A Compendium of Grande Ronde River and Imnaha River Basins Spring Chinook Salmon Spawning Ground Surveys Conducted from 1948 through 2003

Fish Research and Development, Northeast Region
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LOWER SNAKE RIVER
COMPENSATION PLAN

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We would like to thank the many people who contributed to this report. Numerous biologists with the Oregon Fish Commission, Oregon Wildlife Commission, Oregon Department of Fish and Wildlife, Confederated Tribes of the Umatilla Indian Reservation, Nez Perce Tribe, US Fish and Wildlife Service, and the US Forest Service walked the streams of northeast Oregon in August and September each year to count the redds and spawning fish and sample the carcasses of spawned out Chinook salmon. Without their efforts, there would be no data to summarize for this report.

Since 1986, the US Fish and Wildlife Service, through the Lower Snake River Compensation Plan, has provided funding to ODFW for spawning ground surveys beyond the traditional index surveys to gain a better understanding of the magnitude, timing, and distribution of the spring Chinook salmon spawning in the Grande Ronde and Imnaha rivers. We thank Ed Crateau, Dan Herrig, and Joe Krakker of the USFWS for providing funds and survey help.

ODFW district biologists Brad Smith, Jeff Zakel, Ken Witty, Duane West conducted most of index surveys, assisted with many of the additional surveys, and provided access to much of the historical data.

We used Terrain Navigator from Maptech, Inc. to determine survey unit lengths and to produce the survey unit maps in Appendix F.

HISTORIC PREFACE

Prior to 1948 very little quantitative information is available regarding anadromous fish production and habitat in the Grande Ronde and Imnaha river basins. The only documented information comes from the accounts of early pioneers. In 1838, Martha Gay Masterson described the Grande Ronde "valley with no fields or houses" as a "a veritable paradise. . . . Near the hill and the river were Indian wigwams, and all around over the valley were thousands of Indian ponies (Barton 1986)." Missionary Henry Spalding described the Wallowa Valley as he traveled with Chief Joseph to Wallowa Lake in 1839. On 25 July, he noted that "salmon quite plentiful lie in sight by fifty or more in the holes...some 300 [sockeye] salmon are taken today." On 26 July, he noted that "people [Nez Perce] have taken about 600 [sockeye] salmon today (Drury 1958)."

In the fall of 1880, 13-year-old Bill Warnock fished with his family at the head of Wallowa Lake, where "one end of the seine was fastened to a tree and the other was hauled around the school of fish with a row boat. . . . It required a team of eight men to drag the haul, which usually contained 1500 fish [sockeye salmon] at an average weight of 5 pounds apiece. Fish were packed in 60 pound kegs and taken outside town for sale." In 1881 a small industry harvested approximately 60,000 pounds of sockeye salmon at Wallowa Lake (roughly 12,000 fish). As early as 1890 a heavy dam was built across the outlet to the lake and irrigation ditch companies were forming (Bartlett 1967).

Experimental fish culture attempts recorded in the annual reports of the Master Fish Warden provide the most quantitative fish counts at the turn of the century. On 29 August 1901, Mr. A. D. Allen racked the main Grande Ronde River above the current village of Troy. He was successful in spawning 2,511 female coho salmon from 14 September through 8 December. The majority of returning adults may have passed this site prior to the racks installation and most fertilized eggs were out-planted into the mainstem Grande Ronde. Tragically, these early practices may have lead to complete year class failures for some runs. In 1902 the rack was again installed on 3 July. Bluebacks [sockeye salmon] were believed to pass this point between "June 20th and July 20th." The enclosure was full on September 1st and 2,655 female sockeye salmon were spawned from 13 October through 31 October [5 million eggs out-planted] (State of Oregon 1903). In 1905 the experimental station was moved "thirty or forty miles" farther upstream into the Wallowa River. The Wallowa River was racked on 27 June and the Chinook run consisted of "3 males, and more, to 1 female" [2,157 males to 690 female Chinook salmon]. No sockeye were seen in 1905, and the few coho that were captured were released due to the cold weather (State of Oregon 1904).

Adult Chinook were also counted in 1963 on the Lostine River after the municipal water-supply dam was laddered for better fish passage. Fish passage over the structure was monitored daily from 1 June through 31 July. Daily observations ranged between one and 16 hours. Three hundred and twelve adult Chinook and 194 jacks were counted (Collins 1963). The migration peaked between July 8th and the 14th.

Today, populations of sockeye, coho, and fall Chinook have been functionally extirpated from the Grande Ronde River Basin, while populations of spring/summer Chinook salmon and

summer steelhead have been listed as threatened under the Endangered Species Act. Losses are primarily attributed to juvenile and adult passage mortality at eight mainstem Snake and Columbia River dams (ODFW 1990), over fishing in the late 1800's and early 1900's, misguided hatchery programs, and land-use activities within the Grande Ronde and Imnaha river basins (James 1984). Historically, spring Chinook salmon were distributed among 21 streams, yet today most production is limited to only six streams including: the mainstem Grande Ronde River, Catherine Creek, Lookingglass Creek, the Minam River, the Lostine River and the Wenaha River (ODFW 1990).

INTRODUCTION

A variety of methods have been used to estimate the number of spring/summer Chinook salmon returning to spawn in Northeast Oregon streams. However, little quantitative information has been available to fisheries biologists and studies to quantify total annual escapement have not been conducted. Techniques used to estimate spawning escapement were often not documented (Van Cleave and Ting 1960, Oregon Fish Commission, unpublished data; Smith 1975). While other estimates have formed the basis for compensating losses due to the construction of the lower Snake River dams and setting subbasin supplementation goals, the accuracy of these estimates is unknown (USACE 1975, Carmichael and Boyce 1987, ODFW 1990). As populations continue to decline, accurate historic and current escapement estimates are needed to set management goals for conservation, recovery, supplementation, harvest, and to monitor population health.

Spawning populations of spring/summer Chinook salmon have been monitored in Northeast Oregon streams since 1948 by visually counting redds. The Oregon Fish Commission established early surveys and in 1961 the Oregon Game Commission also began surveys. The two agencies were merged into the Oregon Department of Fish and Wildlife in 1975. In the past, time and budget limitations prevented fishery biologists from surveying entire streams. Redd counts, therefore, were limited to only a portion of the available spawning habitat on each stream termed the "index" area. The index area was chosen as the area most likely to provide a good sample (represent majority of spawning) of spawning escapement for a given stream.

While index redd counts have provided information on trends for long-term population monitoring, they are not quantitative estimates of spawning escapement. Index surveys may represent a different proportion of the actual number of redds in every stream. Index surveys are also conducted only once annually. Variability in survey dates and spawn timing among years may, therefore, result in index redd counts that representing different proportions of the actual number of redds constructed each year. Spatial and temporal patterns in spawning can also complicate index redd count comparisons among years and streams. Peak spawning in upper spawning areas may occur earlier than peak spawning in lower spawning areas. In the past, redds-per-mile was often used to make comparisons among years when different reaches have been surveyed or to expand redd counts to unsurveyed areas. This method assumes spawning is random or is equally distributed, when in fact spawning may be aggregated within certain stream reaches.

We began comprehensive spring Chinook spawning ground surveys in 1986 because of the need for better escapement information for the Pacific Salmon Treaty. These surveys were funded in part by the Lower Snake River Compensation Plan (LSRCP) and Pacific Salmon Commission funds (Carmichael et al. 1987). To better understand the relationship between index surveys and total redds, comprehensive surveys covered most of the available spawning habitat on the same day as the index survey count. Stream reaches surveyed outside of the index area were termed "extensive." Extensive and index surveys were also "supplemented" by repeating some survey sections a second and third time approximately one week apart. The general trend since 1986 has been to expand the area surveyed.

Prior to this report, spring/summer Chinook salmon redd counts from the Grande Ronde and Imnaha river basins were reported annually by a variety of groups within the state. When among year summary tables were constructed they often did not address spatial and temporal inconsistencies in surveys. In this report we have attempted to deal with these issues by providing a comprehensive compilation of the redd count data. We have compiled consistent redd count time series from 1948 through 2003 by survey unit. In addition, we have included descriptions of spawning streams and survey unit access as well as a historical review of survey objectives and methods.

METHODS

Spawning Streams

Spawning streams in the Grande Ronde River basin have been subdivided for purposes of this report into three subbasins: the upper Grande Ronde River, the lower Grande Ronde River, and the Wallowa River (Figure 1). Spawning streams of the upper Grande Ronde River subbasin include the upper mainstem Grande Ronde River, North Fork Catherine Creek, South Fork Catherine Creek, Catherine Creek, Lookingglass Creek, Indian Creek, and Sheep Creek. Incidental information suggests that fish may have historically spawned in Meadow, McCoy, Fly, Clear, Beaver, Dark Canyon, and Limber Jim creeks. Spawning streams of the lower Grande Ronde River subbasin include the North Fork Wenaha River, South Fork Wenaha River, mainstem Wenaha River, and Milk, Butte, and Crooked creeks. Spawning streams of the Wallowa River subbasin include the mainstem Wallowa River, Bear Creek, Hurricane Creek, the Lostine River, the Minam River, Little Minam River, Prairie Creek, and Spring Creek. Spawning streams of the Imnaha River Basin include the mainstem Imnaha River, Big Sheep Creek, and Lick Creek. While access directions are provided in this report, access to private property is subject to landowner cooperation and permission must be obtained before entering private lands.

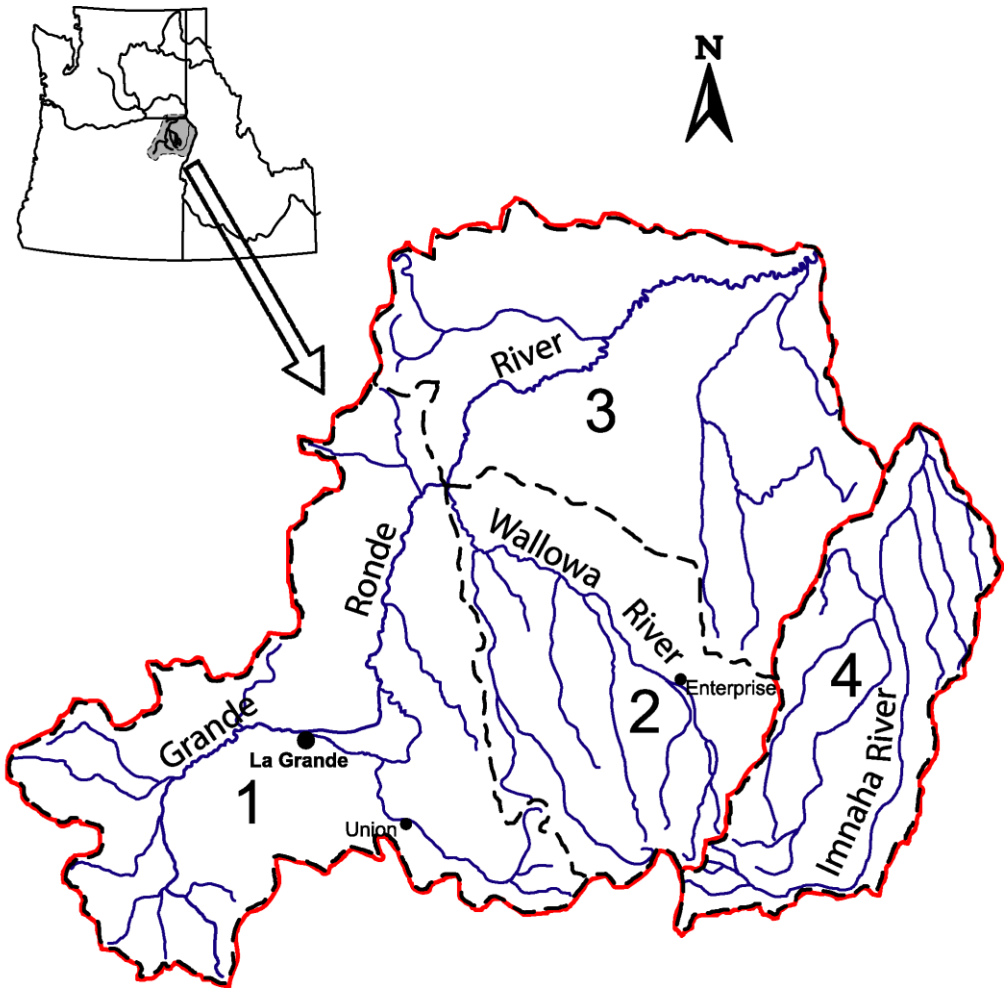

Figure 1. Map of the Grande Ronde River and Imnaha River basins. Subbasins are (1) Upper Grande Ronde River, (2) Wallowa River, (3) Lower Grande Ronde River, and (4) Imnaha River.

Stream Descriptions and Survey Unit Access

Grande Ronde River Basin

Upper Grande Ronde River Subbasin:

Mainstem Grande Ronde River: The Grande Ronde River drains the east slope of the Blue Mountains and the west slope of the Wallowa Mountains. The river flows approximately 212 miles from the headwaters to its confluence with the Snake River at river mile 169 near Rogersburg, Washington. The Grande Ronde River has a long and diverse land-use history. Splash dams were constructed by the timber industry from the late 1800's to 1919 to drive logs on the mainstem Grande Ronde River at Vey Meadows and Perry, and on smaller tributaries such as Dark Canyon, Meadow, and Fly creeks (McIntosh 1992). W. M. Chapman was told in the fall of 1940, that a dam four miles above La Grande, ten or twelve feet high, was partially removed in the early 1920's and has since been completely removed (W.M. Chapman, 1940, unpublished manuscript, available from ODFW La Grande Fish Research and Development office). A ditch (known as the State Ditch) was constructed in the late 1800's to control flooding in the Grande Ronde Valley and reduced the stream length by as much as 33 miles.

There are two index survey units on the upper mainstem Grande Ronde River that total 8 miles. Unit I begins at the end of the National Forest (NF) Road 5138, near the location of the old Three Penny Claim mine site. The unit I survey ends 3 miles downstream at the National Forest boundary. Unit II begins at the National Forest boundary and ends 5 miles downstream below Vey Meadows at the NF Road 5125 bridge. The one extensive survey unit on the upper mainstem Grande Ronde River begins below Vey Meadows at the NF Road 5125 bridge and ends 12.5 miles downstream at the NF Road 51 bridge at Starkey. Survey unit maps are presented in **Appendix Figures F-1 – F-4**.

Access to the upper mainstem Grande Ronde River from La Grande is via Interstate Highway 84 west to State Highway 244 (Hilgard exit). Follow State Highway 244 approximately 12 miles to NF Road 51. Follow NF Road 51 another 12 miles to NF Road 5125. Follow the river on NF Road 5125 to the end of primitive road 5138, approximately 6 miles (near the old Three Penny Claim mine site).

Catherine Creek: Catherine Creek is a large tributary of the Grande Ronde River draining the western slope of the Wallowa Mountains from Little Catherine Creek, and the North, Middle and South Forks. Mainstem Catherine Creek flows approximately 33 miles to its confluence with the old Grande Ronde River channel at river mile 144 near the town of Cove and then joins the Grande Ronde River at the downstream end of the State Ditch at river mile 117.

There are five index survey units and two extensive survey units on Catherine Creek that total 18.7 miles. Index survey units of Catherine Creek include 3 miles on the North Fork, 1.5 miles on the South Fork, and 7.5 miles on the mainstem. Unit I begins on the North Fork at the North Fork Catherine Creek Campground and ends 3 miles downstream where the North and South forks meet. Unit III begins on South Fork Catherine Creek 1.5 miles upstream from the

mouth and ends downstream were the North and South forks meet. Mainstem Catherine Creek is divided into three index units (units IV, V, and VI). Unit IV, begins at the confluence of the North and South forks and ends 2.5 miles downstream at the NF 7735 road bridge. Unit V begins at the 7735-road bridge and ends 2 miles downstream at the State Highway 203 bridge. The Highway 203 bridge is located just upstream of the Catherine Creek State Park. Unit VI begins at the Highway 203 bridge and ends 3 miles downstream at Badger Flat Road. Units II and VII are extensive surveys. Extensive unit II begins on the South Fork 1.1 miles above the index section near the mouth of Bottle Creek. Extensive unit VII begins on the mainstem at the Badger Flat Road Bridge and ends 6.4 miles downstream at the second bridge in the town of Union. Survey unit maps are presented in **Appendix Figures F-5 – F-10**.

Access to Catherine Creek from the town of Union is via Highway 203 southeast. Make a left turn onto NF Road 7785 and cross Merry-Go-Round Bridge (NF Road 7785 bridge). NF Road 7785 proceeds up the North Fork to the North Fork Campground and NF Road 600 proceeds up the South Fork. All survey units can be accessed from these roads.

Lookingglass Creek: Lookingglass Creek originates from Langdon Lake near Tollgate and drains the west slope of the Blue Mountains between the North Fork Umatilla Wilderness and the Wenaha-Tucannon Wilderness. Lookingglass Creek flows 16 miles from its source at Langdon Lake to its confluence with the Grande Ronde River at river mile 85, approximately 4 miles above the confluence of the Wallowa River. The principal water source during late summer months comes from cool springs on Summer Creek. In 1958 a by-pass channel was blasted through bedrock around a six foot falls located approximately 2.5 miles above the mouth that was believed to be restricting access to spawning areas. Spawning also occurs in the lower 4 miles of Little Lookingglass Creek which enters Lookingglass Creek approximately 6 miles below the mouth of Summer Creek. The only spring Chinook salmon hatchery in the Grande Ronde and Imnaha River basins is located on Lookingglass Creek. The hatchery weir, which has been operated each year since 1982, has limited passage above the hatchery.

There is one index survey unit (unit I) on Lookingglass Creek, which begins at Summer Creek and ends 6.2 miles downstream at Little Lookingglass Creek. There are two extensive survey units on Lookingglass Creek, and one extensive survey unit on Little Lookingglass Creek. Extensive survey unit II begins at the mouth of Little Lookingglass Creek and ends 1.6 miles downstream at the intake for Lookingglass Hatchery. Extensive survey unit III begins at the intake for Lookingglass Hatchery and ends 2.8 miles downstream at the mouth of Lookingglass Creek. Extensive survey unit IV is on Little Lookingglass and begins approximately 3 miles above the mouth of Little Lookingglass Creek and ends at the mouth of the creek. Survey unit maps are presented in **Appendix Figures F-11 – F-13**. Access to Lookingglass Creek from the town of Elgin is via county route 42 north. Follow 42 north to Palmer Junction at the mouth of Lookingglass Creek and the turn off for Lookingglass Hatchery (alternate county route 140). To reach the mouth of Summer Creek make a left turn at NF Road 63 and follow it to NF Road 6306. Follow NF Road 6306 to Luger Springs and make a left turn at NF Road 061. Follow NF Road 061 to trailhead 80.

