-	-	-	-	-	-	-	-	-	-	5	-	-	-
222.9	358.6	-	-	-	-	-	-	-	-	1	-	-	-	-	9	-	4	20	19
223.2	359.1	-	-	-	-	-	-	-	-	3	3	-	-	-	-	-	-	1	-
223.7	359.9	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
224.7	361.5	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	12
225.0	362.0	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	8	2	-
225.1	362.2	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	3
226.7	364.8	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	1	-
231.3	372.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1

Appendix 2 (Continued)

RM	RK	Year																	
		1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
235.1	378.3	-	-	-	-	-	-	-	-	-	1	-	-	1	2	3	-	12	10
235.7	379.2	-	4	-	3	-	-	-	-	5	2	7	1	4	11	16	16	22	16
236.0	379.7	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	2
236.1	379.9	-	1	2	1	-	-	-	-	-	-	-	-	-	2	1	1	-	-
236.7	380.9	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
237.0	381.3	-	-	-	-	-	-	-	5	2	1	-	2	8	6	13	14	26	20
238.3	383.4	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	2	1
238.6	383.9	-	2	-	2	-	-	-	-	-	1	-	-	-	4	4	8	13	23
240.5	387.0	-	6	-	-	-	-	-	-	-	-	1	-	2	8	1	3	11	11
240.7	387.3	-	-	-	3	-	6	-	-	-	-	1	1	4	7	11	13	21	24
241.0	387.8	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	4	5	8
242.8	390.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	3	7	11
243.3	391.5	-	1	-	1	-	-	-	-	-	-	-	-	-	-	4	-	-	-
243.5	391.8	-	-	-	-	-	-	-	-	-	-	2	-	1	-	-	5	-	13
243.8	392.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
244.0	392.6	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	12	-
244.3	393.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-
244.6	393.6	-	-	-	1	2	-	-	-	-	-	-	-	-	1	2	9	13	31
244.7	393.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
245.3	394.7	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	9
245.7	395.3	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	2
245.8	395.5	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	4	6
246.5	396.6	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
247.5	398.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
		7	66	64	58	37	46	47	60	53	41	71	49	135	273	255	535	878	1,118

Appendix 3

Fall chinook salmon redds counted in the Snake River during aerial and underwater searches, by river mile (RM), river kilometer (RK), and year (1986-2003). A dash (-) indicates no redds were observed at the corresponding site and year.

RM	RK	Year																	
		1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
148.0	238.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-
148.3	238.6	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1
148.5	238.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	4	37	22
148.8	239.4	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
148.9	239.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	4
149.1	239.9	-	-	-	1	-	2	-	1	-	-	-	-	2	1	-	2	-	-
149.2	240.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	13	15
149.4	240.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
150.0	241.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
151.5	243.8	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	5	-	4
151.9	244.4	-	-	1	-	-	-	-	-	-	3	4	8	-	1	-	-	7	31
152.1	244.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	6
152.3	245.1	-	13	15	23	16	-	7	3	5	-	3	12	3	20	21	52	23	19
153.2	246.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	1
155.2	249.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
156.4	251.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	18	-
156.6	252.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	28	-
156.8	252.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	3	-	-
156.9	252.5	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
157.2	252.9	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
157.4	253.3	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
157.6	253.6	-	-	-	-	-	-	-	-	-	-	-	1	3	-	-	-	1	2
158.0	254.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	2	13
159.3	256.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1
159.5	256.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	2
159.7	257.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	1
160.5	258.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	2
160.8	258.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
161.0	259.0	-	-	-	-	-	-	-	-	-	3	-	-	-	1	7	12	11	20
161.8	260.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
162.4	261.3	-	-	2	1	2	20	11	1	-	-	2	-	-	1	4	56	33	2
163.0	262.3	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
163.3	262.7	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-
163.7	263.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	24
164.4	264.5	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
164.7	265.0	-	-	-	2	1	-	-	-	1	-	-	1	-	-	-	19	12	25

Appendix 3 (Continued)

