

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

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Bonneville Power Administration
P.O. Box 3621
Portland, Oregon 97208

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**Fall Chinook Salmon Spawning Ground Surveys in the Snake River Basin Upriver
of Lower Granite Dam, 2002**

ANNUAL REPORT

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Portland, OR 97208-3621

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By

A. P. Garcia, and S. Bradbury
U.S. Fish and Wildlife Service
Idaho Fishery Resource Office
Ahsahka, Idaho 83520, USA

B. D. Arnsberg, and S. J. Rocklage
Nez Perce Tribe
Fisheries Department
Orofino, Idaho 83544, USA

P. A. Groves
Idaho Power Company
Environmental Affairs Department
Boise, Idaho 83702, USA

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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, 1996-2001; 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 2002 was funded by the Bonneville Power Administration (Projects 1998-01-003 and 1994-03-400) and the Idaho Power Company.

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. In addition, searches were conducted in other portions of the aforementioned Snake River tributaries, and in the Potlatch River, though not as routinely as in the other reaches.

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 a Global Positioning System (GPS) coupled with mapping software. From 1991 to 2002, 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 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 reported.

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.

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, we 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). Some of the spawning sites that were typically only searched from the air were also searched using submersible video cameras during spawning seasons when Hells Canyon Dam discharge was greater than 9,000 cfs.

Results and Discussion

Snake River

In 2002, a total of 1,113 redds were observed in the Snake River (Table 1), of which 878 were observed during seven aerial searches (Table 2) and 235 during searches of 60 deep-water sites (Tables 3 and 4). Visibility ratings were reported as either "fair" or "good" during aerial searches in 2002 (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 60% of all redds observed upriver of Lower Granite Dam in 2002, compared to 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 2002 averaged 28.4%±10.4% for the Snake River, and 16.2%±6.8% for all redds counted above Lower Granite Dam. In

2002, the greatest number of new redds were observed on November 4 (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).

In this report we changed the numbers of redds counted using submersible cameras in 1995 and 1996. In earlier reports we used a conversion factor of 17 m² based on redd-size data from the Columbia River (Chapman et al. 1986) when estimating the numbers of redds contained in large patches of disturbed substrates where individual redds could not be counted. Although we began using a new conversion factor (45.8 m²) for redds reported in 2001, this is the first year the new value was applied to data collected prior to 2001.

Clearwater River basin

A total of 527 redds were observed in the Clearwater River basin in 2002, 524 in the Clearwater River (Tables 1 and 9) during nine aerial searches for fall chinook salmon redds (Table 6), and three in the Potlatch River during searches for coho salmon redds. Observation conditions varied from “poor” to “excellent” during aerial searches of the Clearwater River in 2002 (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 28% of all redds observed upriver of Lower Granite Dam in 2002, compared to 26% in 2001, 32% in 2000, 32% in 1999, 26% in 1998, and 38% in 1997. In 2002, the greatest numbers of new redds were observed on November 4 (Table 9 and Figure 2). On average, redd counts in the lower Clearwater River (RM 0 to RM 41) peaked between October 27 and November 4 (Table 11 and Figure 3).

Grande Ronde River

A total of 111 redds were observed during seven searches of the Grande Ronde River in 2002 (Tables 1, 6, and 12). Observation conditions were reported as “good” on all flights (Table 13). Redds counted in the Grande Ronde River amounted to 6% of all redds observed upriver of Lower Granite Dam in 2002, compared to 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 2002, the greatest numbers of new redds were observed on October 21 (Table 12 and Figure 2). On average, redd counts in the Grande Ronde River peaked between October 20 and November 30 (Table 14 and Figure 3).

Imnaha River

A total of 72 redds were observed during seven searches of the Imnaha River in 2002 (Tables 1, 6, and 15). Observation conditions were reported as “good” on all flights (Table 16). Redds counted in the Imnaha River amounted to 4% of all redds observed upriver of Lower Granite Dam in 2002, compared to 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 6. In 2002, the greatest number of new redds were observed on November 25. However, this likely does not reflect timing of construction since the November 25 search covered more river miles than the other searches. On average, redd counts in the Imnaha did not have a defined peak (Table 17 and Figure 3).

Salmon River

A total of 31 redds were observed during two searches of the Salmon River in 2002 (Tables 1, 6, and 18). Observation conditions were reported as “fair”. Redds counted in the Salmon River amounted to 2% of all redds observed upriver of Lower Granite Dam in 2002, compared to 2% in 2001, 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 7. Not enough searches were conducted in the Salmon River to indicate a peak count (Table 6).

Summary

A total of 1,854 fall chinook salmon redds were observed upriver of Lower Granite Dam in 2002 (Figure 4). This was the largest 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 ± 35.4 from 1986 to 1992, 4.7 ± 0.9 from 1993 to 2002, and 5.4 in 2002 (Table 19). Most of the redds (60%) were observed in the Snake River, followed by the Clearwater River basin (28%), Grande Ronde River (6%), Imnaha River (4%), and Salmon River (2%).

References

- Arnsberg, B. D., W. P. Connor, and E. Connor. 1992. Mainstem Clearwater River study: Assessment for salmonid spawning, incubation, and rearing. Final Report by the Nez Perce Tribe, Contract DE-AI79-87-BP37474 to Bonneville Power Administration, Portland, Oregon.
- Bovee, K. D. 1982. A guide to stream habitat analysis using the Instream Flow Incremental Methodology. Instream Flow Information Paper 12, FWS/OBS-82/26, U.S. Fish and Wildlife Service, Office of Biological Services, Washington, D.C.
- Bugert, R., P. Seidel, P. LaRiviere, D. Marbach, S. Martin, and L. Ross. 1989. Lower Snake Compensation Plan, Lyons Ferry Hatchery Evaluation Program, 1988 Annual Report. Cooperative Agreement 14-16-001-88519, U.S. Fish and Wildlife Service, Boise, Idaho.
- Bugert, R., P. LaRiviere, D. Marbach, S. Martin, L. Ross, and D. Geist. 1990. Lower Snake Compensation Plan, Lyons Ferry Hatchery Evaluation Program, 1989 Annual Report. Cooperative Agreement 14-16-0001-89525, U.S. Fish and Wildlife Service, Boise, Idaho.
- Bugert, R., and six coauthors. 1991. Lyons Ferry Hatchery Evaluation Program, 1990 annual report. Cooperative Agreement 14-16-001-90525 to Lower Snake River Compensation Plan, U.S. Fish and Wildlife Service, Boise, Idaho.
- Chapman, D. W., D. E. Weitkamp, T. L. Welsh, M. B. Dell, and T. H. Schadt. 1986. Effects of river flow on the distribution of chinook salmon redds. *Transactions of the American Fisheries Society* 115:537-547.
- Connor, W. P., A. P. Garcia, H. L. Burge, and R. H. Taylor. 1993. Fall chinook salmon spawning in free-flowing reaches of the Snake River. Pages 1-29 in D. W. Rondorf and W. H. Miller, editors. Identification of the spawning, rearing, and migratory requirements of fall chinook salmon in the Columbia River basin. 1991 Annual Report to Bonneville Power Administration, Contract DE-AI79-91BP21708, Portland, Oregon.
- Garcia, A.P., W.P. Connor, and R.H. Taylor. 1994a. Fall chinook spawning ground surveys in the Snake River. Pages 1-19 in D.W. Rondorf and W.H. Miller, editors. Identification of the spawning, rearing, and migratory requirements of fall chinook salmon in the Columbia River basin. 1992 Annual Report to Bonneville Power Administration, Contract DE-AI79-91BP21708, Portland, Oregon.
- Garcia, A.P., W.P. Connor, and R.H. Taylor. 1994b. Fall chinook spawning ground surveys in the Snake River. Pages 1-21 in D.W. Rondorf and K.F. Tiffan, editors. Identification of the spawning, rearing, and migratory requirements of fall chinook salmon in the Columbia River basin. 1993 Annual Report to Bonneville Power Administration, Contract DE-AI79-91BP21708, Portland, Oregon.