Indian Creek: Indian Creek drains the northwest slopes of the Wallowa Mountains and enters the upper Grande Ronde River at river mile 101.5, 2 miles south of Elgin. Indian Creek flows approximately 15 miles through a canyon from the headwaters and then 5 miles through a cultivated valley.

Recently, a private landowner has denied access to the survey area on Indian Creek. As a result, no surveys have been conducted on Indian Creek since 1994. There is one survey unit on Indian Creek that begins at the mouth of Little Indian Creek and continues downstream for 3 miles. Survey unit maps are presented in **Appendix Figures F-14** and **F-15**. Access to Indian Creek from Elgin is via State Highway 82 south 2 miles to Indian Creek Road. Follow Indian Creek Road approximately 4.5 miles and then stay to the right where the road splits to follow Indian Creek, and then continue another 5.5 miles to the confluence of Indian Creek and Little Indian Creek.

Sheep Creek: Sheep Creek is approximately 15 miles long and enters the upper Grande Ronde River at river mile 197, approximately 35 miles above the city of La Grande. There is one index survey unit and one extensive survey unit on Sheep Creek that together total 10.8 miles. Extensive survey unit I, begins at the forks and ends 4.5 miles downstream at the NF Road 5160 culvert. Index survey unit II, begins at the NF Road 5160 culvert and ends 6.3 miles downstream at the mouth. Survey unit maps are presented in **Appendix Figures F-16** and **F-17**.

Recently, access to lower Sheep Creek below the NF Road 5160 been denied by a private landowner and Sheep Creek was identified as a lower priority when surveys were expanded. As a result, no surveys have been conducted on Sheep Creek since 1995. Access to Sheep Creek from La Grande is via interstate 84 west to State Highway 244 (Hilgard exit). Follow State Highway 244 approximately 12 miles to NF Road 51 to Starkey. Follow NF Road 51 another 14.5 miles to NF Road 5160. Make a right turn onto NF Road 5160 and travel approximately 3 miles to NF Road 5182 (Sheep Creek road). Turn left on NF Road 5182 and travel approximately 2.5 miles to the intersection of NF Road 5182 and NF Road 500.

Wallowa River Subbasin:

Mainstem Wallowa River: The Wallowa River originates from the north slope of the Wallowa Mountains in the Eagle Cap Wilderness and joins the Grande Ronde River near Rondowa at river mile 82. The West Fork Wallowa River originates from multiple cirque lakes ranging in elevation from 7,127 to 8,328 feet. The East Fork originates from Aneroid Lake at 7,500 feet. Shortly below the forks the river is impounded by lateral and terminal glacial moraines forming Wallowa Lake (4,372 feet). From Wallowa Lake the river flows approximately 30 miles through the Wallowa Valley and 20 miles through a large canyon before its confluence with the Grande Ronde River at river mile 82. The Wallowa Valley is extensively irrigated for livestock and crop production. The use of Wallowa Lake as a water storage reservoir began in the 1880's with the construction of log dams. The current concrete dam was constructed in 1916 and raised to 40 feet in 1928. Additional water for irrigation is brought into the Wallowa Valley from Imnaha River basin via the Sheep Creek inter-basin canal. Spawning streams for spring Chinook salmon in the Wallowa subbasin include the upper mainstem

Wallowa River, Bear Creek, Hurricane Creek, the Lostine River, the Minam River, Prairie Creek, and Spring Creek.

There are two index survey units on the mainstem Wallowa River that total 4.5 miles. Survey unit maps are presented in **Appendix Figures F-18 – F-20**. Unit I begins at the McClarren Lane bridge and ends 1.5 miles downstream at the Eggelson Road bridge. Unit II begins at the Eggelson Road bridge and ends 3 miles downstream at the Wallowa Hatchery intake. Access to the Wallowa River from the town of Enterprise is via the Wallowa Lake Highway (Highway 82) south. Make a right turn on McClarren Lane (Dorrance Road) to the first of two bridges over the Wallowa River. Unit one begins at these two bridges. The Wallowa River forms multiple braided channels throughout both survey units.

Bear Creek: Bear Creek originates from Bear Lake (7,905 ft.) in the Eagle Cap Wilderness and flows northerly approximately 24 miles to its confluence with the Wallowa River at river mile 23, near the town of Wallowa. Approximately 75% of the creek is located within the Wilderness and National Forest boundaries.

There are three index survey units and one extensive survey unit on Bear Creek that total 8.5 miles. Extensive survey unit I begins 2 miles above the Guard Station and ends at the Guard Station. Index unit II begins at the Guard Station and ends 2.3 miles downstream at Baker Gulch. Index unit III begins at Baker Gulch and ends 1.7 miles downstream at the NF Boundary Campground. Unit IV begins at Boundary Campground and ends 2.5 miles downstream where the 8250 road crosses Bear Creek below the mouth of Little Bear Creek. Survey unit maps are presented in **Appendix Figures F-21 – F-24**.

Access to Bear Creek from the town of Wallowa is via Bear Creek Road. Follow the Bear Creek Road south to Boundary Campground. Make a right turn at the fork in the road onto NF Road 040. Boundary Campground is located at the terminus of NF Road 040. From Boundary Campground the beginning of units I and II are accessed by NF Trail 1653.

Hurricane Creek: Hurricane Creek originates in the Eagle Cap Wilderness and flows approximately 18 miles to its confluence with the Wallowa River at river mile 40 near the town of Enterprise. Spawning is limited to the Wallowa Valley due to the presence of numerous falls and high gradient within the Wilderness boundary.

There are two index survey units on Hurricane Creek that total 3. 5 miles. Unit I begins at Dorrance Road Bridge and ends 1.25 miles downstream at the Eggelson Road Bridge. Unit II begins at Eggelson Road Bridge and ends 2.25 miles downstream at the mouth of Hurricane Creek. Survey unit maps are presented in **Appendix Figures F-25** and **F-26**.

Access to Hurricane Creek from the town of Enterprise is via Hurricane Creek Road south. Make a left turn on Eggleson Lane. The first bridge on Eggleson Lane is the beginning of index survey unit II. To reach the beginning of index survey unit I continue south on Hurricane

Creek Road and make a left turn on Dorrance Lane. The first bridge on Dorrance Lane is the beginning of index survey unit I.

Lostine River: The mainstem Lostine River originates from Minam Lake (7,373 ft.) and the East Fork originates from Upper Lake (7,670 ft.) in the Eagle Cap Wilderness. From the forks the Lostine River flows approximately 25 miles to its confluence with the Wallowa River at river mile 26 between the towns of Wallowa and Lostine. Approximately half of the Lostine River is within the wilderness boundary with the remaining half flowing through private and agricultural lands. The Cross Country Canal diverts water from the Wallowa River and delivers it to the Lostine River just upstream from the Highway 82 bridge. The Clearwater Ditch then diverts water from the Lostine River below the Highway 82 bridge west.

There is one index survey unit on the Lostine River (Unit IV), which begins at the "Six-mile" bridge (first bridge on Lostine River Road) and ends 3 miles downstream at the Lostine River Ranch (formerly known as the O. C. Ranch) bridge. There are seven extensive units on the Lostine River that cover 21 miles above and below the index unit. Unit I begins at the confluence of the East Fork and the main channel of the Lostine River, and ends 3 miles downstream at Lapover Meadows. Unit II begins at Lapover Meadows and ends 5 miles downstream at Williamson Campground. Unit III begins at Lostine River falls or the Pole Bridge Picnic Area during high water, and ends 2 miles downstream at "Six-mile bridge." Unit V begins at the Lostine River Ranch Bridge and ends 1.6 miles downstream at the Westside Ditch. Unit VI begins at Westside Ditch and ends 4 miles downstream at the Wallowa River Road, Highway 82. Unit VII begins at State Highway 82 and ends 2.7 miles downstream at the McLain Ranch. Unit VIII begins at the McLain Ranch and ends 2.7 miles downstream at the mouth. Survey unit maps are presented in **Appendix Figures F-27 – F-33**.

Access to the upper survey units on the Lostine River from the town of Lostine is via the Lostine River Road. The Lostine River falls are reached from the top of the S-turn in the road above the Pole Bridge Picnic area. Downstream units on the Lostine River can be accessed from the Wallowa River road (State Highway 82).

Minam River: The Minam River originates from Minam Lake (7,373 feet) and Blue Lake (7,703 feet) in the Eagle Cap Wilderness and flows approximately 50 miles to its confluence with the Wallowa River at river mile 10 near Minam State Park. Major tributaries include the Little Minam River and the North Minam River. Nearly the entire watershed (all but the lower 8.5 miles) is within the wilderness boundary today. Early logging activities, however, relied on a splash dam in the upper river to move timber to market.

There are eight index survey units on the Minam River that total 9.8 miles. Survey units on the upper Minam River are intermittent with large areas of unsurveyed river. For the most part survey boundaries generally start and stop with the suitable spawning gravel. Upper Minam index survey units include: (I) Elk Creek survey (Mouth of Elk Creek to NF Trail 1944 bridge), 1 mile; (II) Camp One survey (NF Trail 1944 bridge to end of suitable spawning gravel), 0.5 mile; (III) Rock Creek survey (suitable spawning gravel to NF Trail 1905), 0.5 miles; (IV) Little Pot

survey (NF Trail 1919 down around horseshoe bend, ending near the tributary on left, above the mouth of Threemile Creek), 0.5 miles; (V) Splash Dam Survey (old Splash dam up to end of suitable spawning gravel), 1 mile. Survey units on the lower Minam River are continuous. Unit VI begins at Salmon Hole and continues downstream 1.4 miles to the bridge at Red's Horse Ranch. Unit VII begins at Red's Horse Ranch bridge and continues downstream 3.4 miles to the bluff (above the mouth of the Little Minam River). From 1954-1983 units VI and VII were conducted as one survey that started at Salmon Hole and ended at the mouth of Little Minam River (6.5 miles). Unit VIII is on the Little Minam River and begins at the falls and continues downstream 1.5 miles to end 0.25 mile below Big Canyon Creek. Survey unit maps are presented in **Appendix Figures F-35 – F-42**.

Index surveys on the Minam River are usually conducted over a two to three day period. Typically, upper Minam River index survey units I-III are accessed by horseback by NF Trail 1905 or 1944. During supplemental surveys, upper units I-III are accessed by foot over Burger Pass. Access to the upper Minam River units I-III is from the town of Union via Highway 203 southeast. Make a left turn on NF Road 7785 and proceed up the North Fork of Catherine Creek. Take a right on NF Road 7787 and follow Buck Creek up to the Buck Creek trailhead (No. 150). Take NF Trail 1944 over Burger Pass 11.5 miles to a NF bridge over the Minam River just below Elk Creek. All three upper Minam index units can be accessed from NF Trail 1673, which follows the river. It is a 4.3 mile hike downstream to Rock Creek.

Supplemental surveys on the Minam River (Little Pot, Splash Dam, Salmon Hole to Red's Horse Ranch bridge, and Red's Horse Ranch bridge to bluff) are usually accessed by chartering flights from La Grande to Red's Horse Ranch. From Red's Horse Ranch Bridge hiking up NF Trail 1673 accesses the Little Pot and Splash Dam surveys.

Prairie Creek: Prairie Creek originates from several small springs on the north slope of Mt. Howard and flows approximately 18 miles through the Wallowa Valley to its confluence with the upper Wallowa River at river mile 40 in the town of Enterprise. The extent to which spring Chinook salmon utilize Prairie Creek is relatively unknown due to the nearly constant high turbidity of the stream. Limited survey data and early accounts, however, indicate that spring Chinook salmon have utilized the creek.

There are two survey units on Prairie Creek that total two miles (Anderson 1977). These are the same survey units that were historically used for coho salmon. The Hayes Fork is a small spring fed tributary of Prairie Creek. The survey begins at the mouth of the Hayes Fork just below the road culvert and proceeds upstream. Above the county road culvert the Hayes Fork splits into two forks, both of which are surveyed upstream for a distance of approximately 0.3 miles to the marsh. The Pratt Fork of Prairie Creek enters the mainstem from the east, 0.75 miles north of where Hayes Fork enters Prairie Creek. This is just south of the Swamp Creek junction and the old Pratt School House which is now used as a home. The Pratt Fork is surveyed upstream from the mouth to the McFetridge Road crossing, approximately 1 mile. Survey unit maps are presented in **Appendix Figure F-43**.

Access to the Hayes Fork is via Highway 82, 3 miles out of Enterprise heading towards Joseph. Make a left turn onto Zumwalt-Crow turnoff. The Hayes Fork is the first small tributary that goes under the road via a culvert within 0.25 miles of Highway 82. Access to the Pratt Fork is to park along the county road and hike across a pasture and wade across Prairie Creek to begin the survey.

Spring Creek: Spring Creek originates from several springs in the Wallowa Valley and the east slope of Ruby Peak in the Eagle Cap Wilderness. Spring Creek meets the Wallowa River at river mile 39 below the town of Enterprise and is one of many water sources for the Wallowa Fish Hatchery. Surveys were conducted in Spring Creek in 1955, and 1964 through 1978. Survey unit maps are presented in **Appendix Figures F-44 – F-46**.

Lower Grande Ronde River Subbasin:

Wenaha River: The Wenaha River originates in the Wenaha-Tucannon Wilderness and flows 22 miles from the forks to its confluence with Grande Ronde River at river mile 45 near the town of Troy. Principle spawning streams within the basin include the North Fork Wenaha River, South Fork Wenaha River, Butte Creek and the mainstem Wenaha River. The Wenaha River has remained relatively unaffected by man's activities as most of the basin resides within the wilderness area. Early attempts in 1901 and 1902 to trap returning adults for an experimental fish culture station on the Wenaha River were largely unsuccessful and are believed to have had little to no affect on spawning populations in the Wenaha River (State of Oregon 1903, 1904).

The index survey unit on the Wenaha River begins at the mouth of Milk Creek on the South Fork and ends 6 miles downstream at the forks (unit III). There are six extensive survey units that cover 21.5 miles. The North Fork survey begins at the State Line and ends at the forks (Unit I). It is difficult to assess where exactly the State Line is because there is no geographic landmark marking it's location. As a result this survey may have varied in length between 3 to 5.5 miles among years with different surveyors. Unit II extends from 0.3 miles up Milk Creek to its confluence with the Wenaha River. Unit VII extends from 1.5 miles up Butte Creek to its confluence with the Wenaha River. Unit IV begins at the forks and ends 5.5 miles downstream at the mouth of Rock Creek. Unit V begins at mouth of Rock Creek and ends 2.8 miles downstream at the mouth of Butte Creek. Unit VI begins at the mouth of Butte Creek and ends 8.4 miles downstream at the mouth of Crooked Creek. Survey unit maps are presented in **Appendix Figures F-47 – F-52**.

Index and extensive surveys are usually conducted over a three to four day period. Pack animals and horses are used to set up camp along the river and facilitate travel to and from surveys. Supplemental surveys are usually conducted in a single day by accessing the river from NF trails at Timothy Springs, Elk Flat, Cross Canyon and Hoodoo Spring. Access to the Wenaha River from the town of Elgin is via county route 42 north to county route 140. Follow NF Road 63 to NF Road 62. Timothy Springs is reached via NF Road 6236 to 6413 or 6413 to 6415 to trail head 92, NF Trail 3106. Elk Flat is reached via NF Road 290 to trail head 74, NF Trail 3241. Cross Canyon is reached via NF Road 6217 to trail head 72, NF Trail 3242. Hoodoo Spring is reached via NF Road 6214, NF Trail 3244.

Imnaha River Basin

Imnaha River: The Imnaha River originates in alpine meadows of the Eagle Cap Wilderness and flows approximately 72 miles from the forks to its confluence with the Snake River at river mile 192. The basin drains a 950 square mile area between the Wallowa River Subbasin and Hells Canyon of the Snake River. Nearly the entire basin falls within the Wilderness and/or Hells Canyon National Recreation Area boundaries. Major spawning streams for spring Chinook salmon within the Basin include South Fork Imnaha River, upper mainstem Imnaha River, Big Sheep Creek, and Lick Creek. Spawning occurs in the South Fork of the Imnaha River from Bear Creek to the forks and in the mainstem from the forks to Grouse Creek.

There are two index survey units on the Imnaha River that total 9.7 miles. Unit III begins at Blue Hole and ends 2 miles downstream at the Indian Crossing Campground. Unit IV begins at Indian Crossing Campground and ends 7.7 miles downstream at Mac's Mine. There are six extensive sections on the Imnaha River that total 6.7 miles above and 18 miles below the index units. Unit I, located on the South Fork of the Imnaha River, begins at Bear Creek and ends 2.7 miles downstream at the forks of the Imnaha River. Unit II begins at the forks and ends 4 miles downstream at Blue Hole. Unit V begins at Mac's Mine and ends 5 miles downstream at the Imnaha Fish Weir. Unit VI begins at the weir and ends 4 miles downstream at Crazyman Creek. Unit VII begins at Crazyman Creek and ends 8 miles downstream at Grouse Creek. Unit VIII begins at Grouse Creek and ends 6 miles downstream at Freezeout Creek. Survey unit maps are presented in **Appendix Figures F-57 – F-62**.

Access to the Imnaha River from the town of Joseph is via State Highway 350 east. Make a right turn onto the Wallowa Mountain Loop Road (NF Road 39) and proceed south. When NF Road 39 reaches the Imnaha River, turn left on to NF Road 3955 and travel downstream to the Imnaha Fish Weir and points downstream, or continue upstream on NF Road 39. Access Blue Hole by turning right on NF Road 3960 and proceed upstream to Indian Crossing Campground at the end of NF Road 3960. A marked trail leads from the Indian Crossing Campground to Blue Hole. The remaining mainstem survey units can be accessed from NF Road 3960.

Big Sheep Creek: Big Sheep Creek originates near the headwaters of the Imnaha River in the Eagle Cap Wilderness and flows approximately 40 miles to its confluence with the Imnaha River at river mile 20 at the town of Imnaha. Big Sheep Creek drains approximately 300 square miles composed of Wilderness, National Forest and private land holdings. Spawning occurs in Lick Creek and from 0.25 miles above Lick Creek downstream to Muley Creek. Hatchery adults collected at the Imnaha Weir have been released into Big Sheep Creek in recent years.

There is one index survey unit on Big Sheep Creek that begins at the NF Road 140 bridge and ends 4 miles downstream at the mouth of Echo Canyon (unit I). There is one extensive survey unit that begins at Echo Canyon and ends 9 miles downstream at Coyote Creek (unit II). Survey unit maps are presented in **Appendix Figures F-63 – F-66**.

Access to Big Sheep Creek from the town of Joseph is via State Highway 350 east. Make a right turn onto the Wallowa Mountain Loop Road (NF Road 39) and proceed south 12.5 miles to NF Road 140. Unit I begins at the NF 140 Bridge.

Lick Creek: Lick Creek, a tributary of Big Sheep Creek, originates in the Eagle Cap Wilderness and flows approximately 11 miles to its confluence with Big Sheep Creek at river mile 33. Hatchery adults collected at the Imnaha Weir have been released into Lick Creek in recent years.