RM	RK	Year																	
		1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
165.2	265.8	-	-	5	-	-	-	-	2	3	-	-	-	-	-	-	5	-	-
165.3	266.0	-	-	-	-	-	-	-	2	-	-	-	-	1	-	-	-	7	19
165.5	266.3	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
165.7	266.6	-	-	-	-	-	-	-	28	-	-	-	-	-	-	-	38	52	117
165.9	266.9	-	2	14	-	-	1	3	9	-	-	3	-	2	5	-	-	1	-
166.2	267.4	-	-	-	-	-	-	-	17	-	-	-	-	-	-	-	-	9	-
166.4	267.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
166.6	268.1	-	-	-	-	-	6	-	21	-	-	-	-	6	-	1	-	1	-
167.9	270.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
168.1	270.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
168.6	271.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	8
168.7	271.4	-	-	-	-	-	-	-	5	6	3	-	-	-	-	-	7	47	90
169.7	273.0	-	-	-	1	-	-	-	-	-	1	1	-	-	-	-	-	11	31
169.9	273.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
172.5	277.6	-	1	-	-	-	-	-	-	-	-	3	-	4	1	1	18	11	1
173.9	279.8	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	2
175.2	281.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-
175.7	282.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1
176.5	284.0	-	-	-	-	-	-	-	-	-	1	-	-	-	-	2	1	-	2
178.3	286.9	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	3	-	-
178.5	287.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	38
178.9	287.9	-	-	-	1	-	-	-	-	1	-	-	-	-	7	13	-	18	10
179.6	289.0	-	-	-	-	-	-	-	6	13	21	32	5	16	40	56	72	92	110
181.7	292.4	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	3	9
183.1	294.6	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	4	-
182.3	293.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8
183.4	295.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
183.5	295.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11
184.7	297.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6
186.7	300.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-
187.5	301.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-
187.7	302.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	7
188.2	302.8	-	-	-	-	-	-	-	-	-	-	-	-	-	1	2	7	1	3
190.0	305.7	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1
190.1	305.9	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	2	5	3
190.7	306.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
190.8	307.0	-	1	5	-	2	5	1	-	-	-	1	-	4	2	5	18	28	6

Appendix 3 (Continued)

RM	RK	Year																	
		1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
191.0	307.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
191.7	308.4	2	2	4	-	-	-	-	-	-	-	-	-	-	1	-	3	10	11
193.0	310.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	28	18
193.2	310.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
193.4	311.2	-	-	-	5	2	-	-	-	-	2	-	1	4	-	-	-	5	3
193.6	311.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	1	9
193.7	311.7	-	4	-	-	-	-	6	1	2	1	-	2	3	-	5	8	8	-
193.8	311.8	-	-	-	-	-	-	-	1	1	1	-	-	-	1	2	1	1	-
194.0	312.1	-	2	-	3	3	-	1	2	4	2	2	6	14	11	11	22	26	20
194.1	312.3	-	-	2	2	-	-	-	5	-	-	-	-	-	-	-	1	-	1
194.4	312.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	5
196.0	315.4	-	-	3	-	-	-	-	2	-	-	-	-	1	6	10	20	23	34
196.2	315.7	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	25
198.2	318.9	-	-	-	-	-	-	-	-	-	2	-	-	1	17	14	36	33	13
198.8	319.9	-	5	-	3	2	7	3	6	1	6	5	-	4	15	17	21	25	39
199.4	320.8	-	-	-	-	-	-	-	1	-	-	5	-	-	2	1	2	-	-
201.1	323.6	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	2	3	6
203.1	326.8	-	-	-	-	-	-	-	-	-	-	-	-	10	-	-	-	1	10
204.1	328.4	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
205.3	330.3	-	-	-	-	-	3	-	-	1	-	-	-	3	6	2	-	11	17
205.4	330.5	-	1	-	-	-	-	-	-	-	2	-	-	-	-	4	-	2	4
205.7	331.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
206.4	332.1	-	1	4	-	-	1	2	1	2	-	-	-	2	4	-	2	2	10
206.6	332.4	-	-	-	-	-	-	-	-	-	-	-	-	-	2	1	-	1	5
207.7	334.2	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	3	3
207.8	334.4	-	-	1	-	-	-	-	-	-	-	3	2	-	5	-	-	1	3
207.9	334.5	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
208.0	334.7	-	-	-	1	-	-	-	-	2	9	-	5	13	36	17	26	37	62
208.1	334.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
208.3	335.2	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	-	-	-
209.1	336.4	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	-
209.7	337.4	-	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-	2	-
210.8	339.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
211.9	340.9	-	-	-	-	-	-	-	2	-	-	-	-	11	10	6	14	25	30
212.2	341.4	-	-	-	-	-	-	-	-	-	2	-	-	17	24	28	37	37	34
212.3	341.6	-	-	-	-	-	-	-	-	-	-	-	-	-	2	3	9	9	4
213.3	343.2	-	-	-	2	-	-	-	-	-	-	1	-	-	-	1	6	9	12