- Garcia, A.P., and six coauthors. 1996. Fall chinook spawning ground surveys in the Snake River, 1994. Pages 1-18 in D.W. Rondorf and K.F. Tiffan, editors. Identification of the spawning, rearing, and migratory requirements of fall chinook salmon in the Columbia River basin. 1994 Annual Report to Bonneville Power Administration, Contract DE-AI79-91BP21708, Portland, Oregon.
- Garcia, A.P., W.P. Connor, R.D. Nelle, R.D. Waitt, E.A. Rockhold, and R.S. Bowen. 1997. Fall chinook spawning ground surveys in the Snake River, 1995. Pages 1-17 in D.W. Rondorf and K.F. Tiffan, editors. Identification of the spawning, rearing, and migratory requirements of fall chinook salmon in the Columbia River basin. 1995 Annual Report to Bonneville Power Administration, Contract DE-AI79-91BP21708, Portland, Oregon.
- Garcia, A.P., R.D. Waitt, C.A. Larsen, S.M. Bradbury, B.D. Arnsberg, M. Key, P.A. Groves. 1999. Fall chinook salmon spawning ground surveys in the Snake River basin upriver of Lower Granite Dam, 1998. Pages 7-19 in A.P. Garcia editor. Spawning distribution of fall chinook salmon in the Snake River. 1998 Annual Report to Bonneville Power Administration, Project number 9801003, Contract 98-AI-37776, Portland, Oregon.
- Garcia, A.P., R.D. Waitt, C.A. Larsen, D. Burum, B.D. Arnsberg, M. Key, P.A. Groves. 2000. Fall chinook salmon spawning ground surveys in the Snake River basin upriver of Lower Granite Dam, 1999. Pages 10-28 in A.P. Garcia editor. Spawning distribution of fall chinook salmon in the Snake River. 1999 Annual Report to Bonneville Power Administration, Project number 9801003, Contract 98-AI-37776, Portland, Oregon.
- Garcia, A.P., R.D. Waitt, C.A. Larsen, D. Burum, B.D. Arnsberg, M. Key, P.A. Groves. 2001. Fall chinook salmon spawning ground surveys in the Snake River basin upriver of Lower Granite Dam, 2000. Pages 13-31 in A.P. Garcia editor. Spawning distribution of fall chinook salmon in the Snake River. Draft 2000 Annual Report to Bonneville Power Administration, Project number 199801003, Contract 98-AI-37776, Portland, Oregon.
- Groves, P.A. 1993. Habitat available for, and used by, fall chinook salmon within the Hells Canyon Reach of the Snake River. Idaho Power Company, Boise, Idaho.
- Groves, P.A., and J.A. Chandler. 1996. A summary of fall chinook salmon (*Oncorhynchus tshawytscha*) redd surveys within the Hells Canyon reach of the Snake River, Idaho: 1991-1995. Report to the National Marine Fisheries Service, Silver Springs, Maryland.
- Groves, P.A., and J.A. Chandler. 2001. Chapter 3: The quality and availability of fall Chinook salmon spawning and incubation habitat downstream of the Hells Canyon Complex. In: P.A. Groves, editor. Evaluation of anadromous fish potential within the mainstem Snake River, downstream of the Hells Canyon Complex of reservoirs. Technical Appendices for Hells Canyon Complex Hydroelectric Project. Technical Report E.3.1-3. Idaho Power Company, Boise, Idaho.
- Groves, P.A., and A.P. Garcia. 1998. Two carriers used to suspend an underwater video camera from a boat. North American Journal of Fisheries Management 18:1004-1007.
- Irving, J.S. and T.C. Bjornn. 1981. Status of Snake River fall chinook salmon in relation to the Endangered Species Act. Prepared for the U.S. Fish and Wildlife Service, Portland, Oregon.
- Mendel, G. K., and six coauthors. 1992. Lower Snake River Compensation Plan Lyons Ferry fall chinook salmon hatchery program. 1991 Evaluation Report. Cooperative Agreement 14-16-0001-91534, Washington Department of Fisheries report to the U.S. Fish and Wildlife Service, Lower Snake River Compensation Plan Office, Boise, Idaho.
- Raleigh, R.F., W.J. Miller, and P.C. Nelson. 1986. Habitat suitability index models and instream flow

suitability curves: Chinook salmon. U.S. Fish and Wildlife Service, Biological Report 82(10.122).

Seidel, P., and R. Bugert. 1987. Lower Snake River Compensation Plan, Lyons Ferry Salmon Evaluation Program, 1986 Annual Report. Cooperative Agreement 14-16-0001-86521. U.S. Fish and Wildlife Service, Boise, Idaho.

Seidel, P., R. Bugert, and P. LaRiviere, D. Marbach, S. Martin, and L. Ross. 1988. Lower Snake River Compensation Plan, Lyons Ferry Evaluation Program, 1987 Annual Report. Cooperative Agreement 14-16-0001-87512. U.S. Fish and Wildlife Service, Boise, Idaho.

Swan, G.A. 1989. Chinook salmon spawning surveys in deep waters of a large, regulated river. *Regulated Rivers: Research and Management* 4:355-370.

USACE (U.S. Army Corp of Engineers). 1986-2002. Annual fish passage reports, Columbia and Snake Rivers. North Pacific Division, U.S. Army Corps of Engineers, Portland and Walla Walla Districts.

USACE (U.S. Army Corp of Engineers). 1990. Navigation charts of the Snake River, Oregon, Washington, and Idaho. Lewiston to Johnson Bar. U.S. Army Corps of Engineers, Walla Walla District, Walla Walla, Washington.

Witty, K.L. 1988. Annual Fish Report. Wallowa Fish District. Oregon Department of Fish and Wildlife, Enterprise, Oregon.

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Figures and Tables

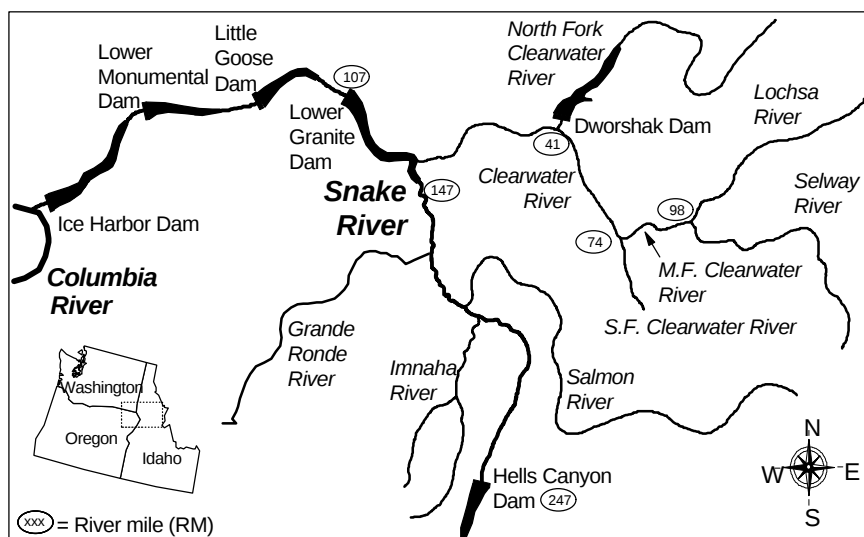


Figure 1. Map of the Snake River drainage in Oregon, Washington, and parts of Idaho.

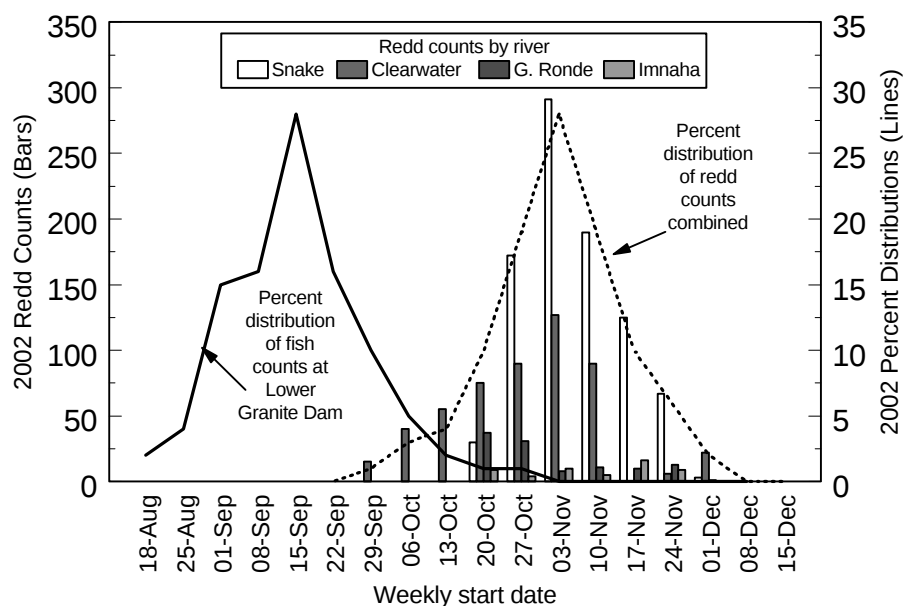


Figure 2. Weekly redd counts in 2002 for the Snake (RM 147-247), Clearwater (RM 0-41), Grande Ronde (RM 0-53), and Imnaha (RM 0-4) rivers, their combined percent distribution, and the percent distribution of adult fall chinook salmon passage at Lower Granite Dam in 2002 (USACE, unpublished data).