There is one 4 mile index survey unit on Lick Creek that extends from the Wallowa Mountain Loop road crossing at Lick Creek Campground to the mouth. Survey unit maps are presented in **Appendix Figures F-67 – F-68**. Access to Lick Creek from the town of Joseph is via State Highway 350 east. Make a turn onto the Wallowa Mountain Loop Road (NF Road 39) and proceed south 11 miles to the Lick Creek Campground

REVIEW OF HISTORICAL OBJECTIVES AND METHODS

Data used in this report were obtained from a variety of sources and in many ways the data collected reflects the changing objectives of surveys during different time periods. Unfortunately, due to the number of sources within the state that reported annual redd counts, discrepancies and inconsistencies among data sources do exist. The primary objective of this report was to alleviate some of these complications and provide a single document with consistent time series data for spring Chinook salmon spawning surveys in Northeast Oregon from 1948 through 2003. Our focus has been to determine where surveys started and ended, what date the surveys were conducted, and categorize the data accordingly. The term "index" has been widely used and misused in the past to describe a consistent survey area. Previous tables often describe redd counts as index surveys that may include one survey section (or unit) for a number of years and two survey sections for other years.

We used a hierarchical list of references, choosing raw data first when it could be located, including survey data cards, field notes, files, and/or inter-department memos. Secondary data sources included Annual Northeast Oregon Spring Chinook Spawning Ground Survey Reports, Annual La Grande and Wallowa Fish District Reports, and Thompson and Haas (1960).

The tables presented in this report provide a reference for each row of data. We could not report all of the data in our tables. Only the most consistent time series are reported and referenced. Individual survey sections have been separated by columns to make inconsistencies among years stand out. When surveys have started and ended in different locations among years they have been combined into the smallest survey unit that can be reported consistently for the longest period of time.

In 1975, Wayne Burck produced a "Manual of Operations for Conducting Spawning Ground Surveys for Spring Chinook Salmon in Northeastern Oregon." Wayne provided the following text in his report:

> To a great extent unit boundary descriptions and access directions have, like Indian legend, been handed down from generation to generation of surveyor by word of mouth with the result that details have become hazy and certain directions vague. Some boundaries have been inadequately described or are difficult to find. Consequently, surveys have not always originated or terminated at the intended location or even at the location indicated in the notes and reports.

These and other cautions should be carefully noted when using this data. Often unit boundary descriptions, dates, distances, and survey methods were not provided in references. Every attempt has been made throughout this report to reconstruct a consistent redd count time series. Any data that is believed to have been collected in an inconsistent manner has either been noted as such, or has been excluded from appendices. Table 1 lists data sources and abbreviations used in spawning ground survey tables.

Table 1. Survey reference abbreviations. References for data sources are listed in **REFERENCES**.

Years	Abbreviation	Data source	Data location
1987-1996	Cards	Survey cards, Fish Research and Development	La Grande
1955-1956	Files	Survey files, Fish Commission of Oregon	Clackamas
1948-1975	EOS	Northeast Oregon Spring Chinook Salmon Spawning Ground Survey Reports	Clackamas
1960-1986	LD	La Grande, Fisheries District Annual Reports	La Grande
1964-1989	WD	Wallowa, Fisheries District Annual Reports	Enterprise
Prior to 1960	ESR	Environmental Survey Report Pertaining to Salmon and Steelhead in Certain Rivers of Eastern Oregon and the Willamette River and its Tributaries	Clackamas
1997-2003	Tables	Survey tables, Fish Research and Development	La Grande
1983-1986	MO	La Grande, Fisheries District Monthly Report	La Grande

From 1948 to 1975, Northeast Oregon spring/summer Chinook salmon spawning ground surveys were reported in Annual Columbia River Information Reports. Oregon Fish Commission biologists working from the Clackamas office conducted these surveys. Oregon Game Commission biologists also conducted surveys in Northeast Oregon until the two agencies were merged in 1975. Overall, early survey objectives were to identify spawning streams, locate spawning areas, and determine spawn timing in the Grande Ronde and Imnaha river basins. Generally, surveys were conducted annually on one or more stream sections.

This general methodology varied in some years to accomplish more specific objectives. In 1955 and 1956, five to six multiple surveys were conducted six days apart on each major spawning stream in Northeast Oregon. The primary objective of these repetitive surveys was a Snake River mark-recapture estimate from carcass recoveries. These surveys, however, also provided information about spawn timing, abundance, carcass disappearance rates, observer variation, and migration timing. Two biologists surveyed each stream, one per section, and a third surveyor was present on the fifth survey. Redds were not flagged. Salmon carcasses were counted and fin clips used to mark counted carcasses. Sex of carcasses was not determined until the third survey to prevent accelerated carcass decomposition and movement caused by making a ventral incision in the body cavity. At the time of this report only an incomplete draft report is known to exist from this period. Original data records, however, were obtained for 1955 and 1956 (see **Appendix E).**

In 1958, surveys were limited to only four streams (Imnaha River, Minam River, Catherine Creek, and Lookingglass Creek) in Northeast Oregon to increase scale samples from carcass recoveries. Scales samples were collected for a "racial analysis" of spring and summer run Chinook salmon within the Columbia River Basin.

Survey objectives did not include general trends in population abundance until 1960 when the major spawning streams, areas, and timing had been identified. By this time surveys were somewhat standardized and were referred to as "index surveys" because they provided a general index of escapement. Secondary objectives were to 1) measure and sex all carcasses and obtain scale samples from at least 20% of these, 2) assess Native American fishing activity on spawning grounds, and 3) recover tags from carcasses.

In 1961 La Grande Fish District biologists began reporting spring Chinook salmon spawning ground surveys in Annual Fish District Reports and continued to do so until 1983. In July of 1964, the Wallowa Fish District was created and began reporting all spawning ground surveys conducted in the Wallowa District. The newly created Wallowa District encompassed Bear Creek, Hurricane Creek, the Lostine River, Prairie Creek, the Wallowa River, the Wenaha River, and the Imnaha River Basin.

In 1986, Fish Research and Development in La Grande assumed responsibility for conducting and reporting spawning ground surveys in Northeast Oregon with assistance from the La Grande and Enterprise District biologists, the United States Forest Service, the Nez Perce Tribe, and the Confederated Tribes of the Umatilla Indian Reservation. The primary objectives of spawning ground surveys during this period have been to monitor trends in annual escapement to the Grande Ronde and Imnaha river basins, provide age structure information for run reconstructions, monitor straying, and to assess the use of index surveys as a monitoring tool. Additional surveys, termed "extensive surveys" were added to the index survey in 1986. Extensive surveys are surveys conducted on the same day as the index survey in areas outside of the standard index area. Extensive surveys cover the majority of the known spawning habitat on any given stream. The Wenaha and Minam rivers were the only major exceptions to this. Index and extensive surveys on these two streams generally occurred over multi-day periods due to the length of stream surveyed and access difficulties in wilderness areas. In addition, surveys termed

"supplemental" were added in 1987. Supplemental surveys repeat the index and selected extensive surveys units approximately one and two weeks after the initial index and extensive survey date. Only one supplemental survey is conducted in the Wenaha. Original survey cards were available from 1987 through 2003.

Since 1986, several attempts have been made to standardize survey methodology. Redds are generally counted by two surveyors walking in a downstream direction between 1000 and 1400 hours. Surveyors wear polarized sunglasses and carry a gaff to get at hard to reach carcasses. Redds were tallied or numbered on data cards as either occupied or unoccupied by a fish from 1986 through 1997. Beginning in 1998, live fish were recorded as jack or adult and either on or off digs and redds were recorded as new or flagged. Each redd is marked, dated, and numbered with flagging tape on the first survey. On subsequent surveys both new and flagged redds were recorded. Flagging is removed on the last survey or left in place for subsequent bull trout surveyors. A ventral incision is made in all salmon carcasses for sex determination and tails are removed to mark counted carcasses. While precocious males are often present on redds with adult fish they are not readily observable while conducting surveys and have never been enumerated on survey cards.

In 1998, ODFW conducted a workshop with regional biologists in which "redd identification guidelines" were established. These guidelines were as follows:

> Normally, COMPLETED redds share the following characteristics:
> 1) Thin female Chinook with white-colored tail associated with substrate excavation. If the female is green and tail is dark, then it may be digging but has not yet spawned. Flag as a test dig unless no one will return next week to confirm redd completion.
> 2) Area of excavation is greater than 1 square meter.
> 3) "Algae-free," lighter coloration of excavated substrate compared to surrounding substrate. Differentiate between recent digging and last year's or that of a steelhead in spring.
> 4) Substrate is of appropriate cobble size (usually 1-10 cm), and sorting with larger stones at the head of the pile and smaller stones and fines further downstream towards the tail.
> 5) It would be highly unlikely that the excavation could have been created through some other process (i.e., hydrology, CAT tracks, animals, etc.). Mentally re-enact the process needed to create such a structure - Is a Chinook involved?

Generally, only completed redds should be counted. Incomplete redds, test digs, or redds in progress should be flagged as non-numbered digs and the next surveyor will determine if the dig has been completed or not. On the last survey the surveyor must make a determination whether or not a dig is or will become a completed redd.

RESULTS AND DISCUSSION

Grande Ronde River Basin

Upper Grande Ronde River Subbasin

Spawning streams for spring Chinook salmon in the Upper Grande Ronde River Subbasin include the upper mainstem Grande Ronde River above La Grande, Catherine Creek, North Fork Catherine Creek, South Fork Catherine Creek, Indian Creek, Lookingglass Creek, and Sheep Creek.

Index surveys on the upper mainstem Grande Ronde River were established in 1953 and were conducted through 2003 with the following exceptions. The 1953 survey started at the mouth of Limber Jim Creek. The 1954 survey started at the mouth of Limber Jim Creek and ended at the old Rock Dam (or Splash Dam below Vey Meadows). From 1953 to 1985 the two index survey units were reported as a single unit. From 1960 to 1963 it is unknown where the surveys started and ended. From 1964 to 1968 surveys were inconsistent and variable in length. The survey units totaled 14 miles in length in 1964, 7.5 miles in 1966, 18 miles in 1967, and 21 miles in 1968. No surveys were conducted in 1958. The 1987 survey started at the mouth of the East Fork Grande Ronde River. The 1989 surveys were conducted after severe flooding and supplemental surveys that year were canceled due to the Tanner Creek Fire. From 1986 through 1994 the extensive survey unit began at the NF Road 5125 bridge below Vey Meadows. From 1995 to the present, the extensive survey unit is thought to have started at the splash dam approximately 1/2 a mile downstream of the NF Road 5125 bridge. Access to the second index unit through private property has been restricted and/or denied since 1995.

The peak index survey redd count on the upper mainstem Grande Ronde River occurred in 1969 when 194 redds were counted (Figure 2, **Appendix Table A-1**). The maximum redd count on the upper mainstem Grande Ronde River occurred in 1968 when 304 redds were counted in 21 miles of surveyed stream (**Appendix Table A-1**). Results of redd counts in index, extensive, and supplemental surveys on the upper mainstem Grande Ronde River are presented in **Appendix Tables C-1** and **E-1**.

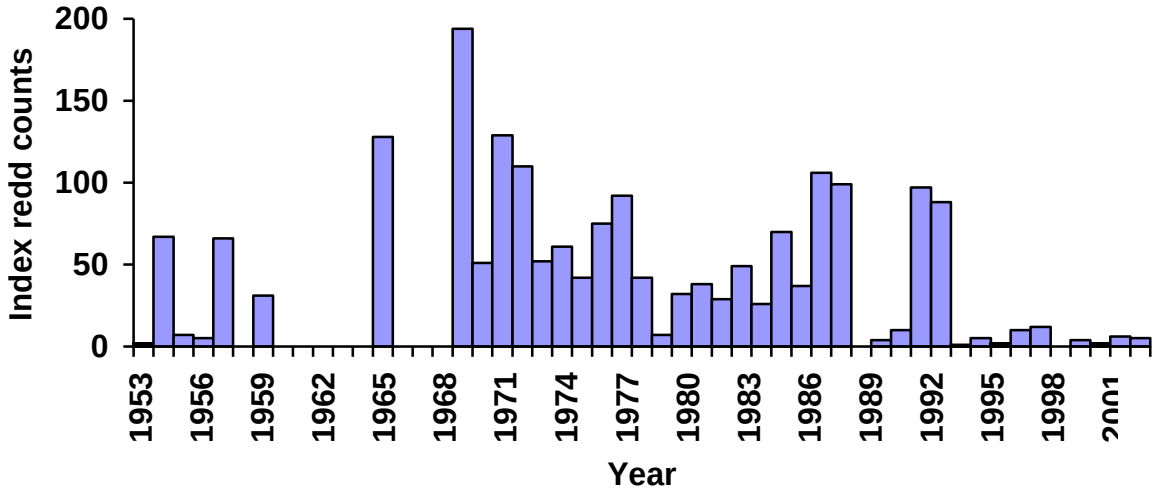

Figure 2. Upper mainstem Grande Ronde River spring Chinook salmon index survey counts from 1953 through 2003. No surveys in 1958; incomplete surveys in 1996 – 2003. Index survey units: I = Three Penny Claim to Forest Service Boundary (3.0 miles), II = Forest Service Boundary to Vey Meadows 5125 Bridge (5.0 miles). Surveys conducted in 1960 – 1963 were of an unknown length; surveys conducted in 1964 covered 14 miles, 7.5 miles in 1966; 18 miles in 1967, and 21 miles in 1968 and are not included in these index survey counts.

Index surveys on Catherine Creek were established in 1948 and were consistently conducted with the following exceptions. North Fork Catherine Creek and South Fork Catherine Creek were most likely not surveyed until 1967. From 1969 to 1976 the La Grande District reported a consistent 14 mile section from the confluence of the north and south forks to the town of Union (See unit VIII, **Appendix Table A-2**). The peak index survey redd count on mainstem Catherine Creek occurred in 1953 when 246 redds were counted (Figure 3, **Appendix Table A-2**). The peak index survey redd count on the North Fork Catherine Creek and South Fork Catherine Creek occurred in 1971 when 114 redds were counted (Figure 4, **Appendix Table A-2**). The maximum redd count on Catherine Creek occurred in 1971 when 505 redds were counted on the North Fork, South Fork and mainstem Catherine Creek from the forks to Union (**Appendix Table A-2**). Results of redd counts in index, extensive, and supplemental surveys on Catherine Creek are presented in **Appendix Tables C-2** and **E-2**.

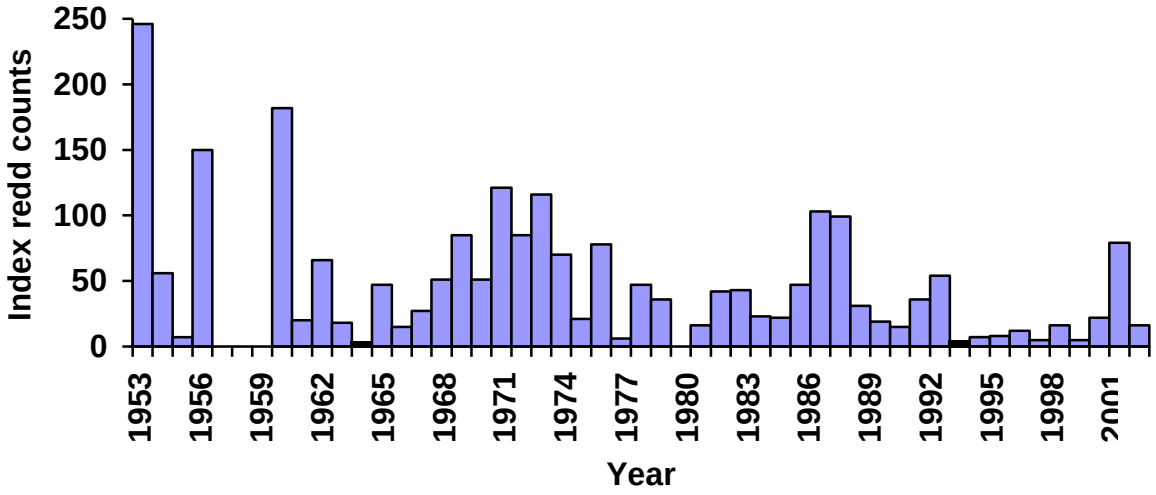

Figure 3. Mainstem Catherine Creek spring Chinook salmon index survey counts from 1953 through 2003. No surveys in 1957-1959. Data presented are from the forks to Badger Flat Road Bridge (units IV, V, and VI; 7.5 mi).

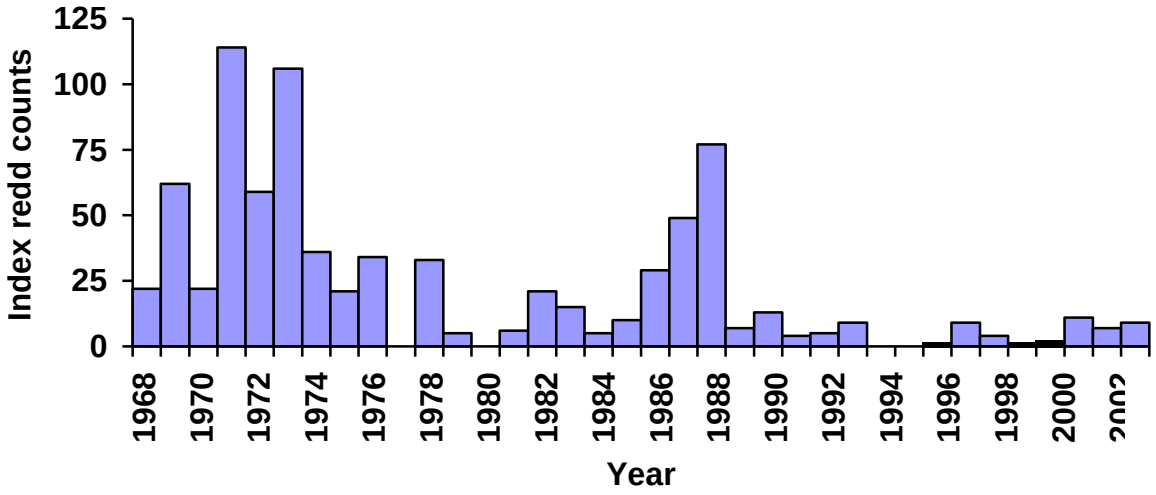

Figure 4. North Fork and South Fork Catherine Creek spring Chinook salmon index survey counts from 1968 through 2003. No surveys in 1977 and 1980. Index survey units: I = North Fork Catherine Creek Campground to forks (3.0 miles), and III = South Fork Catherine Creek, 1.5 miles upstream to forks (1.5 miles).