Appendix 3 (Continued)

RM	RK	Year																	
		1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
213.5	343.5	-	-	-	-	-	-	-	-	-	-	1	-	-	2	1	2	4	6
213.7	343.8	-	-	-	-	1	-	2	-	-	-	-	-	4	1	1	6	7	1
214.5	345.1	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1	4	3
214.7	345.5	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
215.4	346.6	-	-	-	-	-	-	-	-	-	-	-	-	1	2	-	-	-	3
216.1	347.7	-	-	-	-	-	-	-	-	1	-	-	-	3	1	2	6	4	6
216.9	349.0	-	-	-	-	-	-	-	-	-	-	-	-	-	4	5	7	21	23
217.3	349.6	-	-	-	-	-	-	1	3	-	1	-	-	4	24	6	13	22	42
217.8	350.4	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	2
218.2	351.1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
218.5	351.6	-	-	-	-	-	-	-	-	-	-	-	-	-	3	3	-	16	11
218.6	351.7	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
218.7	351.9	-	-	-	-	-	-	-	-	-	4	7	-	4	12	5	15	17	20
219.0	352.4	-	-	-	-	-	-	-	-	-	-	2	-	4	5	6	3	11	7
219.3	352.9	-	-	2	-	-	-	1	-	3	-	2	3	6	8	5	7	13	12
220.7	355.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	4
221.0	355.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
221.5	356.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
222.3	357.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-
222.7	358.3	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1	-	8
222.8	358.5	2	3	-	-	-	-	-	-	-	-	-	-	-	-	5	-	-	-
222.9	358.6	-	-	-	3	-	-	-	3	1	-	-	-	-	9	-	4	20	19
223.2	359.1	-	-	-	-	-	-	-	-	3	3	-	-	-	3	-	-	1	-
223.7	359.9	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
224.7	361.5	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	12
225.0	362.0	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	2	-	-
225.1	362.2	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	1	3	3
226.7	364.8	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-
228.0	366.9	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	1
231.3	372.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1
235.1	378.3	-	-	-	-	-	-	-	-	-	1	-	-	1	2	3	8	21	66
235.7	379.2	-	4	-	3	-	-	-	-	-	2	7	1	4	11	16	16	22	16
236.0	379.7	1	1	2	1	-	-	-	-	-	-	-	-	-	2	1	-	-	2
236.1	379.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	-
236.7	380.9	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
237.0	381.3	-	-	-	-	-	-	-	5	3	1	-	2	8	6	13	14	26	20
238.3	383.4	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	2	1

Appendix 3 (Continued)