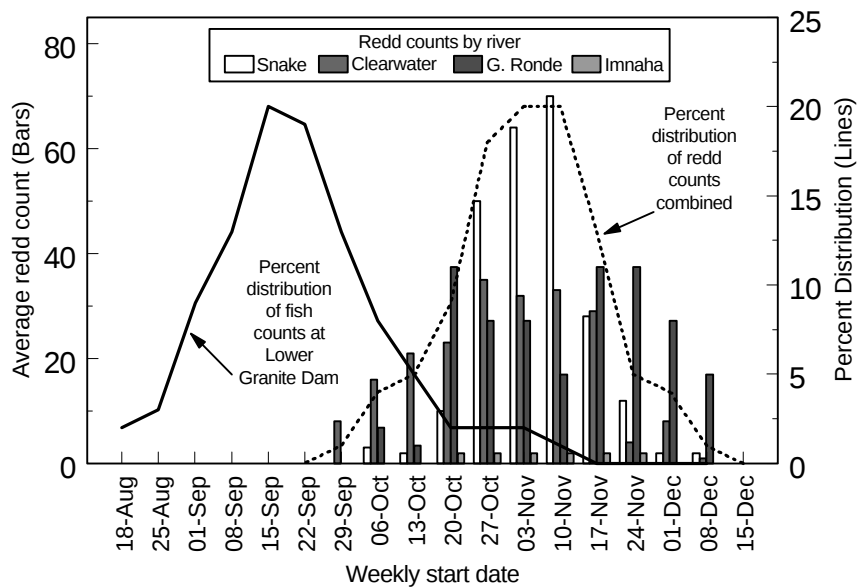


Figure 3. Weekly average redd counts (1993-2002) for the Snake (RM 147-247), Clearwater (RM 0-41), Grande Ronde (RM 0-53), and Imnaha (RM 0-4) rivers, their combined percent distribution, and the average percent distribution of adult fall chinook salmon passage at Lower Granite Dam (1992-2002)(USACE, unpublished data).

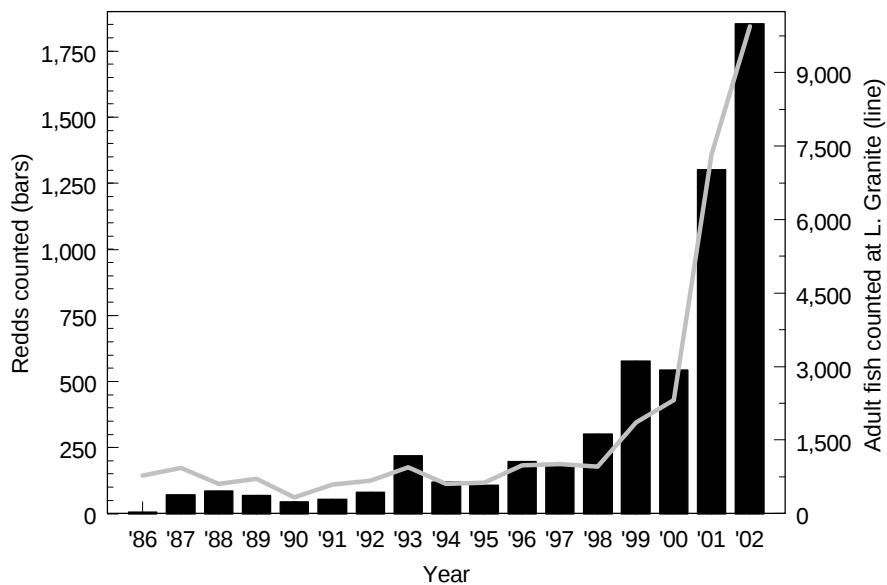


Figure 4. Number of adult fall chinook salmon counted at Lower Granite Dam, and number of redds counted above the dam, 1986-2002 (Fish counts from USACE 1986-2002, and D. Milks, WDFW, unpublished data).

Table 1. Number of fall chinook salmon redds counted in the Snake River and tributaries between Lower Granite and Hells Canyon dams, 1986-2002. 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
Snake (helicopter) ^a	7	66	64	58	37	41	47	60	53	41	71	49	135	273	255	535	878
Snake (underwater video) ^b						5	0	67	14	24	33	9	50	100	91	174	235
Lower Clearwater (RM 0-41)			21	10	4	4	25	36	30	20	66	58	78	179	164	290	520
Potlatch															7	24	3
Mid Clearwater River (42-74)							1	0	0	0	0	0	0	2	8	16	4
M.F. Clearwater (RM 75- 98)									0	0	0	0	0	0	0	0	0
Selway									0	0	0	0	0	0	0	0	0
N. F. Clearwater ^c			0	0	0	0	0	0	7	0	2	14	0	1	0	1	0
S. F. Clearwater							0	0	0	0	1	0	0	2	1	5	0
Grande Ronde	0	7	1	0	1	0	5	49	15	18	20	55	24	13	8	197	111
Imnaha		0	1	1	3	4	3	4	0	4	3	3	13	9	9	38	72
Salmon							1	3	1	2	1	1	3	0	0	22	31
Totals	7	73	87	69	45	54	82	219	120	109	197	189	303	579	543	1,302	1,854

^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, and 1,282 m² in 2002 at RM 179.6 (RK 289). In this report we used a conversion factor of 45.8 m² per redd to estimate the numbers of redds within these patches. In previous reports a conversion factor of 17-m² per redd was used to estimate redds in 1995 and 1996.

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

Table 2. New fall chinook salmon redds counted during aerial searches of the Snake River in 2002 (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. An empty cell indicates no survey was conducted over the corresponding river mile, and a dash (-) indicates no redds were observed on the corresponding date.

RM	RK	New redds counted by flight date							Totals
		21-Oct	28-Oct	4-Nov	11-Nov	18-Nov	25-Nov	2-Dec	
148.0	238.1	-	-	-	4	-	-	1	5
148.5	238.9	-	5	10	5	4	10	-	34
148.9	239.6	-	2	-	-	-	-	-	2
149.2	240.1	2	4	1	-	3	3	-	13
150.0	241.4	-	-	-	-	1	-	-	1
151.9	244.4	-	-	7	-	-	-	-	7
152.3	245.1	-	2	5	5	6	5	-	23
153.2	246.5	-	2	2	-	-	-	-	4
155.2	249.7	-	-	-	-	1	-	-	1
156.6	252.0	1	3	11	4	9	-	-	28
157.6	253.6	-	-	-	-	-	1	-	1
158.0	254.2	-	-	-	-	1	-	-	1
159.7	257.0	1	1	-	-	-	-	1	3
161.0	259.0	-	2	6	2	1	-	-	11
162.5	261.5	-	-	3	5	11	13	-	32
164.7	265.0	-	2	4	-	3	3	-	12
165.3	266.0	-	3	3	-	1	-	-	7
165.8	266.8	-	8	8	8	18	2	-	44
167.9	270.2	-	-	-	1	-	-	-	1
168.1	270.5	-	-	1	-	-	-	-	1
168.6	271.3	-	-	1	-	-	-	-	1
168.7	271.4	2	6	11	6	4	18	-	47
169.7	273.0	-	-	8	-	3	-	-	11
172.5	277.6	-	2	8	1	-	-	-	11
175.7	282.7	-	-	1	-	-	-	-	1
178.9	287.9	2	2	3	10	-	1	-	18
179.6	289.0	1	2	9	1	4	-	-	17
181.7	292.4	-	1	2	-	-	-	-	3

Table 2 (Continued)

RM	RK	New redds counted by flight date							Total
		21-Oct	28-Oct	4-Nov	11-Nov	18-Nov	25-Nov	2-Dec	
187.5	301.7	1	-	-	-	-	-	-	1
188.2	302.8	-	-	-	1	-	-	-	1
190.2	306.0	-	1	-	1	1	2	-	5
190.8	307.0	-	2	-	10	9	7	-	28
191.7	308.4	4	2	1	2	1	-	-	10
193.0	310.5	-	-	4	3	-	-	-	7
193.4	311.2	-	-	-	-	3	-	-	3
193.6	311.5	-	-	-	1	-	-	-	1
193.7	311.7	1	1	1	2	2	-	-	7
194.0	312.1	1	6	9	6	4	-	-	26
196.0	315.4	-	5	7	5	5	1	-	23
198.2	318.9	-	3	6	13	-	-	-	22
198.8	319.9	1	9	6	7	-	-	-	23
201.0	323.4	-	-	2	1	-	-	-	3
203.1	326.8	-	-	-	1	-	-	-	1
205.3	330.3	-	2	6	3	-	-	-	11
205.4	330.5	-	-	-	1	-	-	1	2
206.5	332.3	-	1	-	1	-	-	-	2
206.6	332.4	-	1	-	-	-	-	-	1
207.5	333.9	-	-	1	2	-	-	-	3
207.8	334.4	-	1	-	-	-	-	-	1
208.0	334.7	3	13	13	4	3	-	-	36
208.1	334.8	1	-	-	-	-	-	-	1
209.1	336.4	-	-	-	-	-	1	-	1
209.6	337.2	-	-	-	2	-	-	-	2
211.9	340.9	-	7	4	7	7	-	-	25
212.3	341.6	-	-	-	4	-	-	-	4
213.3	343.2	-	-	-	-	1	-	-	1
213.6	343.7	-	1	1	-	2	-	-	4
213.7	343.8	-	3	1	3	-	-	-	7
214.5	345.1	-	1	-	3	-	-	-	4

Table 2 (Continued)