The index survey on Indian Creek was established in 1968 and was conducted through 1978. No surveys were conducted from 1979 through 1991. Surveys were again conducted in 1992, 1993, and 1994. These surveys appear to have varied among years (See **Appendix Table A-3** foot notes). The peak redd count observed on Indian Creek occurred in 1972 with 19 redds

counted in three miles of stream (Figure 5, **Appendix Table A-3**). Indian Creek has been identified as a lower priority stream and no surveys have been conducted on Indian Creek since 1994.

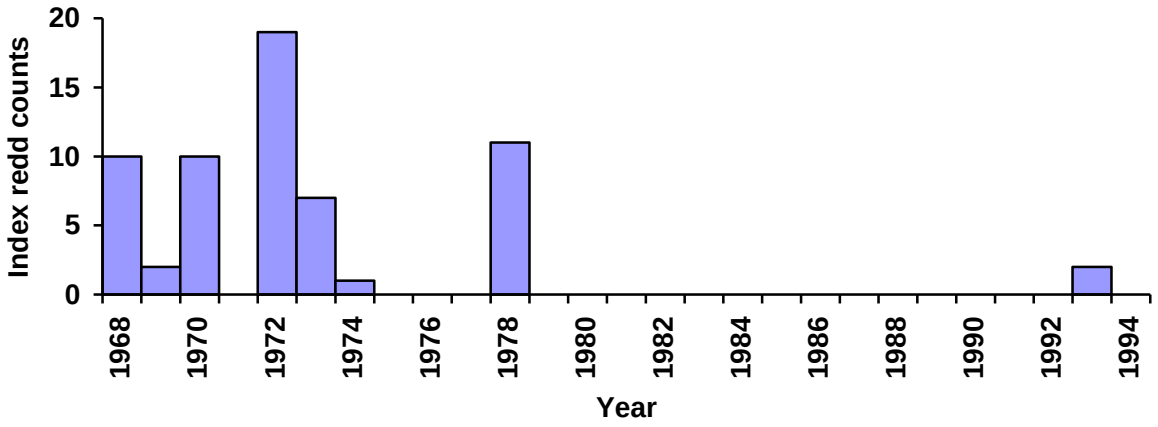

Figure 5. Indian Creek spring Chinook salmon index survey counts from 1968 through 1994. No surveys in 1977 and 1979-1991. Survey unit: I = mouth of Little Indian Creek down three miles**.**

The index survey on Lookingglass Creek was established in 1955 and was conducted through 2003. The peak index survey redd count, and maximum redd count, on Lookingglass Creek occurred in 1957 when 418 redds were counted from Summer Creek to Little Lookingglass Creek (Figure 6, **Appendix Table A-4**). Results of redd counts in index, extensive, and supplemental surveys on Lookingglass Creek are presented in **Appendix Tables C-3** and **E-3**. No survey was conducted in 1984 and escapement above Lookingglass Hatchery has been regulated since 1982. Spring Chinook salmon have been trapped at Lookingglass Hatchery and not allowed above the hatchery to spawn since 1999.

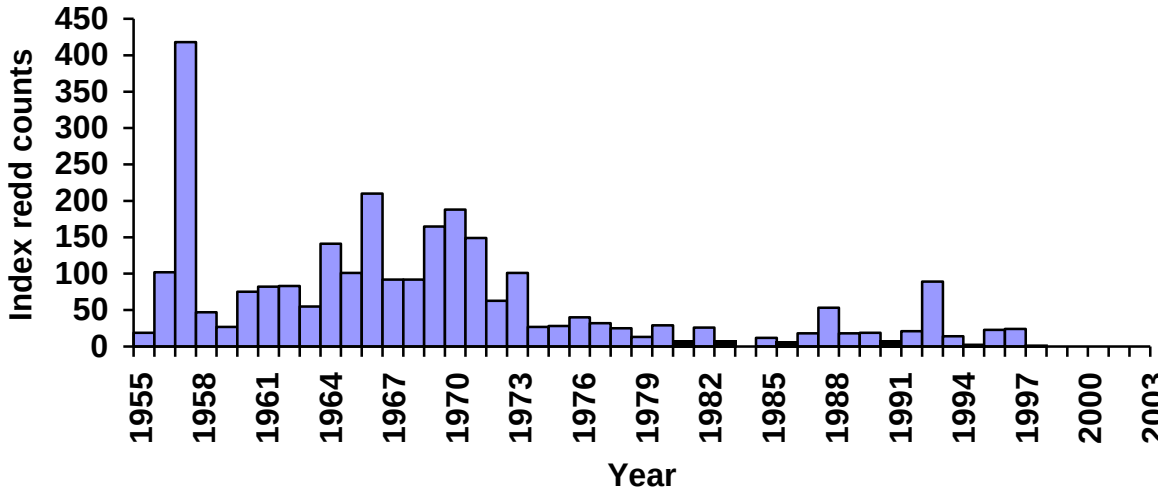

Figure 6. Lookingglass Creek spring Chinook salmon index survey counts from 1955 through 2003. No survey in 1984. Index survey unit: I = Summer Creek to Little Lookingglass Creek miles).

The index survey on Sheep Creek was established in 1969 and was conducted through 1995. No surveys were conducted in 1977, 1978, and 1980. ODFW was denied access to private property in 1996 and no surveys have been conducted on Sheep Creek since then. The peak index survey redd count, and maximum redd count, on Sheep Creek occurred in 1969 when 106 redds were counted in the index area from the NF Road 5160 road culvert to the mouth (Figure 7, **Appendix Table A-5**).

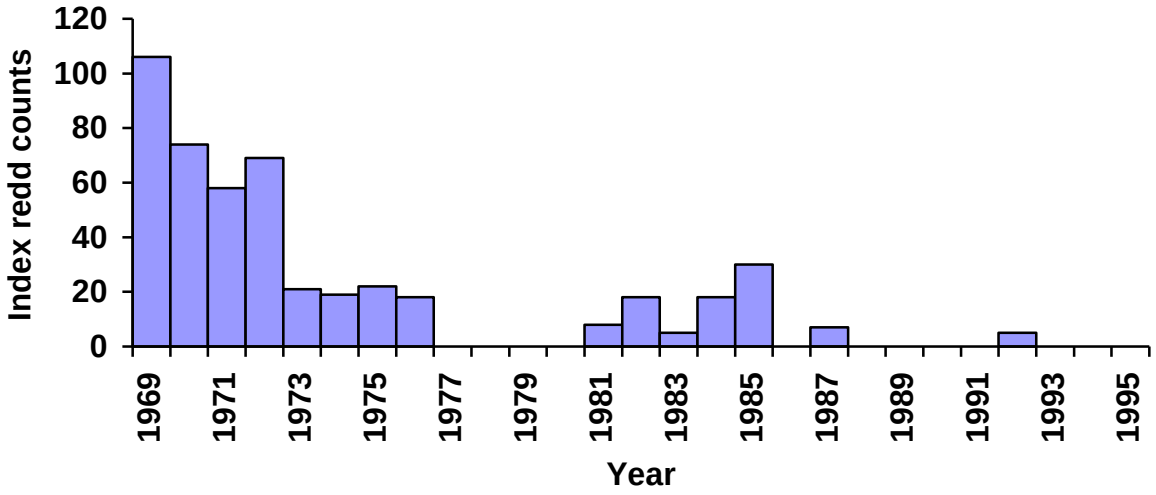

Figure 7. Sheep Creek spring Chinook salmon index survey counts from 1969 through 1995. No surveys in 1977, 1978, 1980, and 1986. Index survey unit: II = 5160 Road culvert to mouth miles).

Redd counts in index areas within the upper Grande Ronde Subbasin have declined steadily since the early 1970's. Index redd counts that once numbered in the hundreds have dropped into the double and single digits within the last ten years. Supplementation and captive brood stock programs have been initiated by the Oregon Department of Fish and Wildlife and the Confederated Tribes of the Umatilla Indian Reservation and are currently in place on the upper mainstem Grande Ronde River and Catherine Creek.

Wallowa River Subbasin

Spawning streams of the Wallowa River Subbasin include the upper mainstem Wallowa River, Bear Creek, Hurricane Creek, the Lostine River, and the upper and lower Minam River, and Little Minam River. Smaller spawning streams include Prairie, Parsnip, and Spring creeks.

Index surveys on the upper mainstem Wallowa River were established in 1963 and were conducted through 2003. The highest index survey redd count on the Wallowa River occurred in 1963 when 37 redds were counted (Figure 8, **Appendix Table A-6**). The maximum redd count on the Wallowa River occurred in 2002 when 70 redds were counted about three weeks after the index count (**Appendix Table C-4**). Results of redd counts in supplemental surveys in 1955 and 1956 on the Wallowa River are presented in **Appendix Table E-4**.

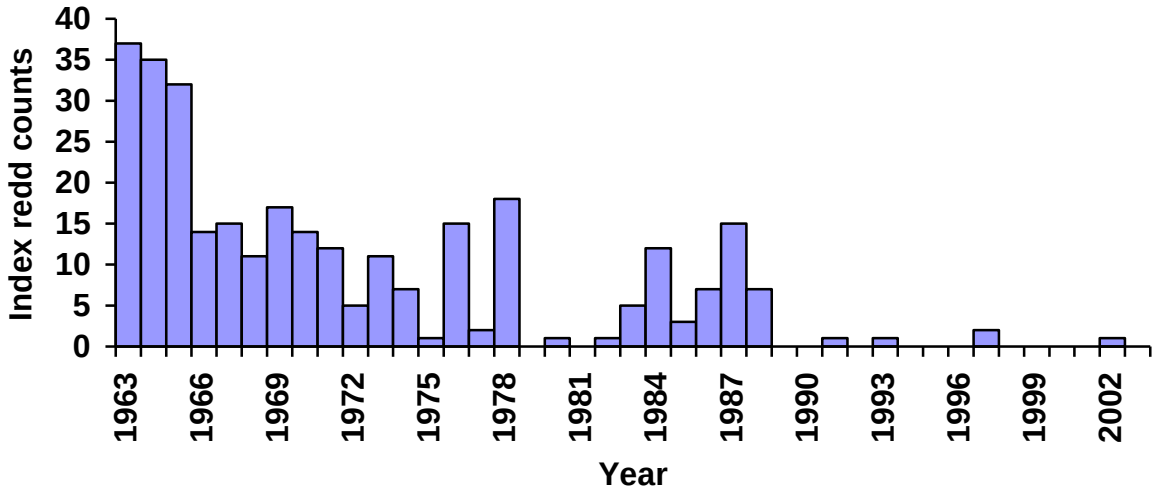

Figure 8. Upper mainstem Wallowa River spring Chinook salmon index survey counts from 1963 through 2003. Index survey units: I = McClarren Lane or Dorrance Road Bridge to Eggleson Lane Bridge (1.5 miles), II = Eggleson Lane Bridge to hatchery intake (or second railroad trestle, 3.0 miles).

Index surveys on Bear Creek were established in 1964 and were conducted through 2003. From 1964 to 1986 units II, III, and IV were combined as a single unit from the Guard Station to the 8250 road bridge below the mouth of Little Bear Creek. The highest index survey redd count, and maximum redd count, on Bear Creek occurred in 1972 when 55 redds were counted (Figure 9, **Appendix Table A-7**). Results of redd counts in index, extensive, and supplemental surveys on Bear Creek are presented in **Appendix Table C-5**.

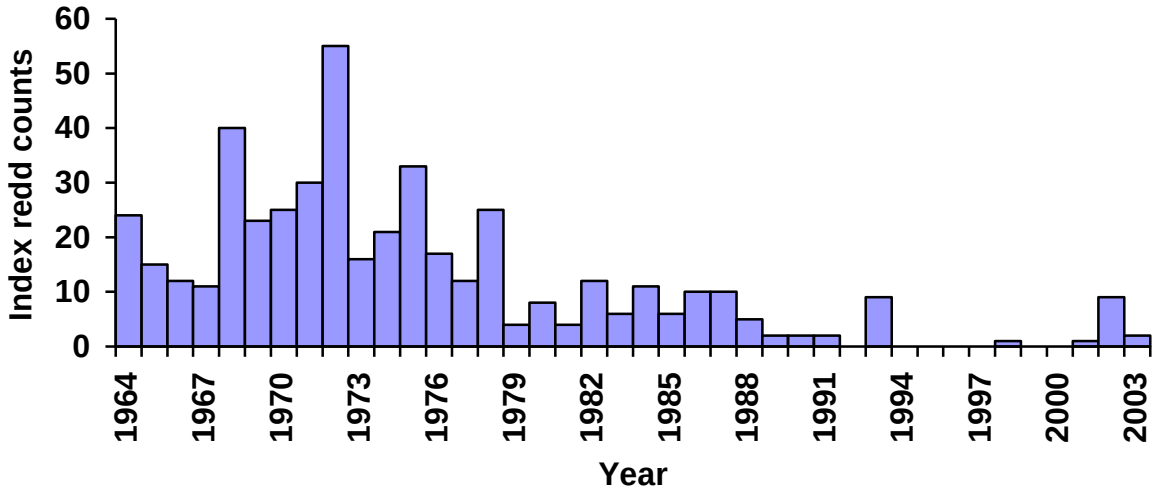

Figure 9. Bear Creek spring Chinook salmon index survey counts from 1964 through 2003. Index survey units: II = Guard Station to Baker Gulch (2.3 miles), III = Baker Gulch to Boundary Campground (1.7 miles), IV = Boundary Campground to 8250 Bridge (2.5 miles).

Index surveys on Hurricane Creek were established in 1956 and were conducted through 2003. No surveys were conducted from 1958 through 1962. From 1964 to 1986 and again from 1996 to 2002, the two index survey units were reported as a single unit. The peak index survey redd count on Hurricane Creek occurred in 1957 when 47 redds were counted (Figure 10, **Appendix Table A-8**). The maximum redd count on Hurricane Creek occurred in 1955 when 134 redds were counted about three weeks after the index count (**Appendix Table E-5**). Results of redd counts in index, extensive, and supplemental surveys on Hurricane Creek are presented in **Appendix Table C-6**.

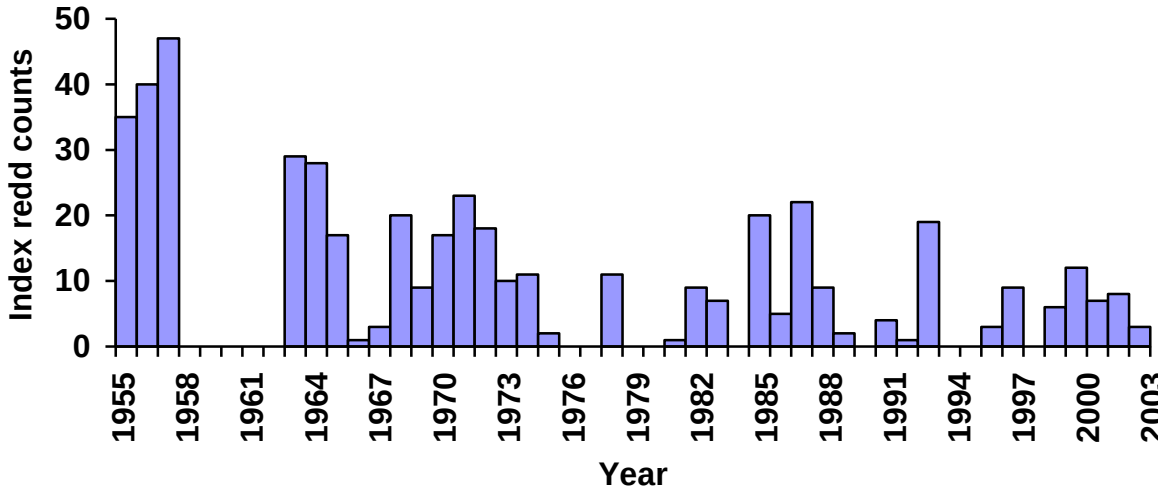

Figure 10. Hurricane Creek spring Chinook salmon index survey counts from 1955 through 2003. Incomplete survey in 1955 (unit II not surveyed); no surveys from 1958 through 1962. Index survey units: I = Dorrance Road Bridge to Eggleson Lane Bridge (1.25 miles), II = Eggleson Lane Bridge to mouth (2.25 miles).

Index surveys on the Lostine River were established in 1950 and were conducted through 2003 with the following exceptions: no surveys were conducted in 1951, 1952, and 1958; and access was restricted to the lower 2.7 miles of the index area in 2003. However, from 1950 through 1955 surveys may have ended in different locations (See **Appendix Table A-9** for details). The highest index survey redd count on the Lostine River occurred in 1957 when 157 redds were counted (Figure 11, **Appendix Table A-9**). The maximum redd count on the Lostine River occurred in 1956 when 261 redds were counted from Lapover Meadows to Williamson Campground and Six-mile Bridge to Lostine River Ranch bridge (**Appendix Table E-6**). Results of redd counts in index, extensive, and supplemental surveys on the Lostine River are also presented in **Appendix Tables C-7** and **C-8**. At one time the Lapover Meadows to Williamson Campground unit (II) was considered part of the index area. A log jam at Lostine River falls, however, was believed to have blocked upriver migration for a number of years. The log jam was removed in a cooperative effort between various agencies.. Prior to the log jam, the upper Lostine River, from the Forks to Williamson Campground was used more extensively for spawning. The upper river is protected with Wild and Scenic River designation and remains in near pristine conditions although redd counts have dropped into the single digits.

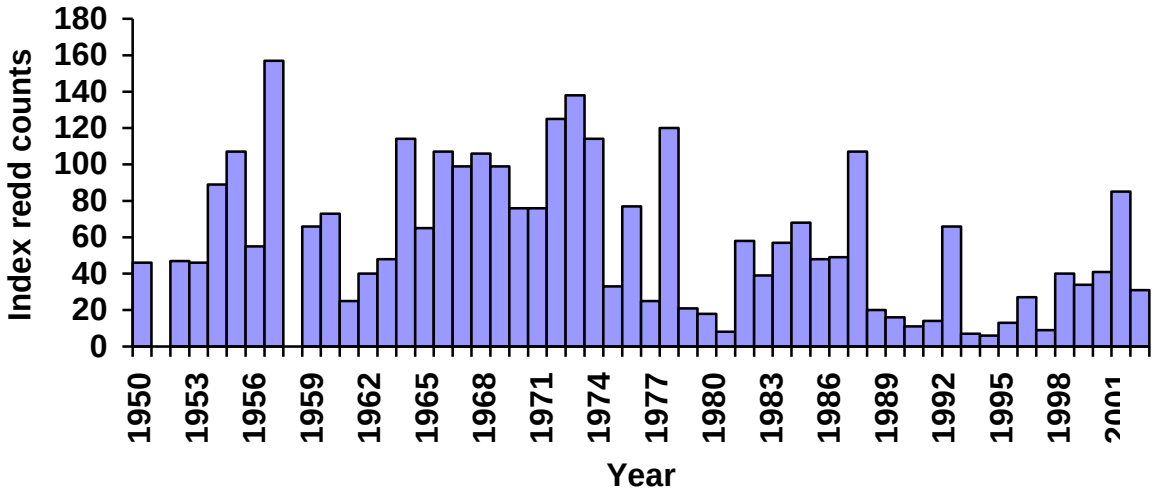

Figure 11. Lostine River spring Chinook salmon index survey counts from 1950 through 2003. No surveys in 1951 and 1958; incomplete survey in 2003. Index survey unit: IV = Six-mile Bridge to Lostine River Ranch bridge (3.0 miles).