RM	RK	Year																	
		1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
238.6	383.9	-	2	-	2	-	-	-	-	1	-	-	-	-	4	4	8	13	23
239.4	385.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6
240.5	387.0	-	6	-	-	-	-	-	-	-	1	1	-	2	8	1	3	11	11
240.7	387.3	-	-	-	3	-	6	-	-	-	1	1	1	4	7	11	13	21	24
241.0	387.8	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	4	5	8
242.8	390.7	-	-	-	-	-	-	-	-	-	-	-	-	1	-	4	4	9	13
243.0	391.0	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-
243.3	391.5	-	1	-	1	-	-	-	-	-	-	-	-	-	-	4	-	-	-
243.5	391.8	-	-	-	-	-	-	-	-	-	-	2	-	1	-	-	5	-	13
243.8	392.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
244.0	392.6	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	12	-
244.3	393.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-
244.6	393.6	-	-	-	1	2	-	-	-	-	-	-	-	-	1	2	9	13	31
244.7	393.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
245.3	394.7	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	9
245.7	395.3	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	2
245.8	395.5	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	1	4	6
246.5	396.6	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
247.5	398.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
7		66	64	58	37	51	47	127	67	65	104	58	185	373	346	709	1,113	1,512	

Appendix 4

Fall chinook salmon redds counted in the Clearwater River during aerial searches, by river mile (RM), river kilometer (RK), and year (1988-2003). A dash (-) indicates no redds were observed at the corresponding site and year. The maximum upstream RM searched was 41 (North Fork Clearwater River) from 1988 to 1990, 67 (Kamiah, Idaho) in 1991, and 74 (beginning of Middle Fork Clearwater River) from 1992 to 2003. An empty cell indicates no searches were conducted in the corresponding site and year.

RM	RK	Year															
		1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
4.0	6.4	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-
6.2	10.0	-	-	-	-	-	-	-	5	-	-	-	-	-	-	-	-
6.7	10.8	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-
7.2	11.6	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-
7.8	12.6	-	-	-	-	-	-	-	-	-	-	-	-	7	6	-	-
8.0	12.8	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
8.1	13.0	9	-	-	-	1	2	6	6	-	-	1	-	-	-	-	-
8.8	14.2	-	-	-	-	-	-	-	-	-	-	-	-	1	5	-	-
10.6	17.1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
11.8	19.0	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
13.9	22.4	-	4	3	-	-	-	-	-	-	1	-	2	8	12	-	-
16.2	26.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
17.4	28.0	-	-	-	-	-	-	-	-	-	1	2	1	-	-	2	-
18.0	29.0	4	3	-	1	-	-	-	-	-	1	2	15	2	18	22	36
18.6	29.9	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	6
18.9	30.4	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
19.0	30.6	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-
19.1	30.7	-	-	-	-	-	-	-	-	-	-	-	3	-	6	17	8
19.4	31.2	-	-	-	-	-	-	-	-	-	1	4	5	-	-	-	-
19.5	31.4	-	-	-	-	-	-	-	-	-	-	-	-	7	14	1	11
20.0	32.2	-	2	-	-	-	-	-	4	6	1	-	-	-	-	-	-
21.7	34.9	-	-	-	-	-	-	-	-	-	-	-	-	-	2	1	7
21.8	35.0	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
22.0	35.4	8	-	-	-	21	9	18	5	24	16	25	62	77	60	110	107
22.2	35.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	49
23.0	37.0	-	-	-	3	-	-	-	-	-	-	-	-	-	29	-	-
23.3	37.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9	3
23.4	37.7	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
24.0	38.6	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
25.5	41.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	5

Appendix 4 (Continued)