RM	RK	New redds counted by flight date							Total
		21-Oct	28-Oct	4-Nov	11-Nov	18-Nov	25-Nov	2-Dec	
216.1	347.7	-	2	1	1	-	-	-	4
216.9	349.0	-	3	10	8	-	-	-	21
217.3	349.6	-	7	10	3	2	-	-	22
218.5	351.6	-	-	5	-	-	-	-	5
218.7	351.9	1	2	8	1	3	-	-	15
219.0	352.4	-	2	6	3	-	-	-	11
219.3	352.9	2	3	7	-	1	-	-	13
222.3	357.7	-	-	-	1	1	-	-	2
222.9	358.6	-	6	8	6	-	-	-	20
223.2	359.1	-	-	1	-	-	-	-	1
225.0	362.0	-	-	1	1	-	-	-	2
225.1	362.2	-	1	-	-	-	-	-	1
231.3	372.2	-	-	-	1	-	-	-	1
235.0	378.1	-	2	8	2	-	-	-	12
235.7	379.2	3	8	11	-	-	-	-	22
236.1	379.9	-	1	-	-	-	-	-	1
237.0	381.3	1	5	13	1	6	-	-	26
238.4	383.6	-	-	-	2	-	-	-	2
238.6	383.9	-	2	8	2	1	-	-	13
240.4	386.8	-	2	7	2	-	-	-	11
240.6	387.1	1	9	8	1	2	-	-	21
241.0	387.8	-	-	3	2	-	-	-	5
242.8	390.7	-	3	1	2	1	-	-	7
244.0	392.6	-	-	3	9	-	-	-	12
244.3	393.1	-	1	-	1	-	-	-	2
244.5	393.4	1	3	3	6	-	-	-	13
245.8	395.5	-	1	3	-	-	-	-	4
		30	172	291	190	125	67	3	878

Table 3. Record of fall chinook salmon redds counted in the Snake River using submersible cameras in 2002 (Data collected by the Idaho Power Company and U.S. Fish and Wildlife Service). Counts are presented by river mile (RM) and river kilometer (RK). At RM 179.6, 47 individual redds could be counted, plus an area of 1,282 m² of disturbed substrate equaling 28 redds using a conversion factor of 45.8 m² per redd.

RM	RK	Redds
148.5	238.9	3
156.4	251.6	18
158.0	254.2	1
162.4	261.3	1
165.7	266.6	8
166.2	267.4	1
166.4	267.7	9
179.6	289.0	75
183.1	294.6	4
193.0	310.5	21
193.5	311.3	2
193.7	311.7	1
193.8	311.8	1
194.4	312.8	1
198.2	318.9	11
198.8	319.9	2
208.0	334.7	1
212.2	341.4	37
212.3	341.6	5
213.3	343.2	8
218.5	351.6	11
218.7	351.9	2
221.0	355.6	1
235.0	378.1	9
242.9	390.8	2
		235

Table 4. List of the 60 sites searched for fall chinook salmon redds in the Snake River, 2002, by river mile (RM).

RM	RM	RM	RM
145.0	166.4	193.8	212.2
148.5	171.4	194.1	212.3
150.5	171.9	194.4	213.3
151.5	172.9	194.6	218.5
153.2	175.3	196.5	218.7
154.3	177.6	198.2	219.8
155.6	179.6	198.8	221.0
156.4	183.1	199.4	222.3
158.0	184.6	202.8	223.7
162.4	185.8	203.1	227.9
163.7	188.2	203.9	228.0
164.4	188.5	205.2	228.2
165.3	193.0	208.0	235.0
165.7	193.5	208.3	236.9
166.2	193.7	209.9	242.9

Table 5. Flight information, river flow, and visibility rating for aerial redd surveys of the Snake River in 2002.

Category	Flight date						
	21-Oct	28-Oct	4-Nov	11-Nov	18-Nov	25-Nov	2-Dec
River Mile Start	147	147	147	147	147	147	147
River Mile End	247	247	247	247	247	247	247
Aircraft	Jet Ranger	Jet Ranger	Jet Ranger	Jet Ranger	Jet Ranger	Jet Ranger	Jet Ranger
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	N/A
Secondary Observer	S. Bradbury	S. Bradbury	S. Bradbury	S. Bradbury	S. Bradbury	S. Bradbury	S. Bradbury
Weather	Clear	Cloudy	Clear	PtlyCdy	Cloudy	Clear	Fog/Cloudy
Flow (cfs) at RM 67.5	13,000	13,000	12,600	14,000	13,400	13,900	13,200
Flow (cfs) at RM 247.0	8,750	8,721	8,751	8,751	8,848	8,703	8,653
Visibility rating (VR): Asotin to G. Ronde River	Good	Good	Good	Good	Good	Good	Good
VR: Grande Ronde River to Salmon River	Good	Good	Good	Good	Good	Good	Good
VR: Salmon River to Hells Canyon Dam	Fair	Fair	Fair	Good	Good	Good	Good

Table 6. Number of redd searches conducted in the Snake River and tributaries between Lower Granite and Hells Canyon dams, 1986-2002. 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
Snake (helicopter)	1	2	2	2	3	9	8	8	8	7	7	8	8	9	9	10	7
Snake (underwater video)						1	3	50	73	42	32	63	48	73	60	67	60
Lower Clearwater (RM 0-41)			1	2	2	2	2	5	5	3	4	9	5	10	11	8	9
Potlatch															1	5	
Mid Clearwater (RM 42-74)									5	2	1	7	5	8	11	4	3
M.F. Clearwater (RM 75-98)									1	2	2	2	5	3	4	5	1
N.F. Clearwater							2	4	5	3	5	9	5	7	11	4	9
S.F. Clearwater							2	4	4	1	3	7	5	8	6	7	3
Grande Ronde	1	3	2	1	1	3	6	8	7	3	4	8	6	7	7	9	7
Imnaha		1	2	2	1	9	6	8	8	6	5	7	6	9	9	9	7
Salmon							2	3	3	1	4	3	3	3	2	1	2
Selway									1	2	2	2	5	3	5	6	1

Table 7. Numbers of fall chinook salmon redds counted using submersible cameras in the Snake River, 1991-2002. 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
148.5	238.9			0	0		0	0		0	0	1	3
156.4	251.6												18
158.0	254.2			0	0		0	0	0	0	0	0	1
162.4	261.3	5	0	0	0		2	0	0	0	0	6	1
165.3	266.0			0	0							4	0
165.7	266.6			28	0		0	0	0	0	0	6	8
166.2	267.4			11	0		0	0	0	0	0	0	1
166.6	268.1			21	0		0	0	6	0	1	0	9
179.6 ^a	289.0			2	8	19	24	5	16	30	48	67	75
181.8	292.5			0	0			0		1		0	0
183.1	294.6			0	0			0	0	2	0	0	4
188.2	302.8									0	0	2	0
193.0	310.5												21
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
198.2	318.9				0	0	2	0	0	6	5	19	11
198.8	319.9				0	0	0	0	0	4	4	2	2
199.4	320.8			1	0	0	5	0	0	2	1	2	0
203.1	326.8			0	0	0	0	0	10	0	0	0	0
208.0	334.7			0	0	0	0	4	0	11	0	0	1
208.3	335.2			0	0	0	0	0	0	4	0	4	0
211.9 ^b	340.9			0						1			
212.2	341.4			0	0	2	0	0	17	24	28	37	37
212.3	341.6					0			0	2	3	8	5
213.3	343.2			0	0	0		0	0	0	0	4	8
216.9	349.0									4	0	1	
218.5	351.6									0	1	0	11
218.7	351.9					3		0	0	1		4	2
219.0 ^b	352.4									1			0
221.0	355.6									0	0	0	1
222.8	358.5			3	0	0				0	0		
223.1	359.0									3	0	0	
228.0	366.9				0	0	0	0	0	2	0	0	0
235.0	378.1				0	0			0		0		9
236.9	381.2			0	1	0	0	0	0				0
242.9	390.8								1	2		1	2
245.8	395.5					0				0		1	
		5	0	67	14	24	33	9	50	100	91	174	235

^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, and 1,282 m² in 2002. 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 1999 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, 1993-2002. An empty cell indicates no searches were conducted in the corresponding week and year.

Week	Calendar Days		Year									
	Perpetual	Leap years	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
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
44	27 Oct. - 02 Nov.	28 Oct. - 03 Nov.	18	4	9	26	16	28	80	80	70	172
45	03 Nov. - 09 Nov.	04 Nov. - 10 Nov.	13	18	18	23	8	43		79	82	291
46	10 Nov. - 16 Nov.	11 Nov. - 17 Nov.	15	9	6	20	13	35	143	52	213	190
47	17 Nov. - 23 Nov.	18 Nov. - 24 Nov.	5	10	3	0	10	20	1	16	85	125
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
50	08 Dec. - 14 Dec.	09 Dec. - 15 Dec.	2	0			0	0			8	

Table 9. New fall chinook salmon redds counted in the Clearwater River in 2002. Counts are presented by river mile (RM) and date. A dash (-) indicates no redds were observed on the corresponding date. An empty cell indicates no search was conducted at the corresponding river mile (Data collected by the Nez Perce Tribe).