Some index surveys were established on the Minam River in 1954. Lower Minam River index survey units VI and VII have been surveyed since 1954. Upper Minam River index survey units I through V not done on an annual basis until 1964. Units I through V were reported as a single survey unit in 1964 to 1983, and 1985. No surveys were conducted on the Minam River in 1980. The peak index survey redd count, and maximum redd count, on the upper Minam River occurred in 1969 when 106 redds counted from above Elk Creek to the Splash Dam (Figure 12, **Appendix Table A-10**). The peak index survey redd count, and maximum redd count, on the lower Minam River occurred in 1957 when 224 redds were counted from Salmon Hole to the Little Minam River (Figure 13, **Appendix Table A-10**). The peak index survey redd count, and maximum redd count, on the Little Minam River peaked in 1957 when 109 redds counted from Little Minam Falls to 1/4 mile below Big Canyon Creek (Figure 14, **Appendix Table A-10**). The maximum redd count for the Minam and Little Minam rivers occurred in 1957 when 333 redds were counted in the lower Minam River and Little Minam River. Results of redd counts in index, extensive, and supplemental surveys on the Minam and Little Minam rivers are presented in **Appendix Tables C-9** and **E-7.**

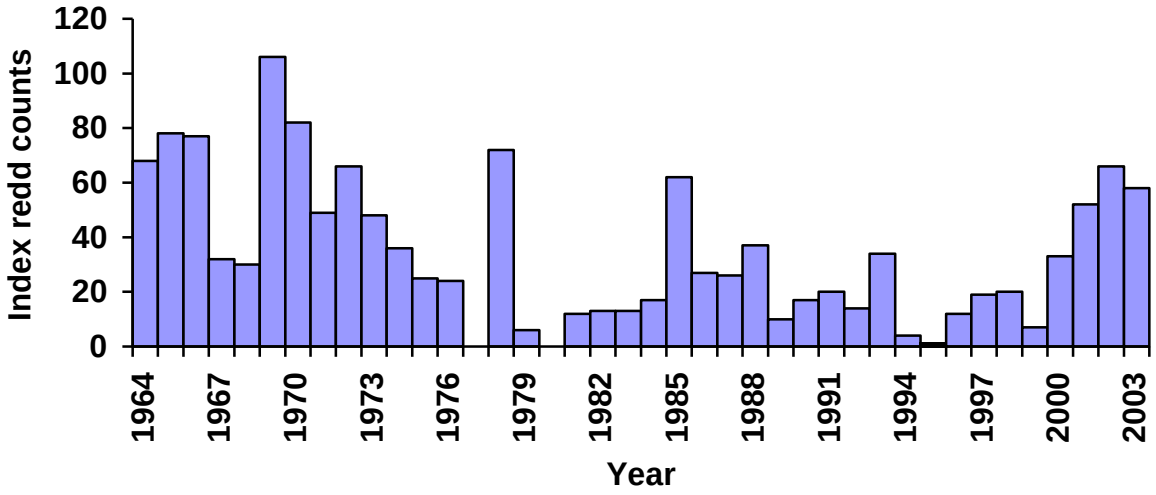

Figure 12. Upper Minam River spring Chinook salmon index survey counts from 1964 through 2003. No survey in 1980. Upper index survey units: I = Elk Creek Survey (1 mile), II = Camp One Survey (0.5 mile), III = Rock Creek Survey (0.5 mile), IV = Little Pot Survey (0.5 mile), V = Splash Dam Survey (1 mile).

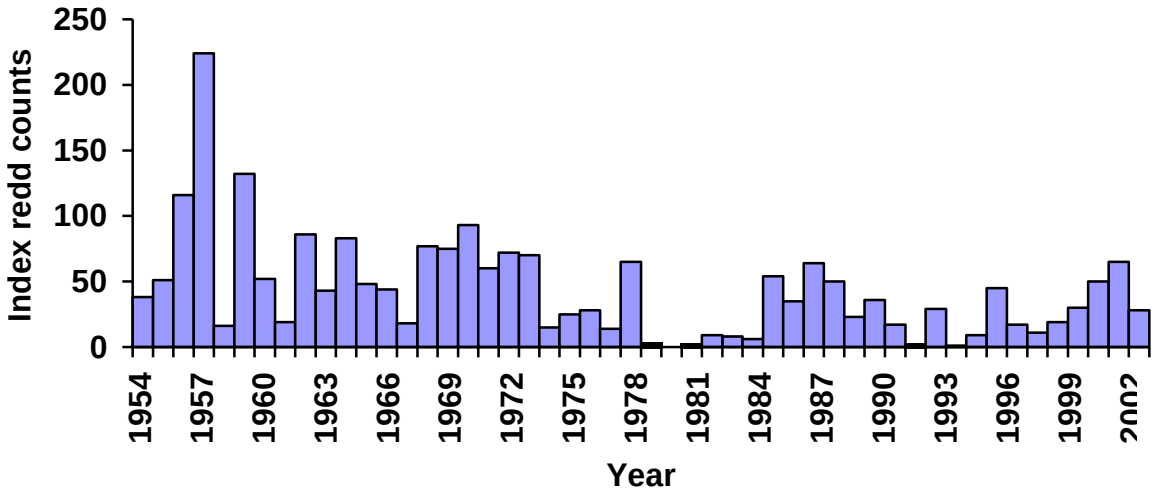

Figure 13. Lower Minam River spring Chinook salmon index survey counts from 1954 through 2003. No survey in 1980. Lower Minam index survey units: VI-VII = from 1954-1983 Salmon Hole to Little Minam River (6 miles), VI = from 1984-2003, Salmon Hole to Bridge at Red's Horse Ranch (1.4 miles), VII = from 1984-2003, Bridge at Red's Horse Ranch to bluff (3.4 miles).

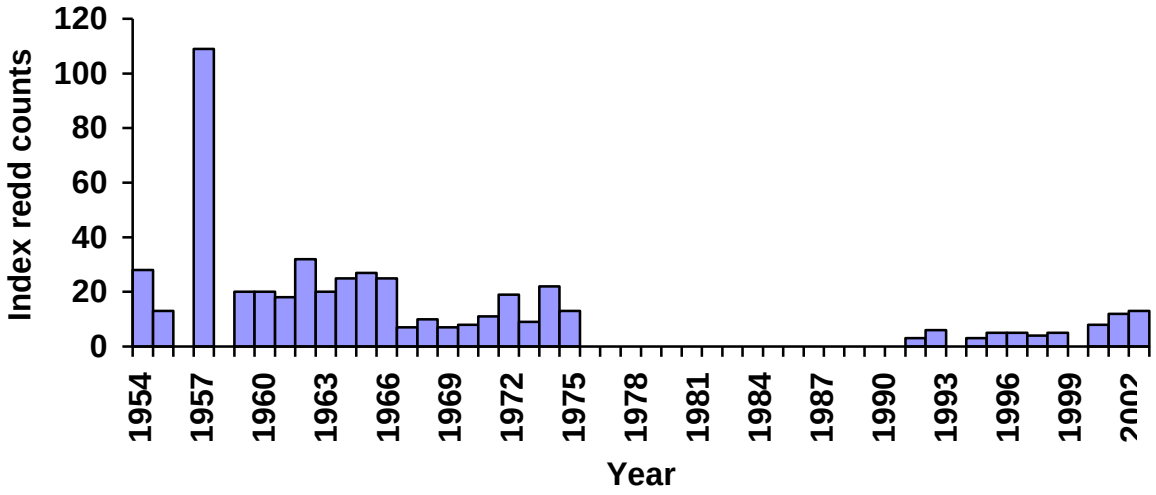

Figure 14. Little Minam River spring Chinook salmon index survey counts from 1954 through 2003. No surveys in 1956, 1958, and 1976–1991. Index survey unit: VIII = Falls to 0.25 miles below Big Canyon Creek (1.5 miles).

Some surveys were conducted on Prairie Creek and Spring Creek sporadically beginning in 1955. A small number of redds were observed in these small Wallowa River tributaries (**Appendix Table C-10**).

Index redd counts within the Wallowa River Subbasin have declined steadily since the early 1970's. Recent index counts on the upper mainstem Wallowa River, Bear Creek, and Hurricane Creek have dropped to zero in some years. Supplementation with captive brood stock offspring and offspring from natural adults collected for broodstock have been initiated by the Oregon Department of Fish and Wildlife and Nez Perce Tribe and are currently in place on the Lostine River.

Lower Grande Ronde River Subbasin

Spawning streams of the Lower Grande Ronde River Subbasin include the North Fork Wenaha River, South Fork Wenaha River, mainstem Wenaha River, and Milk, Butte, and Crooked creeks. The index survey on the South Fork Wenaha River from Milk Creek to the North Fork confluence were established in 1949 and was conducted through 2003. No surveys, however, were conducted in 1951 and from 1958 to 1962. The peak index survey redd count, and maximum redd count, on the South Fork Wenaha River occurred in 1957 when 293 redds were counted (Figure 15, **Appendix Tables A-11** and **C-11**). Results of redd counts in supplemental surveys on the Wenaha River in 1955 and 1956 are presented in **Appendix Table E-8.** The North Fork Wenaha River contained a higher proportion of spawners in the past than it does today. The North Fork has been surveyed sporadically in recent years. Index redd counts on the Wenaha River have declined sharply since the early 1970's, despite the fact that all but six miles of the lower river resides in a wilderness area.

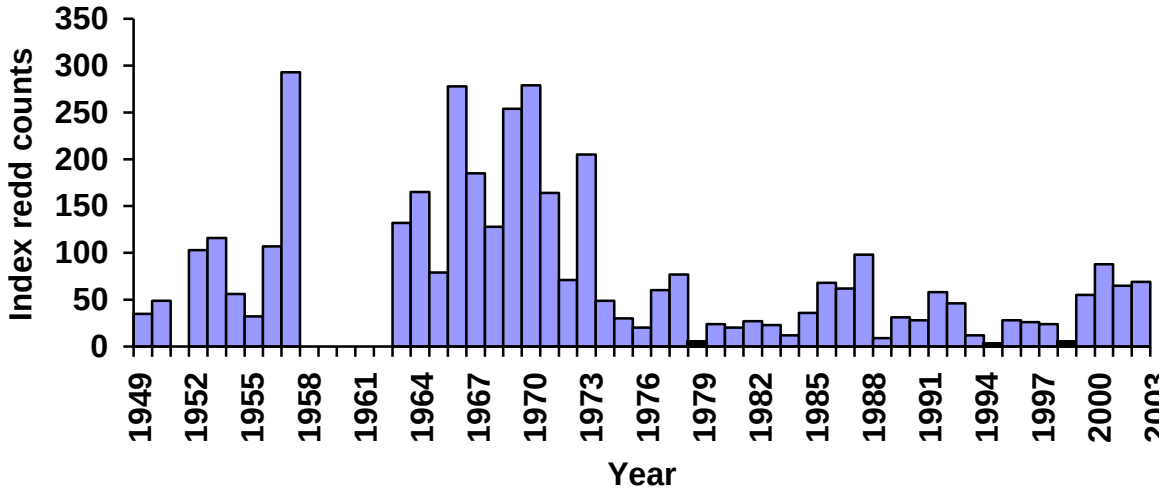

Figure 15. Wenaha River spring Chinook salmon index survey counts from 1949 through 2003. No surveys in 1951 and 1958-1962. Index survey unit: III = South Fork Wenaha River, Milk Creek to forks (6.0 miles).

Imnaha River Basin

Spawning streams of the Imnaha River Basin include the mainstem Imnaha River, Big Sheep Creek, and Lick Creek. Index surveys on the mainstem Imnaha River were established in 1949 and were conducted through 2003. No surveys were conducted on the Imnaha River in 1951. The peak index survey redd count on the Imnaha River occurred in 1957 when 747 redds counted from Blue Hole to Mac's Mine (9.7 miles; Figure 16, **Appendix Table B-1**). The maximum redd count on the Imnaha River occurred in 2002 when 1,111 redds were counted (**Appendix Table D-1**). Results of redd counts in supplemental surveys on the Imnaha River in 1955 and 1956 are presented in **Appendix Table E-9.**

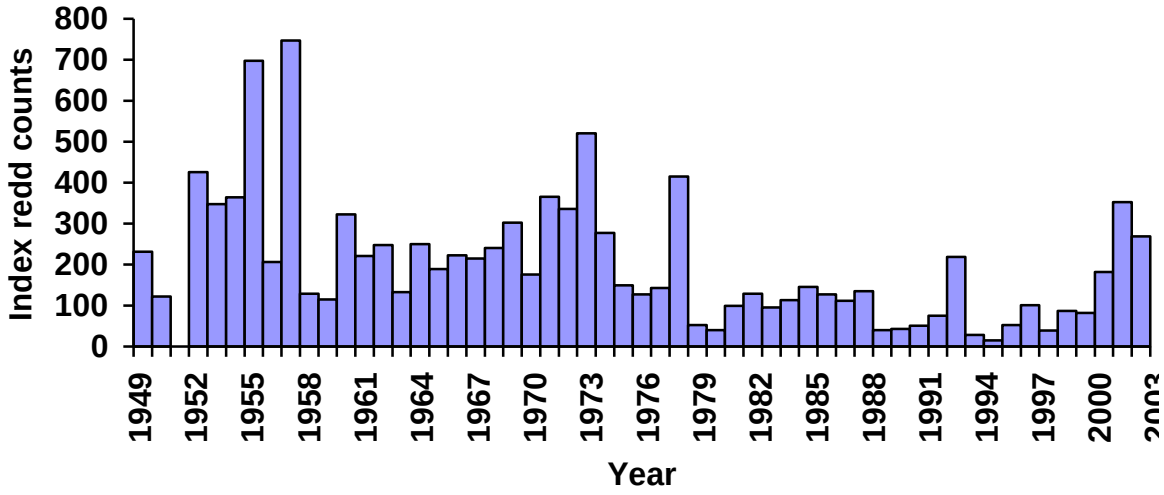

Figure 16. Imnaha River spring Chinook salmon index survey counts from 1949 through 2003. No surveys in 1951. Index survey units: III = Blue Hole to Indian Crossing Campground (2 miles), IV = Indian Crossing Campground to Mac's Mine (7.7 miles).

The Big Sheep Creek index survey was established in 1964 and was conducted through 2003. The peak index survey redd count on Big Sheep Creek occurred in 1966 when 61 redds were counted (Figure 17, **Appendix Table B-2**). The maximum redd count on Big Sheep Creek occurred in 1957 when 147 redds counted from the Lick Creek confluence to the Carrol Creek logging road bridge (9.0 miles, **Appendix Table D-2**). Results of redd counts in supplemental surveys on Big Sheep Creek in 1955 and 1956 are presented in **Appendix Table E-10**.

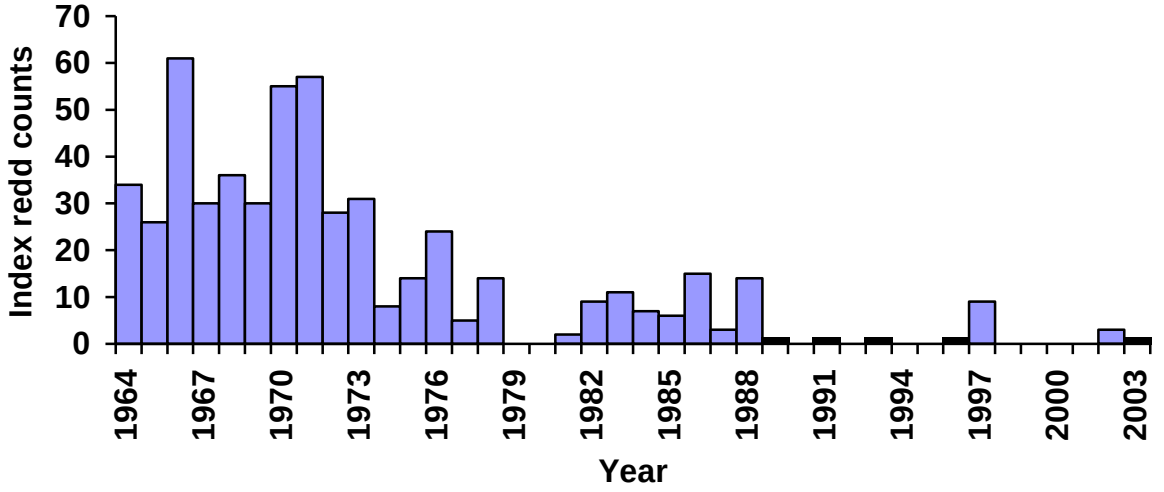

Figure 17. Big Sheep Creek spring Chinook salmon index survey counts from 1964 through 2003. Index survey unit: I = 140 Bridge to Echo Canyon (4.0 miles).

The Lick Creek index survey was also established in 1964 and was conducted through 2003. The peak index survey redd count, and maximum redd count on Lick Creek occurred in 1970 when 50 redds were counted (Figure 18, **Appendix Tables B-3** and **D-3**).

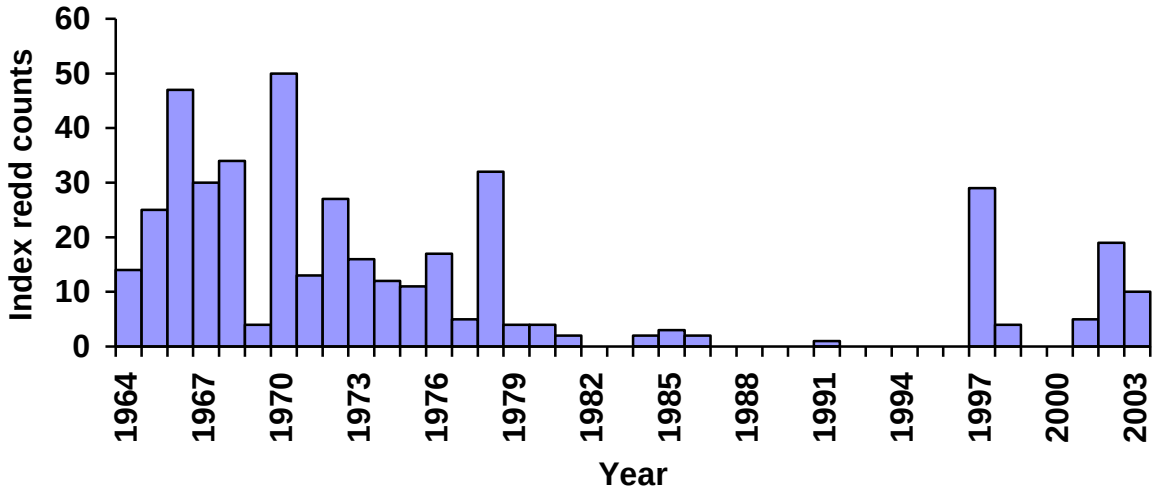

Figure 18. Lick Creek spring Chinook salmon index survey counts from 1964 through 2003. Index survey unit: I = Lick Creek Campground to mouth (4.0 miles).