RM	RK	Year															
		1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
26.3	42.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
26.5	42.6	-	-	-	-	-	-	-	-	-	-	-	-	3	2	20	4
26.8	43.1	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
27.6	44.4	-	-	-	-	-	-	-	-	-	-	2	-	-	-	15	7
28.0	45.1	-	-	-	-	-	-	1	-	-	-	-	-	-	-	48	20
28.4	45.7	-	-	-	-	-	-	-	-	-	11	1	26	1	-	-	-
30.1	48.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	5
31.5	50.7	-	-	-	-	-	-	-	-	-	-	-	-	-	3	28	3
31.7	51.0	-	-	-	-	-	-	-	-	4	-	6	-	-	-	-	37
32.5	52.3	-	-	-	-	-	-	-	-	-	-	-	23	13	19	11	-
32.8	52.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-
33.6	54.0	-	-	-	-	-	13	-	-	-	-	-	-	-	-	-	-
33.8	54.4	-	-	-	-	-	-	-	-	-	-	-	-	6	-	-	-
34.0	54.7	-	-	-	-	-	-	-	-	-	9	4	9	2	13	42	20
34.2	55.0	-	-	-	-	-	-	-	-	10	-	-	-	-	-	-	-
35.0	56.3	-	-	-	3	-	-	-	6	-	7	-	-	-	-	-	-
35.4	56.9	-	-	-	-	-	-	-	-	-	-	-	2	9	47	41	53
35.7	57.5	-	-	-	-	-	-	-	-	-	-	-	3	-	1	7	7
36.2	58.2	-	-	-	-	-	-	-	-	-	6	11	3	11	-	7	4
36.7	59.0	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
37.9	61.0	-	-	-	-	-	-	-	-	-	-	-	-	-	1	8	1
39.1	62.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
39.5	63.6	-	-	-	-	-	-	-	-	-	1	9	1	-	4	2	1
40.3	64.8	-	-	-	1	1	11	4	1	11	1	10	21	22	46	109	147
40.6	65.3	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-
43.2	69.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1
45.0	72.4	-	-	-	-	-	-	-	-	-	-	-	-	3	9	2	2
49.2	79.2	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
49.4	79.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
51.7	83.2	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-
52.0	83.7	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
52.8	85.0	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	3
53.4	85.9	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-

Appendix 4 (Continued)

RM	RK	Year															
		1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
57.2	92.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9
61.0	98.1	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
62.4	100.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
66.0	106.2	-	-	-	-	-	-	-	-	-	-	-	-	-	4	1	-
70.2	113.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
		21	10	4	4	26	36	30	20	66	58	78	181	172	306	524	563

Appendix 5

Fall chinook salmon redds counted in the Grande Ronde River during aerial searches, by river mile (RM), river kilometer (RK), and year (1992-2003). A dash (-) indicates no redds were observed at the corresponding site and year. Redd searches were also conducted from 1986 to 1991, however, no ground locations were recorded. Redd counts totaled 0 in 1986, 7 in 1987, 1 in 1988, 0 in 1989, 1 in 1990, and 0 in 1991. The maximum upstream RM searched was 4.5 in 1986, 36 in 1987, and 45.5 from 1988 to 1991, 45.3 in 1992, 53 in 1993 and 1994, 45.3 in 1995, and 53 from 1996 to 2003.