RM	RKM	New redds counted by flight date									Totals
		01-Oct	07-Oct	14-Oct	21-Oct	28-Oct	04-Nov	15-Nov	25-Nov	04-Dec	
7.8	12.6	-	-	-	1	4	-	1	-	-	6
8.8	14.2	-	-	-	-	-	-	3	-	2	5
16.2	26.1	-	-	-	-	-	1	-	-	-	1
17.3	27.8	-	-	1	-	1	-	-	-	-	2
18.0	29.0	2	-	1	-	5	-	9	2	3	22
19.1	30.7	-	5	7	1	4	-	-	-	-	17
19.5	31.4	-	-	-	-	1	-	-	-	-	1
21.7	34.9	-	-	1	-	-	-	-	-	-	1
22.0	35.4	4	13	3	19	12	47	12	-	-	110
23.3	37.5	-	-	-	2	3	4	-	-	-	9
25.5	41.0	-	1	-	-	-	-	-	-	-	1
26.5	42.6	-	1	2	-	5	12	-	-	-	20
27.5	44.2	-	-	4	4	6	1	-	-	-	15
28.0	45.1	4	7	2	12	6	1	16	-	-	48
30.1	48.4	-	-	-	3	-	-	-	-	-	3
31.5	50.7	1	5	10	9	3	-	-	-	-	28
32.5	52.3	-	-	1	4	4	-	2	-	-	11
32.8	52.8	-	-	-	-	-	2	-	-	2	4
34.0	54.7	-	-	3	5	18	1	-	-	15	42
35.4	57.0	2	4	2	9	11	5	8	-	-	41
35.7	57.4	-	1	3	3	-	-	-	-	-	7
36.2	58.2	1	2	-	-	-	4	-	-	-	7
37.8	60.8	-	-	8	-	-	-	-	-	-	8
39.6	63.7	-	-	-	2	-	-	-	-	-	2
40.3	64.8	1	1	7	1	7	49	39	4	-	109
43.2	69.5	-	-	-	1	-	-	-	-	-	1
45.0	72.4	-	-	-	2	-	-	-	-	-	2
66.0	106.2	-	-	-	1	-	-	-	-	-	1
		15	40	55	79	90	127	90	6	22	524

Table 10. Flight information, river flow, and visibility rating for aerial redd surveys of the Clearwater River in 2002 (Data provided by the Nez Perce Tribe).

Category	Flight date								
	01-Oct	07-Oct	14-Oct	21-Oct	28-Oct	04-Nov	15-Nov	25-Nov	04-Dec
Start (RM)	4	4	4	4	4	4	4	4	4
End (RM)	45	75	41	75	45	45	45	75	45
Flow (cfs) at RM 11.6	3,240	3,310	2,920	2,850	2,800	2,600	3,800	4,530	3,030
Flow (cfs) at RM 37.4	2,940	3,120	2,830	2,800	2,700	2,400	3,750	4,440	2,920
Flow at (cfs) at RM 44.6	1,290	1,270	1,860	950	884	873	2,000	2,640	1,430
Visibility rating	Excel	Good	Fair	Fair	Fair	Fair	Poor	Poor	Good

Table 11. Numbers of redds counted during aerial searches of the Clearwater River (RM 0-41), by week of the year, 1993-2002. 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
39	22 Sep. - 28 Sep.	23 Sep. - 29 Sep.								0		
40	29 Sep - 5 Oct.	30 Sep. - 06 Oct.							12	1	4	15
41	6 Oct. - 12 Oct.	7 Oct. - 13 Oct.						14	20	6	0	40
42	13 Oct. - 19 Oct.	14 Oct. - 20 Oct.					9		13	7		55
43	20 Oct. - 26 Oct.	21 Oct. - 27 Oct.		6	5	28	17	18	22	4	34	75
44	27 Oct. - 02 Nov.	28 Oct. - 03 Nov.	8		11	27	22	35	35	53		90
45	03 Nov. - 09 Nov.	04 Nov. - 10 Nov.		10		9	5	13	29	39	22	127
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	
48	24 Nov. - 30 Nov.	25 Nov. - 01 Dec.	0				0		0	12		6
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 2002 (Data collected by the Idaho Power Company and U.S. Fish and Wildlife Service). 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 date.

RM	RK	New redds counted by flight date							Totals
		21-Oct	28-Oct	04-Nov	11-Nov	18-Nov	25-Nov	02-Dec	
0.8	1.3	1	-	-	-	1	-	-	2
1.8	2.9	-	-	-	1	4	2	1	8
3.0	4.8	-	1	-	-	-	-	-	1
3.2	5.1	-	2	-	-	1	2	-	5
3.6	5.8	-	-	-	-	3	-	-	3
4.4	7.1	1	7	-	-	1	-	-	9
4.5	7.2	-	1	-	-	-	-	-	1
8.2	13.2	-	1	-	-	-	-	-	1
10.0	16.1	-	-	-	-	-	2	-	2
10.4	16.7	-	2	-	4	-	-	-	6
10.5	16.9	3	3	-	-	-	-	-	6
11.6	18.7	-	-	1	-	-	-	-	1
12.5	20.1	2	1	1	-	-	-	-	4
13.8	22.2	-	1	1	-	-	-	-	2
13.9	22.4	-	2	-	-	-	-	-	2
16.8	27.0	-	-	1	-	-	-	-	1
17.6	28.3	5	2	1	3	-	2	-	13
19.0	30.6	-	2	1	-	-	-	-	3
19.3	31.1	-	-	-	2	-	-	-	2
29.1	46.8	-	-	-	-	-	2	-	2
29.3	47.1	1	-	-	-	-	-	-	1
29.7	47.8	3	-	-	-	-	-	-	3
29.8	47.9	1	-	-	-	-	-	-	1
31.1	50.0	1	-	-	-	-	2	-	3
33.1	53.3	-	1	-	-	-	-	-	1
33.3	53.6	4	3	-	-	-	-	-	7
37.6	60.5	3	-	-	1	-	-	-	4
43.2	69.5	6	-	2	-	-	-	-	8
44.5	71.6	1	-	-	-	-	1	-	2
45.0	72.4	2	-	-	-	-	-	-	2
45.7	73.5	3	1	-	-	-	-	-	4
49.2	79.2	-	1	-	-	-	-	-	1
		37	31	8	11	10	13	1	111

Table 13. Flight information, river discharge, and visibility rating for aerial redd surveys of the Grande Ronde River in 2002.

Category	Flight date						
	21-Oct	28-Oct	04-Nov	11-Nov	18-Nov	25-Nov	02-Dec
Start (RM)	0	0	0	0	0	0	0
End (RM)	53	53	53	53	53	53	53
Aircraft	Jet Ranger	Jet Ranger	Jet Ranger	Jet Ranger	Jet Ranger	Jet Ranger	Jet Ranger
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	N/A
Secondary Observer	S. Bradbury	S. Bradbury	S. Bradbury	S. Bradbury	S. Bradbury	S. Bradbury	S. Bradbury
Weather	Clear	Cloudy	Clear	PtlyCdy	Cloudy	Clear	Fog/Cloudy
Flow (cfs) at RM 45.2	630	620	670	776	N/A	719	647
Visibility rating	Good	Good	Good	Good	Good	Good	Good

Table 14. Numbers of redds counted during aerial searches of the Grande Ronde River (RM 0-53), by week of the year, 1993-2002. 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
41	6 Oct. - 12 Oct.	7 Oct. - 13 Oct.						0	6	0	1	
42	13 Oct. - 19 Oct.	14 Oct. - 20 Oct.					0	0	1	3	3	
43	20 Oct. - 26 Oct.	21 Oct. - 27 Oct.	11	1	10	3	12	11	4	1	19	37
44	27 Oct. - 02 Nov.	28 Oct. - 03 Nov.	11		3	3	11	7	0	2	7	31
45	03 Nov. - 09 Nov.	04 Nov. - 10 Nov.	1	8	5	10	1	6		0	31	8
46	10 Nov. - 16 Nov.	11 Nov. - 17 Nov.	7	0		4	13		2	2	0	11
47	17 Nov. - 23 Nov.	18 Nov. - 24 Nov.	12	1		0	10	0	0	0	62	10
48	24 Nov. - 30 Nov.	25 Nov. - 01 Dec.	4	5			6				25	13
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. New fall chinook salmon redds counted during aerial searches of the Imnaha River in 2002 (Data collected by the Idaho Power Company and U.S. Fish and Wildlife Service). 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 date.

RM	RK	New redds counted by flight date							Totals
		21-Oct	28-Oct	04-Nov	11-Nov	18-Nov	25-Nov	02-Dec	
0.2	0.3	-	-	1	-	2	-	-	3
0.3	0.5	6	-	1	-	-	-	-	7
0.4	0.6	-	-	-	1	1	1	-	3
0.6	1.0	-	-	2	-	-	-	-	2
0.9	1.4	-	-	1	-	-	1	-	2
1.3	2.1	-	-	-	-	1	-	-	1
1.5	2.4	-	-	-	-	3	-	-	3
1.6	2.6	-	-	-	3	-	-	-	3
1.7	2.7	-	-	2	-	-	-	-	2
1.8	2.9	1	-	-	-	-	-	-	1
2.0	3.2	-	-	2	-	-	-	-	2
2.3	3.7	-	-	-	-	-	1	-	1
2.4	3.9	1	-	-	1	3	2	-	7
2.5	4.0	-	-	-	-	-	2	-	2
2.5	4.0	-	-	1	-	2	-	-	3
2.5	4.0	-	-	-	-	1	1	-	2
2.5	4.0	-	2	-	-	-	-	-	2
2.7	4.3	-	-	-	-	1	1	-	2
2.9	4.7	1	-	-	-	-	-	-	1
3.4	5.5	-	2	-	-	-	-	-	2
3.7	6.0	-	-	-	-	1	-	-	1
4.1	6.6	-	-	-	-	1	-	-	1
5.4	8.7	-	-	-	-	-	1	-	1
7.1	11.4						10		10
9.9	15.9						1		1
12.8	20.6						1		1
13.0	20.9						1		1
13.4	21.6						2		2
13.5	21.7						1		1
18.2	29.3						1		1
20.7	33.3						1		1
		9	4	10	5	16	28	0	72

Table 16. Flight information, river flow, and visibility rating for aerial redd surveys of the Imnaha River in 2002.