Index redd counts within the Imnaha River Basin have declined steadily since the early 1970's. A supplementation program on the mainstem Imnaha River was initiated in 1982 under the Lower Snake River Compensation Program. Recently, hatchery adults from this program have been out-planted into Lick Creek and Big Sheep Creek.

Other Surveys in NE Oregon

Eagle Creek in the Powder River Basin was surveyed for Chinook salmon redds in 1955 and 1956, In 1956, 17 redds were counted in Eagle Creek on August 18 (**Appendix Table E-11**). Brownlee Dam, the first dam completed in the Hells Canyon Complex on the Snake River, blocked access for anadromous fish to spawning areas in the Snake River Basin above the dam (RM 285 of the Snake River) in 1958.

RECOMMENDATIONS

Escapement monitoring of spring Chinook salmon in northeast Oregon is a critical component of the management of this species. In streams without adult weirs to enumerate adult spring Chinook salmon, spawning ground surveys provide a quantitative measure of adult production. In streams with adult weirs, spawning ground surveys provide a quantitative measure of returning adults surviving to spawn. In addition to enumerating the redds in a stream,

spawning surveys provide information regarding spawning distribution, prespawning mortality, straying, and age structure. Distribution data is important to monitor changes over time and to compare performance of wild and hatchery fish. Data about straying is critical for the success of managing the Minam and Wenaha rivers as wild streams. Data from age structure is very important for productivity assessment and run reconstruction.

- Spring Chinook salmon spawning surveys should be continued in index survey areas at traditional times to add to the existing long-term data sets to monitor trends in spawning escapement.

- The expanded surveys (extensive and supplemental surveys) developed since 1986 should be continued as they provide a more complete assessment of the number of redds produced by the returning adults. These surveys are used to monitor the status and recovery of ESA listed stocks and to evaluate supplementation efforts for spring Chinook salmon in the Imnaha and Grande Ronde River basins.

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APPENDIX A

Grande Ronde River Basin Index Surveys

Appendix Table A-1. Upper mainstem Grande Ronde River, Grande Ronde River Basin, spring Chinook salmon index survey counts from 1953 through 2003. Index survey units: I = Three Penny Claim to Forest Service boundary (3.0 miles), II = Forest Service Boundary to Vey Meadows 5125 Bridge (5.0 miles). Abbreviations are as follows: M = male, F = female, J = jack, U = unknown sex, A = adults, J = jacks, Ref. = reference, ND = no data, NS = no survey, I = incomplete survey of the index survey units. Abbreviations for the references are given in Table 1, page 14.

		Redds		Total	Redds/	Dead fish				Total	Live fish		Total	
Year	Date	I	II	redds	mile	M	F	J	U	dead	A	J	live	Ref.
1953	28 Aug	[2[a]	+]	I	0.5	1	1	0	0	2	5	6	11	EOS
1954	26 Aug	[67[b]	+]	I	12.2	0	0	0	0	0	69	17	86	EOS
1955	27 Aug	[7[b]	+]	I	1.3	0	0	0	0	0	0	0	0	EOS
1956	1 Sep	[5[b]	+]	I	0.9	0	0	0	0	0	5	1	6	EOS
1957	2 Sep	[66[b]	+]	I	12.0	ND	ND	7	ND	21	28	47	75	EOS
1958	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1959	31 Aug	[31[b]	+]	I	5.6	ND	ND	ND	ND	4	ND	ND	24	ESR
1960	ND	[73[c]	+]	I	ND	ND	ND	ND	ND	ND	ND	ND	ND	EOS
1961	19 Aug	[122[c]	+]	I	ND	7	6	10	0	23	ND	ND	9	LD
1962	28 Aug, 5 Sep	[179[c]	+]	I	ND	ND	ND	ND	ND	92	118	14	132	EOS
1963	19 Aug, 5 Sep	[20[c]	+]	I	ND	ND	ND	0	ND	10	ND	ND	51	LD
1964	29 Aug, 18 Sep	[172[c]	+]	I	12.3	ND	ND	4	ND	70	ND	ND	88	LD
1965	24 Aug, 2 Sep	[128[d]	+]	I	15.1	ND	ND	3	ND	24	ND	ND	113	LD
1966	7, 23 Sep	[143[c]	+]	I	19.1	ND	ND	8	ND	19	ND	ND	88	LD
1967	28 Sep	[216[c]	+]	I	12.0	ND	ND	0	ND	0	ND	ND	0	LD
1968	10 Sep	[304[c]	+]	I	14.5	ND	ND	24	ND	94	ND	ND	15	LD
1969	5 Sep	[194[d]	+]	I	22.8	25	40	1	0	66	ND	ND	69	LD
1970	11 Sep	[51[d]	+]	I	6.0	ND	ND	1	ND	7	ND	ND	8	LD
1971	7 Sep	[129[d]	+]	I	15.2	ND	ND	2	ND	24	ND	ND	48	LD
1972	8 Sep	[110[d]	+]	I	12.9	ND	ND	0	ND	31	ND	ND	4	LD
1973	6 Sep	[52[d]	+]	I	6.1	ND	ND	1	ND	ND[e]	ND	ND	ND[e]	LD
1974	5 Sep	[61[d]	+]	I	7.2	ND	ND	0	ND	ND[e]	ND	ND	ND[e]	LD
1975	4 Sep	[42[d]	+]	I	4.9	ND	ND	1	ND	ND[e]	ND	ND	ND[e]	LD
1976	13 Sep	[75[d]	+]	I	8.8	ND	ND	0	ND	ND[e]	ND	ND	ND[e]	LD

[a] *Mouth of Limber Jim Creek to one mile below Sheep Creek (4.4 miles).*
[b] *Mouth of Limber Jim Creek to Old Rock Dam below Vey Meadows (5.5 miles).*
[c] *Inconsistent, unknown survey units: unknown miles from 1960-1963; 14 miles in 1964; 7.5 miles in 1966; 18 miles in 1967; 21 miles in 1968.*
[d] *Consistent, unknown survey unit, 8.5 miles.*
[e] *Total fish (dead and live), 1973-1979: 23, 24, 7, 14, 34, 13, 2.*

Appendix Table A-1. Continued.

Year	Date	Redds I	Redds II	Total redds	Redds/ mile	Dead fish M	Dead fish F	Dead fish J	Dead fish U	Total dead	Live fish A	Live fish J	Total live	Ref.
1977	30 Aug, 2 Sep	[92[d]	+]	I	10.8	ND	ND	ND	ND	ND[e]	ND	ND	ND[e]	LD
1978	13 Sep	[42[d]	+]	I	4.9	ND	ND	0	ND	ND[e]	ND	ND	ND[e]	LD
1979	7 Sep	[7[d]	+]	I	0.8	ND	ND	3	ND	ND[e]	ND	ND	ND[e]	LD
1980	ND	[32[d]	+]	I	3.8	ND	ND	0	ND	ND	ND	ND	ND	LD
1981	1 Sep	[38[d]	+]	I	4.5	ND	ND	0	ND	ND[f]	ND	ND	ND[f]	LD
1982	8 Sep	[29[d]	+]	I	3.4	ND	ND	0	ND	ND[f]	ND	ND	ND[f]	LD
1983	12 Sep	[49[d]	+]	I	5.8	ND	ND	1	ND	ND[f]	ND	ND	ND[f]	LD
1984	6 Sep	[26[d]	+]	I	3.1	ND	ND	1	ND	ND[f]	ND	ND	ND[f]	LD
1985	5 Sep	[70[d]	+]	I	8.2	ND	ND	1	ND	ND[f]	ND	ND	ND[f]	LD
1986	3 Sep	18	19	37	4.6	3	5	0	0	8	10	0	10	Tables
1987[g]	1 Sep	65	41	106	13.3	5	13	0	1	19	50	1	51	Cards
1988[g]	30 Aug	77	22	99	12.4	35	29	3	11	78	16	4	20	Cards
1989[h]	16 Aug	0	0	0	0.0	2	1	0	4	7	0	0	0	Cards
1990	27-28 Aug	3	1	4	0.5	1	0	0	1	2	7	0	7	Cards
1991	4 Sep	1	9	10	1.3	1	2	1	0	4	8	0	8	Cards
1992	2 Sep	76	21	97	12.1	13	3	0	0	16	65	0	65	Cards
1993	3 Sep	49	39	88	11.0	5	13	0	7	25	9	0	9	Cards
1994	30 Aug	1	0	1	0.1	0	0	0	0	0	0	0	0	Cards
1995	28 Aug	0	5	5	0.6	0	1	0	0	1	0	0	0	Cards
1996	26 Aug	2	NS	I	0.7	1	0	0	0	1	2	2	4	Cards
1997	25 Aug	10	NS	I	3.3	0	1	0	0	1	10	0	10	Tables
1998	24 Aug	12	NS	I	4.0	1	2	0	0	3	20	0	20	Tables
1999	30 Aug	0	NS	I	0.0	0	0	0	0	0	0	0	0	Tables
2000	28 Aug	4	NS	I	1.3	0	0	0	0	0	5	0	5	Tables
2001	27 Aug	2	NS	I	0.7	0	0	0	0	0	1	0	1	Tables
2002	26 Aug	6	NS	I	2.0	0	0	0	0	0	9	0	9	Tables
2003	25 Aug	5	NS	I	1.7	1	0	0	0	1	2	2	4	Tables

[f] *Total fish (dead and live), 1981-1985: 10, 13, 10, 23, 33.*
[g] *Chinook salmon outplanted from Lookingglass Hatchery: 224 M, 271 F, 3 J in 1987; and 281 M, 235 F, 6 J in 1988.*
[h] *Conducted after flash flooding on 8 August 1989.*

Appendix Table A-2. Catherine Creek, Grande Ronde River Basin, spring Chinook salmon index survey counts from 1948 through 2003. Index survey units: I = North Fork Catherine Creek Campground to Forks (3.0 miles), III = South Fork Catherine Creek, 1.5 mile upstream of mouth to Forks (1.5 miles), IV = Forks to 7735 Bridge (2.5 miles), V = 7735 Bridge to Highway 203 Bridge (2.0 miles), VI = Highway 203 Bridge to Badger Flat Road Bridge (3.0 miles). Also included is section VII = Badger Flat Road Bridge to Union (6.4 miles), which is an extensive survey unit, but is included in this table because some of the surveys prior to 1977 included this section, or a portion of it, and the redds counted could not be separated from those in the index units. Abbreviations are as follows: M = male, F = female, J = jack, U = unknown sex, A = adults, J = jacks, Ref. = reference, ND = no data, NS = no survey, I = incomplete survey of the index survey units. Abbreviations for the references are given in Table 1, page 14.

		Redds						Total	Redds/	Dead fish				Total	Live fish		Total	Total	
Year	Date	I	III	IV	V	VI	VII	redds	mile	M	F	J	U	dead	A	J	live	fish	Ref.
1948	4 Aug	NS	NS	[0	+]	NS	NS	I	0.0	ND	ND	ND	ND	1	ND	ND	2	3	(a)
1949	22 Aug	NS	NS	[0	+]	NS	NS	I	0.0	ND	ND	ND	ND	0	ND	ND	5	5	(a)
1950	22 Aug	NS	NS	8	24	NS	NS	I	7.1	2	ND	ND	ND	2	ND	ND	21	23	(a)
1951	NS	NS	NS	NS	NS	NS	NS	I	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1952	18 Aug	NS	NS	[10	+]	NS	NS	I	2.2	ND	ND	ND	ND	3	18	0	18	21	(a)
1953	30 Aug	NS	NS	[177	+]	69	NS	I	32.8	ND	ND	ND	ND	102	243	55	298	400	EOS
1954	25 Aug	NS	NS	[44	+]	12	NS	I	7.5	ND	ND	0	ND	11	78	15	93	104	EOS
1955	15 Aug	NS	NS	[4	+]	3	NS	I	0.9	ND	ND	0	ND	2	3	0	3	5	EOS
1956	19 Aug	NS	NS	[112	+]	38	NS	I	20.0	ND	ND	1	ND	40	122	14	136	176	EOS
1957	25 Aug	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1958	27 Aug	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1959	27 Aug	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1960	31 Aug	NS	NS	[50	+]	132	NS	I	24.3	ND	ND	1	ND	16	358	26	384	400	EOS
1961	3 Sep	NS	NS	[6	+]	14	NS	I	2.7	ND	ND	0	ND	2	23	5	28	30	EOS
1962	31 Aug	NS	NS	[39	+]	27	NS	I	8.8	ND	ND	0	ND	18	83	5	88	106	EOS
1963	28 Aug	NS	NS	[9	+]	9	NS	I	2.4	ND	ND	0	ND	0	20	4	24	24	EOS
1964	11, 16 Sep	NS	NS	[1	+]	2	NS	I	0.4	ND	ND	0	ND	4	2	0	2	6	EOS
(b)	31 Aug	ND	ND	ND	ND	ND	41[c]	I	4.1	ND	ND	0[d]	ND	3	ND	ND	10	13	LD

[a] *Summary of 1948, 1949, and 1952 Eastern Oregon Surveys.*

[b] *Excessive precipitation caused flash floods on 30 July 1964 in Catherine Creek, Eagle Creek, and the Minam River. Nine miles of Catherine Creek were surveyed to determine damage to fish life. Sixty-three adult Chinook were found dead in this section of stream. Another 20 adult Chinook were reportedly salvaged by the public the night of the flood. Thirty-seven of the dead salmon checked were females and 24 were males. One 16 inch jack was found.*

[c] *Oregon Game Commission survey (1964, 9.9 miles checked; 1965, 12 miles; 1966, 12 miles; 1967, upper section (7 miles, 212 redds), lower section (9 miles, 67 redds); 1968, 17.5 miles (Forks down to a point below Union).*

[d] *Report did not indicate if jack counts were live or dead.*

Appendix Table A-2. Continued.

Year	Date	Redds I	Redds III	Redds IV	Redds V	Redds VI	Redds VII	Total redds	Redds/ mile	Dead fish M	Dead fish F	Dead fish J	Dead fish U	Total dead	Live fish A	Live fish J	Total live	Total fish	Ref.
1965	31 Aug	NS	NS	[18	+]	29	NS	I	6.3	ND	ND	2	ND	6	71	3	74	80	EOS
	27 Aug to 17 Sep	ND	ND	ND	ND	ND	101[c]	I	8.4	ND	ND	1[d]	ND	21	ND	ND	118	140	LD
1966	25 Aug	NS	NS	[9	+]	6	NS	I	2.0	ND	ND	0	ND	4	43	10	53	57	EOS
	24 Aug to 7 Sep	ND	ND	ND	ND	ND	115[c]	I	9.6	ND	ND	4[d]	ND	10	ND	ND	140	154	LD
1967	29 Aug	NS	NS	[14	+]	13	NS	I	3.6	ND	ND	0	ND	6	45	3	48	54	EOS
	29 Sep	31	17	ND	ND	ND	279[c]	I	16.0	ND	ND	0[d]	ND	0	0	ND	ND	0	LD
1968	29 Aug	NS	NS	[25	+]	26	NS	I	6.8	ND	ND	0	ND	6	77	10	87	93	EOS
	11 Sep	15	7	ND	ND	ND	157[c]	I	8.1	19	19	7[d]	ND	45	ND	ND	5	50	LD
1969	29 Aug	NS	NS	[36	+]	49	NS	I	11.3	ND	ND	2	ND	47	115	6	121	168	EOS
	10-11 Sep	43	19	[348	+	+	+]	I	22.2	105	112	2	9	228	ND	ND	97	325	LD
1970	28 Aug	NS	NS	[21	+]	30	NS	I	6.8	ND	ND	0	ND	15	67	6	73	88	EOS
	9 Sep	19	3	[194	+	+	+]	I	11.7	ND	ND	12[d]	ND	43	ND	ND	82	137	LD
1971	2 Sep	NS	NS	[36	+]	85	NS	I	16.1	ND	ND	5	ND	26	176	9	185	211	EOS
	9 Sep	28	86	[391	+	+	+]	I	27.3	ND	ND	4[d]	ND	94	ND	ND	324	422	LD
1972	31 Aug	NS	NS	[30	+]	55	NS	I	11.3	ND	ND	2	ND	64	64	4	68	132	EOS
	5-6 Sep	38	21	[182	+	+	+]	I	13.0	ND	ND	4[d]	ND	91	ND	ND	78	173	LD
1973	31 Aug	NS	NS	[59	+]	57	NS	I	15.5	ND	ND	0	ND	15	191	4	195	210	EOS
	4-5 Sep	73	33	[298	+	+	+]	I	21.8	ND	ND	4[d]	ND	ND	ND	ND	ND	341	LD
1974	30 Aug	NS	NS	[29	+]	41	NS	I	9.3	ND	ND	1	ND	43	50	1	51	94	EOS
	4 Sep	17	19	[128	+	+	+]	I	8.9	ND	ND	1[d]	ND	ND	ND	ND	ND	55	LD
1975	29 Aug	NS	NS	[10	+]	11	NS	I	2.9	ND	ND	0	ND	1	18	2	20	21	EOS
	3 Sep	9	12	[66	+	+	+]	I	4.7	ND	ND	2[d]	ND	ND	ND	ND	ND	31	LD
1976	7-10 Sep	13	21	[78	+	+]	112	I	12.1	ND	ND	8[d]	ND	ND	ND	ND	ND	207	LD
1977[e]	(f)	NS	NS	[6	+	+]	NS	I	0.8	ND	ND	ND	ND	ND	ND	ND	ND	9	LD
1978	6 Sep	7	26	[47	+	+]	NS	80	6.7	ND	ND	1[d]	ND	ND	ND	ND	ND	31	LD

[e] *A report was received that approximately 17 salmon had been killed below Woodruff Dam on Catherine Creek by blasting caps. Investigations produced the remains of five blasting caps but fish were never recovered.*

[f] *All surveys were conducted between 30 Aug and 2 Sep in 1977.*

Appendix Table A-2. Continued.