RM	RK	Year											
		1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
0.1	0.2	-	-	-	-	-	-	-	-	-	12	-	2
0.5	0.8	-	-	-	-	-	-	-	-	-	-	-	2
0.7	1.1	-	-	-	-	-	-	-	-	-	22	-	-
0.8	1.3	-	-	-	-	-	-	-	-	-	-	2	-
1.0	1.6	-	-	-	-	-	-	-	-	-	2	-	4
1.2	1.9	-	-	-	-	-	-	-	-	-	2	-	-
1.9	3.1	-	-	-	-	-	-	-	-	-	3	8	-
2.0	3.2	-	-	-	-	-	-	-	-	-	2	-	-
2.1	3.4	-	2	-	-	-	-	-	-	-	-	-	2
2.2	3.5	-	-	-	-	-	-	-	-	-	4	-	-
3.0	4.8	-	-	-	-	-	-	1	-	-	1	1	-
3.2	5.1	1	1	-	-	-	1	1	-	-	7	5	2
3.5	5.6	-	-	-	-	-	-	-	-	-	-	-	1
3.6	5.8	-	-	-	2	2	-	-	-	1	14	3	4
4.4	7.1	2	4	-	-	-	1	3	1	1	1	9	6
4.5	7.2	-	-	-	-	-	-	-	-	-	2	1	3
4.6	7.4	-	2	-	-	1	-	-	-	-	7	-	1
5.5	8.8	-	-	-	-	-	-	-	-	-	8	-	-
6.2	10.0	-	-	-	-	-	-	-	-	-	4	-	-
6.5	10.5	-	-	-	-	-	-	-	-	-	-	-	1
6.8	10.9	-	-	-	-	-	-	-	-	-	1	-	-
7.9	12.7	-	-	-	-	-	-	-	-	-	1	-	-
8.2	13.2	-	-	-	-	-	-	-	-	-	-	1	1
8.5	13.7	-	-	-	-	-	-	-	-	-	7	-	-
8.9	14.3	-	-	-	-	-	-	-	-	-	-	-	1
9.2	14.8	-	-	-	-	-	-	-	-	-	6	-	-
9.6	15.4	-	-	-	-	-	1	-	-	-	-	-	-
10.0	16.1	-	-	-	-	-	-	-	-	-	-	2	-
10.4	16.7	-	-	-	-	-	-	-	-	-	-	6	-
10.5	16.9	-	5	1	-	6	7	2	-	-	9	6	-
11.0	17.7	-	-	-	-	-	-	-	-	-	-	-	1
11.6	18.7	-	2	-	-	-	-	-	-	-	-	1	-
11.7	18.8	-	-	-	-	-	-	-	-	-	3	-	2
12.0	19.3	-	-	-	-	-	-	-	-	-	2	-	-
12.5	20.1	-	-	-	-	-	-	-	-	-	12	4	4
12.6	20.3	-	2	-	-	-	6	5	-	-	6	-	-
12.7	20.4	-	2	-	-	-	-	-	-	-	3	-	-
13.2	21.2	-	3	-	-	1	-	-	-	-	-	-	-
13.8	22.2	-	7	-	4	-	-	-	-	-	1	2	3
13.9	22.4	-	-	-	-	-	-	-	-	-	-	2	-
15.0	24.1	-	-	-	-	-	-	-	-	-	-	-	1
16.3	26.2	-	-	-	-	-	-	-	-	-	-	-	1
16.8	27.0	-	-	-	-	-	-	-	-	-	-	1	-
17.0	27.4	-	-	1	-	-	-	-	-	-	-	-	-

Appendix 5 (Continued)

RM	RK	Year											
		1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
17.6	28.3	-	2	3	5	-	9	-	-	-	10	13	5
18.0	29.0	-	-	-	-	-	4	-	-	-	-	-	6
18.6	29.9	1	-	-	-	-	-	-	-	-	-	-	-
19.1	30.7	-	-	-	-	-	-	-	-	-	1	3	-
19.2	30.9	-	-	-	-	-	3	-	-	-	-	2	2
19.5	31.4	-	-	-	-	-	-	2	-	-	-	-	-
20.0	32.2	-	-	-	-	-	4	5	-	-	2	-	1
21.0	33.8	-	-	-	-	-	-	-	-	-	3	-	1
21.5	34.6	-	-	-	-	-	-	-	-	-	-	-	2
22.0	35.4	-	-	-	-	-	-	-	-	-	1	-	-
25.6	41.2	-	4	-	-	-	-	-	-	-	-	-	-
26.4	42.5	-	-	7	-	-	-	-	-	-	1	-	1
26.9	43.3	-	-	-	-	-	-	-	-	-	-	-	5
27.1	43.6	-	-	-	-	-	-	-	-	-	2	-	-
27.3	43.9	-	-	-	-	-	-	-	-	-	2	-	2
27.9	44.9	-	-	-	-	3	-	-	6	-	-	-	-
29.1	46.8	-	-	-	-	-	-	-	-	-	-	2	1
29.3	47.1	-	-	-	-	-	-	-	-	-	-	1	-
29.7	47.8	-	-	-	-	-	-	-	-	-	-	3	-
29.8	47.9	-	-	-	-	-	-	-	-	-	-	1	-
31.1	50.0	-	-	-	-	-	-	-	-	-	-	3	-
32.2	51.8	-	-	1	-	-	1	-	-	-	-	-	-
32.7	52.6	-	-	-	-	-	4	-	-	-	-	-	-
33.1	53.3	-	-	-	-	-	-	-	-	-	-	1	-
33.3	53.6	1	-	1	-	1	2	3	-	-	10	7	3
34.0	54.7	-	2	-	-	-	-	-	-	-	-	-	-
36.4	58.6	-	-	-	-	-	1	-	-	-	-	-	-
37.5	60.3	-	-	-	-	-	-	-	-	-	2	-	-
37.6	60.5	-	2	-	1	-	-	2	-	2	2	4	4
37.8	60.8	-	7	1	-	-	3	-	-	-	-	-	2
39.0	62.8	-	-	-	-	-	-	-	-	-	3	-	-
39.1	62.9	-	-	-	-	-	1	-	-	-	-	-	-
41.3	66.5	-	-	-	-	-	2	-	-	-	-	-	-
41.7	67.1	-	1	-	-	-	-	-	-	-	-	-	-
41.8	67.3	-	-	-	-	1	-	-	-	-	-	-	-
42.5	68.4	-	-	-	-	-	-	-	-	-	-	-	1
43.2	69.5	-	1	-	3	-	-	-	2	-	11	8	1
44.5	71.6	-	-	-	-	-	-	-	-	-	-	2	-
44.9	72.2	-	-	-	-	-	-	-	-	4	-	2	4
45.7	73.5	-	-	-	-	-	-	-	-	-	-	4	-
45.9	73.9	-	-	-	-	4	-	-	-	-	-	-	-
46.5	74.8	-	-	-	2	-	-	-	-	-	-	-	-
47.5	76.4	-	-	-	-	-	1	-	4	-	-	-	-
47.8	76.9	-	-	-	-	-	-	-	-	-	2	-	10
49.3	79.3	-	-	-	-	-	-	-	-	-	3	1	-
50.5	81.3	-	-	-	-	-	4	-	-	-	-	-	-
51.5	82.9	-	-	-	1	1	-	-	-	-	-	-	-
		5	49	15	18	20	55	24	13	8	197	111	93