Category	New redds counted by flight date						
	21-Oct	28-Oct	04-Nov	11-Nov	18-Nov	25-Nov	02-Dec
Start (RM)	0	0	0	0	0	35	0
End (RM)	4	4	4	4	4	0	4
Aircraft	Jet Ranger	Jet Ranger	Jet Ranger	Jet Ranger	Jet Ranger	Jet Ranger	Jet Ranger
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	N/A
Secondary Observer	S. Bradbury	S. Bradbury	S. Bradbury	S. Bradbury	S. Bradbury	S. Bradbury	S. Bradbury
Weather	Clear	Cloudy	Clear	Partly Cldy	Cloudy	Clear	Fog/Cloudy
Flow (cfs) at RM 19.3	133	131	122	138	N/A	124	124
Visibility rating	Good	Good	Good	Good	Good	Good	Good

Table 17. Numbers of redds counted during aerial searches of the Imnaha River (RM 0-4), by week of the year, 1993-2002. 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
41	6 Oct. - 12 Oct.	7 Oct. - 13 Oct.							0	0	0	
42	13 Oct. - 19 Oct.	14 Oct. - 20 Oct.						0	0	0	0	
43	20 Oct. - 26 Oct.	21 Oct. - 27 Oct.	2	0	0	0	0	2	1	1	0	9
44	27 Oct. - 02 Nov.	28 Oct. - 03 Nov.	2	0	1	2	0	5	0	1	4	4
45	03 Nov. - 09 Nov.	04 Nov. - 10 Nov.	0	0	0	0	0	1		5	1	10
46	10 Nov. - 16 Nov.	11 Nov. - 17 Nov.		0	1	1	1	0	4	1	11	5
47	17 Nov. - 23 Nov.	18 Nov. - 24 Nov.	0	0	2	0	2	0	2	0	8	16
48	24 Nov. - 30 Nov.	25 Nov. - 01 Dec.	0	0	0		0			0	7	9
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 18. Fall chinook aerial spawning ground surveys conducted in the Salmon River, 2002 (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 date.

RM	RK	New redds counted by flight date	
		14-Oct	20-Nov
35.7	57.5	-	11
45.2	72.7	-	3
62.1	99.9	-	8
63.9	102.8	-	2
65.3	105.1	-	2
65.6	105.6	-	3
88.0	141.6	-	2
		0	31
Start (RM)		0	0
End (RM)		106	89
Flow (cfs) at RM 53.7		3,300	3,610
Visibility rating		Fair	Fair

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, 1986-2002. Raw counts are from USACE annual fish passage reports (USACE 1986-2002), 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	10	774	7	110.6
1987	951	12	939	73	12.9
1988	627	22	605	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	1,371	2,323	543	4.3
2001	8,915	1,587	7,328	1302	5.6
2002	12,351	2,404	9,947	1854	5.4

Appendices

Appendix 1

Redd counts recorded from 1959 to 1978 in the Snake River between Lewiston, Idaho, and the Hells Canyon Dam site.

Total counts recorded from 1959 to 1976 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 (1986-2002). 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
148.0	238.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5
148.3	238.6	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
148.5	238.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	3	34
148.8	239.4	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	2
149.1	239.9	-	-	-	1	-	2	-	1	-	-	-	-	2	1	-	2	13
149.2	240.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-
150.0	241.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
151.5	243.8	-	-	-	-	-	-	-	2	-	-	-	-	-	1	-	5	-
151.9	244.4	-	-	1	-	-	-	-	-	-	3	4	8	-	-	-	-	7
152.1	244.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
152.3	245.1	-	13	15	23	16	-	7	3	5	-	3	12	3	20	21	52	23
153.2	246.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
155.2	249.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
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
158.0	254.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1
159.3	256.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
159.5	256.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
159.7	257.0	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	3
160.5	258.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
160.8	258.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
161.0	259.0	-	-	-	-	-	-	7	11	-	3	-	7	9	1	7	12	11
161.8	260.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
162.4	261.3	-	-	2	1	2	15	11	1	-	-	-	-	-	1	4	50	32
163.0	262.3	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 2 (Continued)

RM	RK	Year																
		1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
163.3	262.7	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-
164.4	264.5	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
164.7	265.0	-	-	-	2	1	-	-	-	1	-	-	1	-	-	-	19	12
165.2	265.8	-	-	5	-	-	-	-	2	3	-	-	-	-	-	-	1	-
165.3	266.0	-	-	-	-	-	-	-	2	-	-	-	-	1	-	-	-	7
165.5	266.3	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
165.7	266.6	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-	-	44
165.9	266.9	-	2	14	-	-	1	3	9	-	-	3	-	2	-	-	32	-
166.2	267.4	-	-	-	-	-	-	-	6	-	-	-	-	-	-	-	-	-
166.5	267.9	-	-	-	-	-	6	-	-	-	-	-	-	-	-	-	-	-
167.9	270.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
168.1	270.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
168.6	271.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
168.7	271.4	-	-	-	-	-	-	-	5	6	3	-	-	-	-	-	7	47
169.6	272.9	-	-	-	1	-	-	-	-	-	1	1	-	-	-	-	-	11
172.5	277.6	-	1	-	-	-	-	-	-	-	-	3	-	4	1	1	18	11
173.9	279.8	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-
175.2	281.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-
175.7	282.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
176.5	284.0	-	-	-	-	-	-	-	-	-	1	-	-	-	-	2	1	-
178.3	286.9	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
178.5	287.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-
178.9	287.9	-	-	-	1	-	-	-	-	1	-	-	-	2	7	13	3	18
179.6	289.0	-	-	-	-	-	-	-	4	5	2	8	-	-	10	8	5	17
181.7	292.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	3
186.7	300.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
187.5	301.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1
187.7	302.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
188.2	302.8	-	-	-	-	-	-	-	-	-	-	-	-	-	1	2	5	1
190.0	305.7	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
190.1	305.9	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	2	5

Appendix 2 (Continued)

RM	RK	Year																
		1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
190.8	307.0	-	1	5	-	2	5	1	-	-	-	1	-	4	2	5	18	28
191.7	308.4	2	2	4	-	-	-	-	-	-	-	-	-	-	1	-	3	10
193.0	310.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7
193.4	311.2	-	-	-	5	2	-	-	-	2	-	2	1	4	-	-	2	3
193.6	311.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
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	2	4	2	6	14	11	11	22	26
194.1	312.3	-	-	2	-	2	-	-	-	-	-	-	-	-	-	-	1	-
196.0	315.4	-	-	3	-	-	-	-	-	2	-	-	-	1	6	10	20	23
196.2	315.7	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
198.2	318.9	-	-	-	-	-	-	-	-	-	-	-	-	1	11	9	17	22
198.8	319.9	-	5	-	3	2	7	3	-	6	1	6	-	4	11	13	19	23
201.1	323.6	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	2	3
203.1	326.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
204.1	328.4	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
205.3	330.3	-	-	-	-	-	3	-	-	-	1	-	-	3	6	2	-	11
205.4	330.5	-	1	-	-	-	-	-	-	-	-	2	-	-	-	4	-	2
206.4	332.1	-	1	4	-	-	1	2	1	-	2	-	-	2	4	-	2	2
206.6	332.4	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	1
207.5	333.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
207.7	334.2	-	-	-	-	-	-	-	-	-	-	-	-	-	2	1	-	-
207.8	334.4	-	-	1	-	-	-	-	-	-	-	3	2	-	5	-	-	1
207.9	334.5	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
208.0	334.7	-	-	-	1	-	-	-	-	-	2	9	1	13	25	17	22	36
208.1	334.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
209.1	336.4	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1
209.7	337.4	-	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-	2
211.9	340.9	-	-	-	-	-	-	-	2	-	-	-	-	11	9	6	14	25
212.3	341.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	4
213.3	343.2	-	-	-	2	-	-	-	-	-	-	1	-	-	-	1	2	1

Appendix 2 (Continued)

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

Appendix 2 (Continued)

RM	RK	Year																
		1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
237.0	381.3	-	-	-	-	-	-	-	5	2	1	-	2	8	6	13	14	26
238.3	383.4	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	2
238.6	383.9	-	2	-	2	-	-	-	-	-	1	-	-	-	4	4	8	13
240.5	387.0	-	6	-	-	-	-	-	-	-	-	1	-	2	8	1	3	11
240.7	387.3	-	-	-	3	-	6	-	-	-	-	1	1	4	7	11	13	21
241.0	387.8	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	4	5
242.8	390.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	3	7
243.3	391.5	-	1	-	1	-	-	-	-	-	-	-	-	-	-	4	-	-
243.5	391.8	-	-	-	-	-	-	-	-	-	-	2	-	1	-	-	5	-
244.0	392.6	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	12
244.3	393.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
244.6	393.6	-	-	-	1	2	-	-	-	-	-	-	-	-	1	2	9	13
245.3	394.7	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-
245.7	395.3	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-
245.8	395.5	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	4
246.5	396.6	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		7	66	64	58	37	46	47	60	53	41	71	49	135	273	255	535	878