		Redds						Total	Redds/	Dead fish				Total	Live fish		Total	Total	
Year	Date	I	III	IV	V	VI	VII	redds	mile	M	F	J	U	dead	A	J	live	fish	Ref.
1979	3 Sep	0	5	[36	+	+]	NS	41	3.4	ND	ND	0[d]	ND	ND	ND	ND	ND	11	LD
1980	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1981	3 Sep	3	3	[16	+	+]	NS	22	1.8	ND	ND	0[d]	ND	ND	ND	ND	ND	9	LD
1982	1, 7 Sep	14	7	[42	+	+]	NS	63	5.3	ND	ND	0[d]	ND	ND	ND	ND	ND	40	LD
1983	6, 7, 9 Sep	11	4	[43	+	+]	NS	58	4.8	ND	ND	1[d]	ND	ND	ND	ND	ND	35	LD
1984	5 Sep	1	4	[23	+	+]	NS	28	2.3	3	6	1[d]	0	10	17	2	19	31	(g)
1985	4 Sep	3	7	[22	+	+]	NS	32	2.7	ND	ND	0[d]	ND	ND	ND	ND	ND	20	LD
1986	4 Sep	8	21	[47	+	+]	(h)	76	6.3	5	5	0	0	10	31	1	32	42	(g)
1987[i]	2 Sep	14	35	28	40	35	(h)	152	12.7	26	30	1	6	63	76	4	80	143	LD
1988[i]	31 Aug, 1-2 Sep	38	39	35	37	27	(h)	176	14.7	75	75	0	16	166	23	0	23	189	Cards
1989[i]	29 Aug	6	1	17	8	6	(h)	38	3.2	1	4	0	0	5	21	0	21	26	Cards
1990	29 Aug	6	7	10	7	2	(h)	32	2.7	1	3	0	0	4	27	1	28	32	Cards
1991	31 Aug	3	1	4	9	2	(h)	19	1.6	4	4	0	0	8	15	2	17	25	Cards
1992	3 Sep	5	0	14	18	4	(h)	41	3.4	4	1	0	0	5	48	0	48	53	Cards
1993	2 Sep	7	2	17	31	6	(h)	63	5.3	9	9	0	0	18	14	0	14	32	Cards
1994	29 Aug	0	0	4	0	0	(h)	4	0.3	0	0	0	0	0	5	0	5	5	Cards
1995	29 Aug	0	0	2	5	0	(h)	7	0.6	0	1	0	0	1	4	0	4	5	Cards
1996	27 Aug	1	0	1	5	2	(h)	9	0.8	0	1	0	0	1	11	1	12	13	Cards
1997	26 Aug	7	2	6	4	2	(h)	21	1.8	2	2	0	0	4	25	1	26	30	Tables
1998	25 Aug	4	0	3	0	2	(h)	9	0.8	0	1	0	0	1	8	1	9	10	Tables
1999	31 Aug	1	0	6	8	2	(h)	17	1.4	0	4	0	0	4	16	0	16	20	Tables
2000	29 Aug	2	0	0	4	1	(h)	7	0.6	1	0	0	0	1	4	0	4	5	Tables
2001	28 Aug	10	1	12	9	1		33	2.8	0	2	0	0	2	50	2	52	54	Tables
2002	27 Aug	6	1	36	28	15	(h)	86	7.2	13	8	0	2	23	83	1	84	107	Tables
2003	26 Aug	7	2	13	3	0	(h)	25	2.1	4	4	0	4	12	74	0	74	86	Tables

[g] *La Grande District field notes.*
[h] *Extensive survey unit. Results are reported in Appendix Table C-2.*
[i] *Chinook salmon outplanted from Lookingglass Hatchery: 268 M, 431 F, 1 J in 1987; 281 M, 426 F, 4 J in 1988; and 37 M, 44 F in 1989.*

Appendix Table A-3. Indian Creek, Grande Ronde River Basin, spring Chinook salmon survey counts from 1968 through 1994. No surveys were conducted in 1977, and 1979-1991. Survey unit: I = Mouth of Little Indian Creek downstream three miles (3 miles). Abbreviations are as follows: M = male, F = female, J = jack, U = unknown sex, A = adults, J = jacks, Ref. = reference, ND = no data. Abbreviations for the references are given in Table 1, page 14.

		Redds	Redds/	Total	Live fish		Total	
Year	Date	I	mile	dead fish	A	J	Live fish	Ref.
1968	16 Sep	10	3.3	2	0	0	0	LD
1969	8 Sep	2	0.7	1	4	0	4	LD
1970	10 Sep	10	3.3	0	0	1	1	LD
1971	10 Sep	0	0.0	0	0	0	0	LD
1972	11 Sep	19	6.3	15	0	0	0	LD
1973	11 Sep	7	2.3	ND	ND	0	ND	LD
1974	6 Sep	1	0.3	ND	ND	0	ND	LD
1975	5 Sep	0	0.0	ND	ND	0	ND	LD
1976	14 Sep	0	0.0	ND	ND	0	ND	LD
1978	11 Sep	11	3.7	ND	ND	0	ND	LD
1992	10 Sep	0[a]	0.0	1	0	0	0	Cards
1993	9 Sep	2[b]	0.7	1	0	0	0	Cards
1994	23 Sep	0[c]	0.0	0	0	0	0	Cards

[a] *East Fork to Gari Price Hydro Plant intake.*
[b] *Midway to lower end, upper fence line to mouth of Little Indian Creek, and mouth of Little Indian Creek to Beck's second road crossing (3 miles).*
[c] *Downstream boundary of Beck's to the Gari Price Hydro Plant.*

Appendix Table A-4. Lookingglass Creek, Grande Ronde River Basin, spring Chinook salmon index survey counts from 1955 through 2003. Index survey unit: I = Summer Creek to Little Lookingglass Creek (6.2 miles). Abbreviations are as follows: M = male, F = female, J = jack, U = unknown sex, A = adults, J = jacks, Ref. = reference, ND = no data, NS = no survey. Abbreviations for the references are given in Table 1, page 14.

		Redds	Redds/	Dead fish				Total	Live fish		Total	
Year	Date	I	mile	M	F	J	U	dead	A	J	live	Ref.
1955	28 Aug	19	3.1	ND	ND	0	ND	0	13	8	21	EOS
1956	27 Aug	102	16.5	ND	ND	1	ND	7	102	54	156	EOS
1957	31 Aug	418	67.4	ND	ND	11	ND	210	324	20	344	EOS
1958	28 Aug	47	7.6	ND	ND	1	ND	6	53	0	53	EOS
1959	28 Aug	27	4.4	ND	ND	0	ND	1	22	14	36	EOS
1960	30 Aug	75	12.1	ND	ND	0	ND	3	44	3	47	EOS
1961	31 Aug	82	13.2	ND	ND	0	ND	19	53	12	65	EOS
1962	30 Aug	83	13.4	ND	ND	0	ND	12	53	6	59	EOS
1963	27 Aug	55	8.9	ND	ND	2	ND	4	21	17	38	EOS
1964	27 Aug	141	22.7	ND	ND	7	ND	38	119	12	131	EOS
1965	26 Aug	101	16.3	ND	ND	1	ND	7	64	15	79	EOS
1966	29 Aug	210	33.9	ND	ND	0	ND	47	165	5	170	EOS
1967	24 Aug	92	14.8	ND	ND	4	ND	16	58	9	67	EOS
1968	22 Aug	92	14.8	ND	ND	0	ND	4	73	35	108	EOS
1969	25 Aug	165	26.6	ND	ND	0	ND	14	146	26	172	EOS
1970	24 Aug	188	30.3	ND	ND	0	ND	12	190	7	197	EOS
1971	26-27 Aug	149	24.0	ND	ND	1	ND	15	89	11	100	EOS
1972	24-25 Aug	63	10.2	ND	ND	0	ND	5	33	5	38	EOS
1973	27 Aug	101	16.3	ND	ND	0	ND	6	69	3	72	EOS
1974	26 Aug	27	4.4	ND	ND	0	ND	0	19	0	19	EOS
1975	28 Aug	28	4.5	ND	ND	0	ND	3	24	0	24	EOS
1976	9 Sep	40	6.5	ND	ND	ND	ND	ND	ND	7	ND	LD
1977	ND	32	5.2	ND	ND	ND	ND	ND	ND	ND	ND	LD
1978	12 Sep	25	4.0	ND	ND	ND	ND	ND	ND	0	ND	LD
1979	28 Aug	13	2.1	ND	ND	ND	ND	ND	ND	0	ND	LD
1980[a]	ND	29	4.7	ND	ND	ND	ND	ND	ND	ND	ND	ND
1981	4 Sep	7	1.1	ND	ND	ND	ND	ND	ND	0	ND	LD
1982	2 Sep	26	4.2	ND	ND	ND	ND	ND	ND	0	ND	LD
1983	14 Sep	7	1.1	ND	ND	ND	ND	ND	ND	0	ND	LD
1984[b]	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	LD
1985	5 Sep	12	1.9	ND	ND	ND	ND	ND	ND	0	ND	LD
1986	3 Sep	5	0.8	ND	ND	ND	ND	ND	ND	0	ND	LD
1987	3 Sep	18	2.9	1	2	0	0	3	6	0	6	Cards
1988	1 Sep	53	8.5	5	6	0	0	11	8	0	8	Cards
1989	8 Sep	18	2.9	0	4	0	1	5	2	0	2	Cards

[a] *No report. Data from summary tables.*
[b] *Weir prevented any fish from reaching index survey unit in 1984.*

Appendix Table A-4. Continued.

Year	Date	Redds I	Redds/ mile	Dead fish M	F	J	U	Total dead	Live fish A	J	Total live	Ref.
1990	30 Aug	19	3.1	0	0	0	0	0	21	0	21	Cards
1991	9 Sep	7	1.1	1	1	0	0	2	1	0	1	Cards
1992	9 Sep	21	3.4	0	2	0	1	3	11	0	11	Cards
1993	9 Sep	89	14.4	28	49	1	1	79	2	0	2	Cards
1994	6 Sep	14	2.3	1	3	0	0	4	8	0	8	Cards
1995	8 Sep	2	0.3	0	1	0	0	1	0	0	0	Cards
1996[c]	9 Sep	23	3.7	0	0	0	0	0	24	0	24	Cards
1997	8 Sep	24	3.9	1	3	0	0	4	5	0	5	Tables
1998	8 Sep	1	0.2	0	0	0	0	0	0	0	0	Tables
1999[d]	14 Sep	0	0.0	0	0	0	0	0	0	0	0	Tables
2000[d]	7 Sep	0	0.0	0	0	0	0	0	0	0	0	Tables
2001[d]	7 Sep	0	0.0	0	0	0	0	0	0	0	0	Tables
2002[d]	6 Sep	0	0.0	0	0	0	0	0	0	0	0	Tables
2003[d]	5 Sep	0	0.0	0	0	0	0	0	0	0	0	Tables

[c] *Sixteen fish were removed before the index survey date (Dead Fish: 1M, 1F; Live Fish: 5M, 9F).*
[d] *Chinook salmon were trapped at Lookingglass Hatchery and not allowed to spawn in Lookingglass Creek above the hatchery.*

Appendix Table A-5. Sheep Creek, Grande Ronde River Basin, spring Chinook salmon index and extensive survey counts from 1967 through 1995. Survey units: I = Fork to NF Road 5160 Road Culvert (extensive survey, 4.5 miles), II = NF Road 5160 Road Culvert to mouth (index survey, 6.3 miles). Abbreviations are as follows: M = male, F = female, J = jack, U = unknown sex, A = adults, J = jacks, Ref. = reference, ND = no data, NS = no survey, I = incomplete survey of the index survey units. Abbreviations for the references are given in Table 1, page 14.

		Redds		Total	Redds/	Dead fish				Total	Live fish		Total	Total	
Year	Date	I[a]	II	redds	mile	M	F	J	U	dead	A	J	live	fish	Ref.
1967	28 Sep	24[b]	ND	I	I	0	0	0	0	0	0	0	0	0	LD
1968	13 Sep	13[c]	ND	I	I	0	0	0	0	0	1	2	3	3	LD
1969	5 Sep	NS	106	106	16.8	2	5	3	0	10	ND	ND	97	107	LD
1970	12 Sep	NS	74	74	11.7	ND	ND	ND	ND	0	11	4	15	18	LD
1971	8 Sep	NS	58	58	9.2	ND	ND	ND	ND	0	3	2	5	5	LD
1972	8 Sep	NS	69	69	11.0	ND	ND	ND	ND	7	20	4	24	31	LD
1973	10 Sep	NS	21	21	3.3	ND	ND	0	ND	ND	ND	0	ND	3	LD
1974	5 Sep	NS	19	19	3.0	ND	ND	0	ND	ND	ND	0	ND	4	LD
1975	4 Sep	NS	22	22	3.5	ND	ND	ND[d]	ND	ND	ND	ND[d]	ND	16	LD
1976	13 Sep	NS	18	18	2.9	ND	ND	0	ND	ND	ND	0	ND	10	LD
1977	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1978	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1979	28 Aug	NS	0	0	0.0	ND	ND	0	ND	ND	ND	0	ND	0	LD
1980	2 Sep	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1981	8 Sep	NS	8	8	1.3	ND	ND	0	ND	ND	ND	0	ND	2	LD
1982	8 Sep	NS	18	18	2.9	ND	ND	0	ND	ND	ND	0	ND	3	LD
1983	13 Sep	NS	5	5	0.8	ND	ND	0	ND	ND	ND	0	ND	3	MO
1984	7 Sep	NS	18	18	2.9	ND	ND	0	ND	ND	ND	0	ND	9	MO
1985	11 Sep	NS	30	30	4.8	ND	ND	0	ND	ND	ND	0	ND	7	MO
1986	2 Sep	6[e]	ND	I	I	ND	ND	0	ND	ND	ND	0	ND	4	MO
1987	31 Aug	2	7	7	1.1	0	0	0	0	0	3	0	3	3	Cards
1988	29 Aug	15	0	0	0.0	0	0	0	0	0	1	0	1	1	Cards
1989	25 Aug	1	0	0	0.0	0	0	0	0	0	1	0	1	1	Cards
1990	25, 27 Aug	1	0	0	0.0	0	0	0	0	0	2	0	2	2	Cards
1991	5 Sep	0	0	0	0.0	0	0	0	0	0	0	0	0	0	Cards
1992	1 Sep	2	5	5	0.8	0	0	0	0	0	0	0	0	0	Cards
1993	3 Sep	1	0	0	0.0	0	0	0	0	0	0	0	0	0	Cards
1994	31 Aug	0	0	0	0.0	0	0	0	0	0	0	0	0	0	Cards
1995	5 Sep	0	0	0	0.0	0	0	0	0	0	0	0	0	0	Cards

[a] *Extensive survey unit I not included in total redds, redds/mile, dead and live fish counts.*
[b] *Surveyed 10 miles, unknown starting and stopping point.*
[c] *Surveyed 4.5 miles, unknown starting and stopping point.*
[d] *Report did not indicate if jacks were live or dead fish counts (6 jacks).*
[e] *Surveyed 9 miles, unknown survey starting and stopping point.*

Appendix Table A-6. Upper mainstem Wallowa River, Grande Ronde River Basin, spring Chinook salmon index survey counts from 1955 through 2003. Index survey units: I = McClarren Lane or Dorrance Road Bridge to Eggleson Lane Bridge (1.5 miles), II = Eggleson Lane Bridge to Hatchery Intake (or Second Railroad Trestle, 3.0 miles). Abbreviations are as follows: M = male, F = female, J = jack, U = unknown sex, A = adults, J = jacks, Ref. = reference, ND = no data, NS = no survey, I = incomplete survey of the index survey units. Abbreviations for the references are given in Table 1, page 14.

		Redds		Total	Redds/	Dead fish				Total	Live fish		Total	
Year	Date	I	II	redds	mile	M	F	J	U	dead	A	J[a]	live	Ref.
1955	26 Aug	NS	29	I	9.7	ND	ND	0	ND	0	1	0	1	EOS
1956	29 Aug	NS	5	I	1.7	ND	ND	0	ND	1	2	0	2	EOS
1957	27 Aug	NS	28	I	9.3	ND	ND	ND	ND	1	22	8	30	EOS
1958	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1959	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1960	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1961	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1962	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1963	24 Sep	[37	+]	37	8.2	ND	ND	ND	ND	8	1	0	1	LD
1964	4 Sep	[35	+]	35	7.8	ND	ND	ND	ND	1	ND	ND	24[b]	WD
1965	31 Aug	[32	+]	32	7.1	ND	ND	ND	ND	0	ND	ND	20[b]	WD
1966	24 Aug	[14	+]	14	3.1	ND	ND	ND	ND	0	ND	ND	16[b]	WD
1967	25 Aug	[15	+]	15	3.3	ND	ND	ND	ND	2	5	0	5	WD
1968	26 Aug	[11	+]	11	2.4	ND	ND	ND	ND	0	23	5	28	WD
1969	27 Aug	[17	+]	17	3.8	ND	ND	ND	ND	1	11	1	12	WD
1970	ND	[14	+]	14	3.1	ND	ND	ND	ND	ND	ND	ND	ND	WD
1971	26 Aug	[12	+]	12	2.7	ND	ND	ND	ND	0	2	0	2	WD
1972	25 Aug	[5	+]	5	1.1	ND	ND	ND	ND	0	5	0	5	WD
1973	27 Aug	[11	+]	11	2.4	ND	ND	ND	ND	0	5	0	5	WD
1974	27 Aug	[7	+]	7	1.6	ND	ND	ND	ND	0	0	0	0	WD
1975	26 Aug	[1	+]	1	0.2	ND	ND	ND	ND	0	0	0	0	WD
1976	26 Aug	[15	+]	15	3.3	ND	ND	ND	ND	0	15	0	15	WD
1977	24 Aug	[2	+]	2	0.4	ND	ND	ND	ND	0	0	0	0	WD
1978	28 Aug	[18	+]	18	4.0	ND	ND	ND	ND	ND[c]	ND	0	ND[c]	WD
1979	21 Aug	[0	+]	0	0.0	ND	ND	ND	ND	ND[c]	ND	0	ND[c]	WD
1980	25 Aug	[1	+]	1	0.2	ND	ND	ND	ND	ND[c]	ND	0	ND[c]	WD
1981	24 Aug	[0	+]	0	0.0	ND	ND	ND	ND	ND[c]	ND	0	ND[c]	WD
1982	25 Aug	[1	+]	1	0.2	ND	ND	ND	ND	ND[c]	ND	0	ND[c]	WD
1983	26 Aug	[5	+]	5	1.1	ND	ND	ND	ND	0	1	0	1	WD
1984	10 Sep	[12	+]	12	2.7	ND	ND	ND	ND	1	5	2	7	WD
1985	22 Aug	[3	+]	3	0.7	ND	ND	ND	ND	0	11	1	12	WD
1986	25 Aug	[7	+]	7	1.6	ND	ND	ND	ND	0	6	1	7	WD
1987[d]	25 Aug	9	6	15	3.3	0	0	0	0	0	16	0	16	Cards
1988[d]	22 Aug	4	3	7	1.6	1	1	0	1	3	11	0	11	Cards
1989[d]	21 Aug	0	0	0	0.0	0	0	0	0	0	0	0	0	Cards

[a] *Wallowa District Reports (WD) did not indicate if jacks were live, dead, or total counts.*
[b] *Reports did not indicate if jacks were included in total live and dead fish counts (1964-1966).*
[c] *Total fish counts, 1978-1982: 9, 0, 0, 0, 0.*
[d] *Chinook salmon outplanted from Lookingglass Hatchery: 162 M, 220 F, 8 J in 1987; 43 M, 47 F, 1 J in 1988; and 45 M, 43 F in 1989.*

Appendix Table A-6. Continued.