Appendix 6

Fall chinook salmon redds counted in the Salmon River during aerial searches, by river mile (RM), river kilometer (RK), and year (1992-2003). A dash (-) indicates no redds were observed at the corresponding site and year. The maximum upstream RM searched was 87 in 1992, 97 in 1993, 134 in 1994, 105 in 1995, 87 in 1996, 134 in 1997, 105 in 1998, 96 in 1999 and 2000, and 105 from 2001–2003.

RM	RK	Year											
		1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
4	6.4	-	-	-	-	-	-	-	-	-	-	-	1
4.8	7.7	-	-	-	-	-	-	-	-	-	1	-	-
5.5	8.8	-	-	-	-	-	-	-	-	-	-	-	1
5.6	9.0	-	-	-	-	-	-	-	-	-	-	-	1
14.2	22.8	-	-	-	-	-	-	-	-	-	1	-	-
15.0	24.1	1	-	-	-	-	-	1	-	-	-	-	-
15.3	24.6	-	-	-	-	-	-	-	-	-	2	-	-
15.7	25.3	-	-	-	-	-	-	-	-	-	1	-	-
16.0	25.7	-	-	-	1	1	-	-	-	-	-	-	-
20.3	32.7	-	-	-	-	-	-	-	-	-	-	-	1
20.6	33.1	-	-	-	-	-	-	-	-	-	-	-	2
26.1	42.0	-	-	-	1	-	-	-	-	-	-	-	-
26.5	42.6	-	-	-	-	-	-	-	-	-	1	-	-
30.9	49.7	-	-	-	-	-	-	-	-	-	-	-	5
31.1	50.0	-	1	-	-	-	-	1	-	-	-	-	1
31.4	50.5	-	-	-	-	-	-	-	-	-	1	-	-
35.0	56.3	-	-	-	-	-	1	-	-	-	-	-	-
35.7	57.4	-	-	-	-	-	-	-	-	-	-	11	-
45.2	72.7	-	-	-	-	-	-	-	-	-	-	3	-
48.8	78.5	-	-	-	-	-	-	-	-	-	3	-	-
56.7	91.2	-	-	-	-	-	-	-	-	-	1	-	-
62.0	99.8	-	-	-	-	-	-	-	-	-	3	8	-
63.9	102.8	-	-	-	-	-	-	-	-	-	-	2	2
65.0	104.6	-	-	-	-	-	-	-	-	-	2	-	-
65.4	105.2	-	-	-	-	-	-	1	-	-	-	2	-
65.7	105.7	-	-	-	-	-	-	-	-	-	2	3	-
65.8	105.9	-	-	-	-	-	-	-	-	-	1	-	-
68.5	110.2	-	-	-	-	-	-	-	-	-	-	-	2
70.5	113.4	-	-	-	-	-	-	-	-	-	1	-	-
70.6	113.6	-	-	-	-	-	-	-	-	-	1	-	-
85.0	136.8	-	-	-	-	-	-	-	-	-	1	-	-
87.0	140.0	-	-	1	-	-	-	-	-	-	-	-	-
91.0	146.4	-	-	-	-	-	-	-	-	-	-	-	1
88.0	141.6	-	-	-	-	-	-	-	-	-	-	2	-
90.7	146.0	-	2	-	-	-	-	-	-	-	-	-	-
100.7	162.0	-	-	-	-	-	-	-	-	-	-	-	1
		1	3	1	2	1	1	3	0	0	22	31	18