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 (1986-2002). 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
148.0	238.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5
148.3	238.6	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
148.5	238.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	4	37
148.8	239.4	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
148.9	239.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
149.1	239.9	-	-	-	1	-	2	-	1	-	-	-	-	2	1	-	2	-
149.2	240.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	13
150.0	241.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
151.5	243.8	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	5	-
151.9	244.4	-	-	1	-	-	-	-	-	-	3	4	8	-	1	-	-	7
152.1	244.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
152.3	245.1	-	13	15	23	16	-	7	3	5	-	3	12	3	20	21	52	23
153.2	246.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
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
158.0	254.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	2
159.3	256.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
159.5	256.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
159.7	257.0	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	3
160.5	258.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
160.8	258.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
161.0	259.0	-	-	-	-	-	-	7	11	-	3	-	7	9	1	7	12	11
161.8	260.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
162.4	261.3	-	-	2	1	2	20	11	1	-	-	2	-	-	1	4	56	33

Appendix 3 (Continued)

		Appendix 3 (Continued)																	
		Year																	
RM	RK	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	
163.0	262.3	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
163.3	262.7	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	
164.4	264.5	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
164.7	265.0	-	-	-	2	1	-	-	-	1	-	-	1	-	-	-	19	12	
165.2	265.8	-	-	5	-	-	-	-	2	3	-	-	-	-	-	-	5	-	
165.3	266.0	-	-	-	-	-	-	-	2	-	-	-	-	1	-	-	-	7	
165.5	266.3	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
165.7	266.6	-	-	-	-	-	-	-	28	-	-	-	-	-	-	-	38	52	
165.9	266.9	-	2	14	-	-	1	3	9	-	-	3	-	2	5	-	-	-	
166.2	267.4	-	-	-	-	-	-	-	17	-	-	-	-	-	-	-	-	1	
166.4	267.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9	
166.6	268.1	-	-	-	-	-	6	-	21	-	-	-	-	6	-	1	-	-	
167.9	270.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	
168.1	270.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	
168.6	271.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	
168.7	271.4	-	-	-	-	-	-	-	5	6	3	-	-	-	-	-	7	47	
169.7	273.0	-	-	-	1	-	-	-	-	-	1	1	-	-	-	-	-	11	
172.5	277.6	-	1	-	-	-	-	-	-	-	-	3	-	4	1	1	18	11	
173.9	279.8	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	
175.2	281.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	
175.7	282.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	
176.5	284.0	-	-	-	-	-	-	-	-	-	1	-	-	-	-	2	1	-	
178.3	286.9	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	3	-	
178.5	287.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	
178.9	287.9	-	-	-	1	-	-	-	-	1	-	-	-	2	7	13	-	18	
179.6	289.0	-	-	-	-	-	-	-	6	13	21	32	5	16	40	56	72	92	
181.7	292.4	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	3	
183.1	294.6	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	4	
186.7	300.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	
187.5	301.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	
187.7	302.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	

Appendix 3 (Continued)

RM	RK	Year																	
		1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	
188.2	302.8	-	-	-	-	-	-	-	-	-	-	-	-	-	1	2	7	1	
190.0	305.7	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	
190.1	305.9	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	2	5	
190.8	307.0	-	1	5	-	2	5	1	-	-	-	1	-	4	2	5	18	28	
191.7	308.4	2	2	4	-	-	-	-	-	-	-	-	-	-	1	-	3	10	
193.0	310.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	28	
193.4	311.2	-	-	-	5	2	-	-	-	2	-	2	1	4	-	-	-	5	
193.6	311.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	1	
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	-	-	1	2	4	2	6	14	11	11	22	26	
194.1	312.3	-	-	2	-	2	-	-	-	5	-	-	-	-	-	-	1	-	
194.4	312.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	
196.0	315.4	-	-	3	-	-	-	-	-	2	-	-	-	1	6	10	20	23	
196.2	315.7	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
198.2	318.9	-	-	-	-	-	-	-	-	-	-	2	-	1	17	14	36	33	
198.8	319.9	-	5	-	3	2	7	3	-	6	1	6	-	4	15	17	21	25	
199.4	320.8	-	-	-	-	-	-	-	1	-	-	5	-	-	2	1	2	-	
201.1	323.6	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	2	3	
203.1	326.8	-	-	-	-	-	-	-	-	-	-	-	-	10	-	-	-	1	
204.1	328.4	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
205.3	330.3	-	-	-	-	-	3	-	-	-	1	-	-	3	6	2	-	11	
205.4	330.5	-	1	-	-	-	-	-	-	-	-	2	-	-	-	4	-	2	
206.4	332.1	-	1	4	-	-	1	2	1	-	2	-	-	2	4	-	2	2	
206.6	332.4	-	-	-	-	-	-	-	-	-	-	-	-	-	2	1	-	1	
207.7	334.2	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	3	
207.8	334.4	-	-	1	-	-	-	-	-	-	-	3	2	-	5	-	-	1	
207.9	334.5	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
208.0	334.7	-	-	-	1	-	-	-	-	-	2	9	5	13	36	17	26	37	
208.1	334.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	
208.3	335.2	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	-	-	

Appendix 3 (Continued)

		Appendix 3 (Continued)																	
		Year																	
RM	RK	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	
209.1	336.4	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	
209.7	337.4	-	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-	2	
211.9	340.9	-	-	-	-	-	-	-	2	-	-	-	-	11	10	6	14	25	
212.2	341.4	-	-	-	-	-	-	-	-	-	2	-	-	17	24	28	37	37	
212.3	341.6	-	-	-	-	-	-	-	-	-	-	-	-	-	2	3	9	9	
213.3	343.2	-	-	-	2	-	-	-	-	-	-	1	-	-	-	1	6	9	
213.5	343.5	-	-	-	-	-	-	-	-	-	-	1	-	-	2	1	2	4	
213.7	343.8	-	-	-	-	1	-	2	-	-	-	-	-	4	1	1	6	7	
214.5	345.1	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1	4	
214.7	345.5	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
215.4	346.6	-	-	-	-	-	-	-	-	-	-	-	-	1	2	-	-	-	
216.1	347.7	-	-	-	-	-	-	-	-	1	-	-	-	3	1	2	6	4	
216.9	349.0	-	-	-	-	-	-	-	-	-	-	-	-	-	4	5	7	21	
217.3	349.6	-	-	-	-	-	-	1	3	-	1	-	-	4	24	6	13	22	
217.8	350.4	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	
218.2	351.1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
218.5	351.6	-	-	-	-	-	-	-	-	-	-	-	-	-	3	3	-	16	
218.6	351.7	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	
218.7	351.9	-	-	-	-	-	-	-	-	-	4	7	-	4	12	5	15	17	
219.0	352.4	-	-	-	-	-	-	-	-	-	3	2	-	4	5	6	3	11	
219.3	352.9	-	-	2	-	-	-	1	-	3	-	2	3	6	8	5	7	13	
221.0	355.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	
221.5	356.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	
222.3	357.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	
222.7	358.3	-	-	-	1	-	-	-	-	-	-	-	-	-	6	-	1	-	
222.8	358.5	2	3	-	-	-	-	-	-	-	-	-	-	-	-	5	-	-	
222.9	358.6	-	-	-	3	-	-	-	3	1	-	-	-	-	9	-	4	20	
223.2	359.1	-	-	-	-	-	-	-	-	3	3	-	-	-	3	-	-	1	
223.7	359.9	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
224.7	361.5	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	
225.0	362.0	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	2	

Appendix 3 (Continued)

		Appendix C (Continued)																	
		Year																	
RM	RK	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	
225.1	362.2	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	1	
226.7	364.8	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	
228.0	366.9	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	
231.3	372.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	
235.1	378.3	-	-	-	-	-	-	-	-	-	1	-	-	1	2	3	8	21	
235.7	379.2	-	4	-	3	-	-	-	-	5	2	7	1	4	11	16	16	22	
236.0	379.7	1	1	2	1	-	-	-	-	-	-	-	-	-	2	1	-	-	
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	
238.3	383.4	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	2	
238.6	383.9	-	2	-	2	-	-	-	-	-	1	-	-	-	4	4	8	13	
240.5	387.0	-	6	-	-	-	-	-	-	-	-	1	-	2	8	1	3	11	
240.7	387.3	-	-	-	3	-	6	-	-	-	-	1	1	4	7	11	13	21	
241.0	387.8	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	4	5	
242.8	390.7	-	-	-	-	-	-	-	-	-	-	-	-	1	-	4	4	9	
243.0	391.0	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	
243.3	391.5	-	1	-	1	-	-	-	-	-	-	-	-	-	-	4	-	-	
243.5	391.8	-	-	-	-	-	-	-	-	-	-	2	-	1	-	-	5	-	
244.0	392.6	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	12	
244.3	393.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	
244.6	393.6	-	-	-	1	2	-	-	-	-	-	-	-	-	1	2	9	13	
245.3	394.7	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	
245.7	395.3	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	
245.8	395.5	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	1	4	
246.5	396.6	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		7	66	64	58	37	51	47	127	67	65	104	58	185	373	346	709	1,113	

Appendix 4

Fall chinook salmon redds counted in the Clearwater River during aerial searches, by river mile (RM), river kilometer (RK), and year (1988-2002). 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 2002. An empty cell indicates no searches were conducted in the corresponding site and year.

		Year														
RM	RK	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
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
18.6	29.9	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
18.9	30.4	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
19.0	30.6	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-
19.1	30.7	-	-	-	-	-	-	-	-	-	-	-	3	-	6	17
19.4	31.2	-	-	-	-	-	-	-	-	-	1	4	5	-	-	-
19.5	31.4	-	-	-	-	-	-	-	-	-	-	-	-	7	14	1
20.0	32.2	-	2	-	-	-	-	-	4	6	1	-	-	-	-	-
21.7	34.9	-	-	-	-	-	-	-	-	-	-	-	-	-	2	1
21.8	35.0	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
22.0	35.4	8	-	-	-	21	9	18	5	24	16	25	62	77	60	110
23.0	37.0	-	-	-	3	-	-	-	-	-	-	-	-	-	29	-
23.3	37.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9
23.4	37.7	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
24.0	38.6	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
25.5	41.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
26.5	42.6	-	-	-	-	-	-	-	-	-	-	-	-	3	2	20
26.8	43.1	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
27.6	44.4	-	-	-	-	-	-	-	-	-	-	2	-	-	-	15
28.0	45.1	-	-	-	-	-	-	1	-	-	-	-	-	-	-	48
28.4	45.7	-	-	-	-	-	-	-	-	-	11	1	26	1	-	-

Appendix 4 (Continued)

RM	RK	Year														
		1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
30.1	48.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
31.5	50.7	-	-	-	-	-	-	-	-	-	-	-	-	-	3	28
31.7	51.0	-	-	-	-	-	-	-	-	4	-	6	-	-	-	-
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
34.2	55.0	-	-	-	-	-	-	-	-	10	-	-	-	-	-	-
35.0	56.3	-	-	-	-	-	-	-	3	6	7	-	-	-	-	-
35.4	56.9	-	-	-	-	-	-	-	-	-	-	-	2	9	47	41
35.7	57.5	-	-	-	-	-	-	-	-	-	-	-	3	-	1	7
36.2	58.2	-	-	-	-	-	-	-	-	-	6	11	3	11	-	7
36.7	59.0	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
37.9	61.0	-	-	-	-	-	-	-	-	-	-	-	-	-	1	8
39.5	63.6	-	-	-	-	-	-	-	-	-	1	9	1	-	4	2
40.3	64.8	-	-	-	-	1	11	4	1	11	1	10	21	22	46	109
40.6	65.3	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-
43.2	69.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
45.0	72.4	-	-	-	-	-	-	-	-	-	-	-	-	3	9	2
49.2	79.2	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
51.7	83.2	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-
52.0	83.7	-	-	-	-	1	-	-	-	-	-	-	-	-	3	-
53.4	85.9	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-
61.0	98.1	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
66.0	106.2	-	-	-	-	-	-	-	-	-	-	-	-	-	4	1
		21	10	4	4	26	36	30	20	66	58	78	181	172	306	524

Appendix 5

Fall chinook salmon redds counted in the Grande Ronde River during aerial searches, by river mile (RM), river kilometer (RK), and year (1992-2002). 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 2002.

RM	RK	Year										
		1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
0.1	0.2	-	-	-	-	-	-	-	-	-	12	-
0.7	1.1	-	-	-	-	-	-	-	-	-	22	-
0.8	1.3	-	-	-	-	-	-	-	-	-	-	2
1.0	1.6	-	-	-	-	-	-	-	-	-	2	-
1.2	1.9	-	-	-	-	-	-	-	-	-	2	-
1.9	3.1	-	-	-	-	-	-	-	-	-	3	8
2.0	3.2	-	-	-	-	-	-	-	-	-	2	-
2.1	3.4	-	2	-	-	-	-	-	-	-	-	-
2.2	3.5	-	-	-	-	-	-	-	-	-	4	-
3.0	4.8	-	-	-	-	-	-	1	-	-	1	1
3.2	5.1	1	1	-	-	-	1	1	-	-	7	5
3.6	5.8	-	-	-	2	2	-	-	-	1	14	3
4.4	7.1	2	4	-	-	-	1	3	1	1	1	9
4.5	7.2	-	-	-	-	-	-	-	-	-	2	1
4.6	7.4	-	2	-	-	1	-	-	-	-	7	-
5.5	8.8	-	-	-	-	-	-	-	-	-	8	-
6.2	10.0	-	-	-	-	-	-	-	-	-	4	-
6.8	10.9	-	-	-	-	-	-	-	-	-	1	-
7.9	12.7	-	-	-	-	-	-	-	-	-	1	-
8.2	13.2	-	-	-	-	-	-	-	-	-	-	1
8.5	13.7	-	-	-	-	-	-	-	-	-	7	-
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
11.6	18.7	-	2	-	-	-	-	-	-	-	-	1
11.7	18.8	-	-	-	-	-	-	-	-	-	3	-
12.0	19.3	-	-	-	-	-	-	-	-	-	2	-
12.5	20.1	-	-	-	-	-	-	-	-	-	12	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
13.9	22.4	-	-	-	-	-	-	-	-	-	-	2

Appendix 5 (Continued)

RM	RK	Year										
		1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
16.8	27.0	-	-	-	-	-	-	-	-	-	-	1
17.0	27.4	-	-	1	-	-	-	-	-	-	-	-
17.6	28.3	-	2	3	5	-	9	-	-	-	10	13
18.0	29.0	-	-	-	-	-	4	-	-	-	-	-
18.6	29.9	1	-	-	-	-	-	-	-	-	-	-
19.1	30.7	-	-	-	-	-	-	-	-	-	1	3
19.2	30.9	-	-	-	-	-	3	-	-	-	-	2
19.5	31.4	-	-	-	-	-	-	2	-	-	-	-
20.0	32.2	-	-	-	-	-	4	5	-	-	2	-
21.0	33.8	-	-	-	-	-	-	-	-	-	3	-
22.0	35.4	-	-	-	-	-	-	-	-	-	1	-
25.6	41.2	-	4	-	-	-	-	-	-	-	-	-
26.4	42.5	-	-	7	-	-	-	-	-	-	1	-
27.1	43.6	-	-	-	-	-	-	-	-	-	2	-
27.3	43.9	-	-	-	-	-	-	-	-	-	2	-
27.9	44.9	-	-	-	-	3	-	-	6	-	-	-
29.1	46.8	-	-	-	-	-	-	-	-	-	-	2
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
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
37.8	60.8	-	7	1	-	-	3	-	-	-	-	-
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	-	-	-	-	-	-
43.2	69.5	-	1	-	3	-	-	-	2	-	11	8
44.5	71.6	-	-	-	-	-	-	-	-	-	-	2
44.9	72.2	-	-	-	-	-	-	-	-	4	-	2
45.7	73.5	-	-	-	-	-	-	-	-	-	-	4

Appendix 5 (Continued)

RM	RK	Year										
		1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
45.9	73.9	-	-	-	-	4	-	-	-	-	-	-
46.5	74.8	-	-	-	2	-	-	-	-	-	-	-
47.5	76.4	-	-	-	-	-	1	-	4	-	-	-
47.8	76.9	-	-	-	-	-	-	-	-	-	2	-
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

Appendix 6

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 and 2001, 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, and 38 in 2001. The maximum upstream RM searched was 4.1, 19, 9.8, 3.8, 3.8, 14, 35 and 35, 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

Appendix 7

Fall chinook salmon redds counted in the Salmon 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. 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 in 2001 and 2002.

RM	RK	Year										
		1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
4.8	7.7	-	-	-	-	-	-	-	-	-	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	-	-	-	-	-	-
26.1	42.0	-	-	-	1	-	-	-	-	-	-	-
26.5	42.6	-	-	-	-	-	-	-	-	-	1	-
31.1	50.0	-	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
65.0	104.6	-	-	-	-	-	-	-	-	-	2	-
65.4	105.2	-	-	-	-	-	-	1	-	-	-	2
65.7	105.7	-	-	-	-	-	-	-	-	-	2	3
65.8	105.9	-	-	-	-	-	-	-	-	-	1	-
70.5	113.4	-	-	-	-	-	-	-	-	-	1	-
70.6	113.6	-	-	-	-	-	-	-	-	-	1	-
85.0	136.8	-	-	-	-	-	-	-	-	-	1	-
87.0	140.0	-	-	1	-	-	-	-	-	-	-	-
88.0	141.6	-	-	-	-	-	-	-	-	-	-	2
90.7	146.0	-	2	-	-	-	-	-	-	-	-	-
		1	3	1	2	1	1	3	0	0	22	31