Appendix 7

Fall chinook salmon redds counted in the Imnaha River during aerial searches, by river mile (RM), river kilometer (RK), and year (1992-2002). A dash (-) indicates no redds were observed at the corresponding site and year. An empty cell indicates no searches were conducted in the corresponding site and year. Redd searches were also conducted from 1987 to 1991, and in 1999, 2001, and 2003, however, no ground locations were recorded. Redd counts totaled 0 in 1987, one in 1988 and 1989, three in 1990, four in 1991, three in 1992, nine in 1999, 38 in 2001, and 43 in 2003. The maximum upstream RM searched was 4.1, 19, 9.8, 3.8, 3.8, 14, 35, 35, and 19 respectively.

RM	RK	Year										
		1993	1994	1995	1996	1997	1998	---	2000	---	2002	---
0.2	0.3	-	-	-	-	-	-		-		3	
0.3	0.5	-	-	-	-	-	-		-		7	
0.4	0.6	-	-	-	-	-	-		-		3	
0.5	0.8	1	-	1	2	1	1		1		-	
0.6	1.0	-	-	-	-	-	-		-		2	
0.6	1.0	1	-	-	1	-	2		2		-	
0.9	1.4	-	-	-	-	-	-		-		2	
1.0	1.6	-	-	-	-	2	1		-		-	
1.2	1.9	-	-	-	-	-	1		-		-	
1.3	2.1	-	-	-	-	-	-		-		1	
1.4	2.3	-	-	-	-	-	1		-		-	
1.5	2.4	-	-	-	-	-	-		-		3	
1.6	2.6	-	-	-	-	-	-		-		3	
1.7	2.7	-	-	-	-	-	-		-		2	
1.8	2.9	-	-	2	-	-	-		-		1	
2.0	3.2	-	-	-	-	-	-		-		2	
2.3	3.7	-	-	-	-	-	-		-		1	
2.4	3.9	-	-	-	-	-	2		2		7	
2.5	4.0	-	-	-	-	-	-		-		9	
2.7	4.3	-	-	-	-	-	-		-		2	
2.9	4.7	-	-	-	-	-	-		-		1	
3.0	4.8	-	-	-	-	-	-		2		-	
3.4	5.5	-	-	-	-	-	1		-		2	
3.7	6.0	2	-	-	-	-	-		-		1	
4.1	6.6	-	-	1	-	-	-		-		1	
5.4	8.7			-		-	-		-		1	
6.5	10.5			-		-	-		1		-	
7.1	11.4			-		-	-		-		10	
9.9	15.9			-		-	-		-		1	
10.0	16.1			-		-	2		1		-	
12.0	19.3			-		-	1		-		-	
12.8	20.6			-		-	-		-		1	
13.0	20.9			-		-	1		-		1	
13.4	21.6			-		-	-		-		2	
13.5	21.7			-		-	-		-		1	
18.2	29.3			-		-	-		-		1	
20.7	33.3			-		-	-		-		1	
		4	0	4	3	3	13		9		72	