		Redds		Total	Redds/	Dead fish				Total	Live fish		Total	
Year	Date	I	II	redds	mile	M	F	J	U	dead	A	J[a]	live	Ref.
1990	21 Aug	0	0	0	0.0	0	0	0	0	0	0	0	0	Cards
1991	22 Aug	0	1	1	0.2	0	0	0	0	0	1	1	2	Cards
1992	24 Aug	0	0	0	0.0	0	0	0	0	0	0	0	0	Cards
1993	23 Aug	0	1	1	0.2	0	0	0	0	0	3	0	3	Cards
1994	22 Aug	0	0	0	0.0	0	0	0	0	0	0	0	0	Cards
1995	21 Aug	0	0	0	0.0	0	0	0	0	0	0	0	0	Cards
1996	21 Aug	0	0	0	0.0	0	0	0	0	0	0	0	0	Cards
1997	18 Aug	1	1	2	0.4	1	0	0	0	1	0	0	0	Tables
1998	17 Aug	0	0	0	0.0	0	0	0	0	0	0	0	0	Tables
1999	23 Aug	0	0	0	0.0	0	0	0	0	0	0	0	0	Tables
2000	21 Aug	0	0	0	0.0	0	0	0	0	0	0	0	0	Tables
2001	20 Aug	0	0	0	0.0	0	0	0	0	0	7	0	7	Tables
2002	19 Aug	1	0	1	0.2	0	0	0	0	0	5	0	5	Tables
2003	18 Aug	0	0	0	0.0	0	0	0	1	1	4	0	4	Tables

Appendix Table A-7. Bear Creek, Grande Ronde River Basin, spring Chinook salmon index survey counts from 1964 through 2003. Index survey units: II = Guard Station to Baker Gulch (2.3 miles), III = Baker Gulch to Boundary Campground (1.7 miles), IV = Boundary Campground to 8250 bridge (2.5 miles). Abbreviations are as follows: M = male, F = female, J = jack, U = unknown sex, A = adults, J = jacks, Ref. = reference, ND = no data. Abbreviations for the references are given in Table 1, page 14.

		Redds			Total	Redds/	Dead fish				Total	Live fish		Total	
Year	Date	II	III	IV	redds	mile	M	F	J	U	dead	A	J[a]	live	Ref.
1964	16 Sep	[24	+	+]	24	3.7	ND	ND	ND	ND	3	ND	ND	14	WD
1965	23 Aug	[15	+	+]	15	2.3	ND	ND	ND	ND	3	ND	ND	9	WD
1966	22 Aug	[12	+	+]	12	1.8	ND	ND	ND	ND	6	ND	ND	2	WD
1967	23 Aug	[11	+	+]	11	1.7	ND	ND	ND	ND	11	5	5	10	WD
1968	22 Aug	[40	+	+]	40	6.2	ND	ND	ND	ND	28	6	6	12	WD
1969	25 Aug	[23	+	+]	23	3.5	ND	ND	ND	ND	29	14	4	18	WD
1970	24 Aug	[25	+	+]	25	3.8	ND	ND	ND	ND	9	10	5	15	WD
1971	23 Aug	[30	+	+]	30	4.6	ND	ND	ND	ND	2	9	10	19	WD
1972	24 Aug	[55	+	+]	55	8.5	ND	ND	ND	ND	18	23	6	29	WD
1973	22 Aug	[16	+	+]	16	2.5	ND	ND	ND	ND	3	7	1	8	WD
1974	21 Aug	[21	+	+]	21	3.2	ND	ND	ND	ND	2	19	2	21	WD
1975	21 Aug	[33	+	+]	33	5.1	ND	ND	ND	ND	0	12	0	12	WD
1976	24 Aug	[17	+	+]	17	2.6	ND	ND	ND	ND	7	6	0	6	WD
1977	23 Aug	[12	+	+]	12	1.8	ND	ND	ND	ND	4	1	0	1	WD
1978	30 Aug	[25	+	+]	25	3.8	ND	ND	ND	ND	ND[b]	ND	0	ND[b]	WD
1979	21 Aug	[4	+	+]	4	0.6	ND	ND	ND	ND	ND[b]	ND	0	ND[b]	WD
1980	27 Aug	[8	+	+]	8	1.2	ND	ND	ND	ND	ND[b]	ND	0	ND[b]	WD
1981	25 Aug	[4	+	+]	4	0.6	ND	ND	ND	ND	ND[b]	ND	0	ND[b]	WD
1982	24 Aug	[12	+	+]	12	1.8	ND	ND	ND	ND	ND[b]	ND	0	ND[b]	WD
1983	23 Aug	[6	+	+]	6	0.9	ND	ND	ND	ND	3	0	0	0	WD
1984	27 Aug	[11	+	+]	11	1.7	ND	ND	ND	ND	5	4	0	4	WD
1985	28 Aug	[6	+	+]	6	0.9	ND	ND	ND	ND	0	0	0	0	WD
1986	25 Aug	[10	+	+]	10	1.5	ND	ND	ND	ND	3	6	1	7	WD
1987	24 Aug	2	6	2	10	1.5	0	0	0	1	1	0	0	0	Cards
1988	22 Aug	5	0	0	5	0.8	0	1	0	1	2	1	0	1	Cards
1989	21 Aug	2	0	0	2	0.3	0	1	0	0	1	1	0	1	Cards

[a] *Wallowa District Reports (WD) did not indicate if jacks were live, dead, or total counts.*

[b] *Total fish (dead and live), 1978-1982: 11, 8, 6, 2, and 13.*

Appendix Table A-7. Continued.

		Redds			Total	Redds/	Dead fish				Total	Live fish		Total	
Year	Date	II	III	IV	redds	mile	M	F	J	U	dead	A	J[a]	live	Ref.
1990	21 Aug	1	0	1	2	0.3	0	1	0	0	1	0	0	0	Cards
1991	23 Aug	2	0	0	2	0.3	1	0	0	0	1	2	0	2	Cards
1992	25 Aug	0	0	0	0	0.0	1	2	0	0	3	0	0	0	Cards
1993	24 Aug	2	1	6	9	1.4	1	2	0	0	3	1	0	1	Cards
1994	23 Aug	0	0	0	0	0.0	0	0	0	0	0	0	0	0	Cards
1995	22 Aug	0	0	0	0	0.0	0	0	0	0	0	0	0	0	Cards
1996	20 Aug	0	0	0	0	0.0	0	0	0	0	0	0	0	0	Cards
1997	19 Aug	0	0	0	0	0.0	0	0	0	0	0	0	0	0	Tables
1998	18 Aug	1	0	0	1	0.2	0	0	0	0	0	3	0	3	Tables
1999	24 Aug	0	0	0	0	0.0	0	0	0	0	0	0	0	0	Tables
2000	22 Aug	0	0	0	0	0.0	0	0	0	0	0	1	0	1	Tables
2001	21 Aug	0	1	0	1	0.2	0	0	0	0	0	3	0	3	Tables
2002	20 Aug	5	2	2	9	1.4	1	5	0	0	6	4	0	4	Tables
2003	19 Aug	1	0	1	2	0.3	1	1	0	0	2	2	0	2	Tables

Appendix Table A-8. Hurricane Creek, Grande Ronde River Basin, spring Chinook salmon index counts from 1955 through 2003. Index survey units: I = Dorrance Road Bridge to Eggleson Lane Bridge (1.25 miles), II = Eggleson Lane Bridge to Mouth (2.25 miles). Abbreviations are as follows: M = male, F = female, J = jack, U = unknown sex, A = adults, J = jacks, Ref. = reference, ND = no data, NS = no survey, I = incomplete survey of the index survey units. Abbreviations for the references are given in Table 1, page 14.

		Redds		Total	Redds/	Dead fish				Total	Live fish		Total	
Year	Date	I	II	redds	mile	M	F	J	U	dead	A	J	Live	Ref.
1955	26 Aug	NS	35	I	10.0	ND	ND	0	ND	2	10	3	13	EOS
1956	29 Aug	15	25	40	11.4	ND	ND	0	ND	5	16	3	19	EOS
1957	27 Aug	32	15	47	13.4	ND	ND	0	ND	1	33	13	46	EOS
1958	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1959	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1960	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1961	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1962	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1963	25 Sep	[29	+]	29	8.3	ND	ND	ND	ND	7	ND	0	ND	LD
1964	4 Sep	[28	+]	28	8.0	ND	ND	ND	ND	4	37	ND	37	WD
1965	30 Aug	[17	+]	17	4.9	ND	ND	ND	ND	1	7	ND	7	WD
1966	24 Aug	[1	+]	1	0.3	ND	ND	ND	ND	0	0	ND	0	WD
1967	24 Aug	[3	+]	3	0.9	ND	ND	ND	ND	0	4	1	5	WD
1968	24 Aug	[20	+]	20	5.7	ND	ND	ND	ND	0	36	5	41	WD
1969	24 Aug	[9	+]	9	2.6	ND	ND	ND	ND	ND	7	ND	ND	WD
1970	27 Aug	[17	+]	17	4.9	ND	ND	ND	ND	0	13	2	15	WD
1971	25 Aug	[23	+]	23	6.6	ND	ND	ND	ND	1	2	1	3	WD
1972	25 Aug	[18	+]	18	5.1	ND	ND	ND	ND	1	2	1	3	WD
1973	24 Aug	[10	+]	10	2.9	ND	ND	ND	ND	0	3	0	3	WD
1974	26 Aug	[11	+]	11	3.1	ND	ND	ND	ND	0	3	2	5	WD
1975	9 Sep	[2	+]	2	0.6	ND	ND	ND	ND	0	3	3	6	WD
1976	23 Aug	[0	+]	0	0.0	ND	ND	ND	ND	0	1	0	1	WD
1977	22 Aug	[0	+]	0	0.0	ND	ND	ND	ND	1	4	1	5	WD
1978	28 Aug	[11	+]	11	3.1	ND	ND	ND	ND	ND[a]	ND	0	ND[a]	WD
1979	20 Aug	[0	+]	0	0.0	ND	ND	ND	ND	ND[a]	ND	0	ND[a]	WD
1980	25 Aug	[0	+]	0	0.0	ND	ND	ND	ND	ND[a]	ND	0	ND[a]	WD
1981	24 Aug	[1	+]	1	0.3	ND	ND	ND	ND	ND[a]	ND	0	ND[a]	WD

[a] *Total fish (dead and live), 1978-1982 = 11, 0, 0, 6, 7.*

Appendix Table A-8. Continued.

Year	Date	Redds I	Redds II	Total redds	Redds/ mile	Dead fish M	Dead fish F	Dead fish J	Dead fish U	Total dead	Live fish A	Live fish J	Total live	Ref.
1982	23 Aug	[9	+]	9	2.6	ND	ND	ND	ND	ND[a]	ND	0	ND[a]	WD
1983	22 Aug	[7	+]	7	2.0	ND	ND	ND	ND	1	0	0	0	WD
1984	24 Aug	[0	+]	0	0.0	ND	ND	ND	ND	0	0	0	0	WD
1985	21 Aug	[20	+]	20	5.7	ND	ND	ND	ND	0	30	2	32	WD
1986	25 Aug	[5	+]	5	1.4	ND	ND	ND	ND	0	3	1	4	WD
1987	24 Aug	21	1	22	6.3	1	0	0	0	1	20	1	21	Cards
1988	22 Aug	5	4	9	2.6	0	1	0	0	1	23	0	23	Cards
1989	21 Aug	2	0	2	0.6	0	0	0	0	0	5	0	5	Cards
1990	21 Aug	0	0	0	0.0	0	0	0	0	0	1	0	1	Cards
1991	23 Aug	4	0	4	1.1	0	0	0	0	0	2	0	2	Cards
1992	24 Aug	0	1	1	0.3	0	0	0	0	0	6	0	6	Cards
1993	23 Aug	12	7	19	5.4	0	2	0	1	3	20	0	20	Cards
1994	22 Aug	0	0	0	0.0	0	0	0	0	0	0	0	0	Cards
1995	21, 30 Aug	0	0	0	0.0	0	0	0	0	0	0	1	1	Cards
1996	26 Aug	[3	+]	3	0.9	0	1	0	0	1	2	0	2	Cards
1997	9 Sep	[9	+]	9	2.6	0	4	0	0	4	4	0	4	Tables
1998	25 Aug	[0	+]	0	0.0	0	0	0	0	0	0	0	0	Tables
1999	15 Sep	[6	+]	6	1.7	0	2	0	0	2	3	1	4	Tables
2000	31 Aug	[12	+]	12	3.4	1	0	0	0	1	13	4	17	Tables
2001	25 Aug	[7	+]	7	2.0	0	0	0	1	1	26	1	27	Tables
2002	28 Aug	[8	+]	8	2.3	0	0	0	0	0	12	1	13	Tables
2003	27 Aug	[3	+]	3	0.9	0	0	0	0	0	6	3	9	Tables

Appendix Table A-9. Lostine River, Grande Ronde River Basin, spring Chinook salmon index survey counts from 1950 through 2003. Index survey unit: IV = "Six-mile bridge to Lostine River Ranch bridge (3.0 miles). Abbreviations are as follows: M = male, F = female, J = jack, U = unknown sex, A = adults, J = jacks, Ref. = reference, ND = no data, NS = no survey. Abbreviations for the references are given in Table 1, page 14.

		Redds	Redds/	Dead fish				Total	Live fish		Total	
Year	Date	IV	mile	M	F	J	U	dead	A	J	live	Ref.
1950	20 Aug	46[a]	15.3	ND	ND	ND	ND	7	ND	ND	14[b]	EOS
1951	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1952	16 Aug	47[a]	15.7	ND	ND	ND	ND	3	10	2	12	EOS
1953	27 Aug	46[a]	15.3	ND	ND	ND	ND	12	ND	ND	0[b]	EOS
1954	19 Aug	89[a]	29.7	ND	ND	3	ND	15	39	10	49	EOS
1955	21 Aug	107[a]	35.7	ND	ND	5	ND	33	38	12	50	EOS
1956	23 Aug	55[a]	18.3	ND	ND	1	ND	11	52	19	71	EOS
1957	21 Aug	157	52.3	ND	ND	ND	ND	40	28	13	41	EOS
1958[c]	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1959	26 Aug	66	22.0	ND	ND	3	ND	40	54	22	76	EOS
1960	26 Aug	73	24.3	ND	ND	3	ND	36	29	2	31	EOS
1961	28 Aug	25	8.3	ND	ND	1	ND	4	15	14	29	EOS
1962	26 Aug	40	13.3	ND	ND	6	ND	29	21	17	38	EOS
1963	24 Aug	48	16.0	ND	ND	4	ND	16	49	41	90	EOS
1964	29 Aug	114	38.0	ND	ND	6	ND	86	102	6	108	EOS
1965	23 Aug	65	21.7	ND	ND	0	ND	6	30	34	64	EOS
1966	27 Aug	107	35.7	ND	ND	14	ND	118	42	20	62	EOS
1967	26 Aug	99	33.0	ND	ND	21	ND	97	96	43	139	EOS
1968	26 Aug	106	35.3	ND	ND	8	ND	72	186	26	212	EOS
1969	26 Aug	99	33.0	ND	ND	5	ND	100	50	19	69	EOS
1970	25 Aug	76	25.3	ND	ND	6	ND	49	81	33	114	EOS
1971	30 Aug	76	25.3	ND	ND	6	ND	45	57	10	67	EOS
1972	28 Aug	125	41.7	ND	ND	5	ND	107	104	5	109	EOS
1973	28 Aug	138	46.0	ND	ND	5	ND	193	68	4	72	EOS
1974	27 Aug	114	38.0	ND	ND	1	ND	42	76	2	78	EOS
1975	26 Aug	33	11.0	ND	ND	ND	ND	14	33	4	37	EOS
1976	30 Aug	77	25.7	ND	ND	ND	ND	25	50	5[d]	55	WD
1977	26 Aug	25	8.3	ND	ND	ND	ND	9	40	0[d]	40	WD
1978	30 Aug	120	40.0	ND	ND	ND	ND	ND[e]	ND	0[d]	ND[e]	WD
1979	23 Aug	21	7.0	ND	ND	ND	ND	ND[e]	ND	3[d]	ND[e]	WD
1980	25 Aug	18	6.0	ND	ND	ND	ND	ND[e]	ND	1[d]	ND[e]	WD
1981	24 Aug	8	2.7	ND	ND	ND	ND	ND[e]	ND	1[d]	ND[e]	WD
1982	24 Aug	58	19.3	ND	ND	ND	ND	ND[e]	ND	1[d]	ND[e]	WD
1983	24 Aug	39	13.0	ND	ND	ND	ND	23	31	0[d]	31	WD

[a] *Surveys may have ended within 0.5 mile of the present day "Lostine River Ranch" bridge site (1950, down 3.25 miles; 1952, to 4 mile post; 1953, to 3.5 mile post; 1954, downstream for 3 miles; 1955, to farm bridge at 3.5 mile; 1956, to white farm house).*

[b] *Report did not indicate if total dead fish count included jacks.*

[c] *No survey conducted in 1958 due to flash flood.*

[d] *Report did not indicate if jack counts were live, dead, or combined.*

[e] *Report did not indicate if total fish were live, dead, or combined (Total Fish: 1978-1982 = 139, 20, 20, 15, 100).*

Appendix Table A-9. Continued.

Year	Date	Redds IV	Redds/ mile	Dead fish M	F	J	U	Total dead	Live fish A	J	Total live	Ref.
1984	27 Aug	57	19.0	ND	ND	ND	ND	37	37	0[d]	37	WD
1985	26 Aug	68	22.7	ND	ND	ND	ND	36	40	6[d]	46	WD
1986	27 Aug	48	16.0	6	7	1	0	13	47	5	51	Tables
1987	27 Aug	49	16.3	1	11	0	0	12	42	0	42	Cards
1988	23 Aug	107	35.7	23	35	0	9	67	46	4	50	Cards
1989	23 Aug	20	6.7	7	6	0	1	14	16	0	16	Cards
1990	23 Aug	16	5.3	2	3	0	0	5	9	0	9	Cards
1991	27 Aug	11	3.7	3	7	0	0	10	4	0	4	Cards
1992	26 Aug	14	4.7	3	3	0	0	6	24	0	24	Cards
1993	26 Aug	66	22.0	3	13	0	0	16	32	0	32	Cards
1994	25 Aug	7	2.3	0	0	0	0	0	6	0	6	Cards
1995	23 Aug	6	2.0	0	0	0	0	0	4	0	4	Cards
1996	21 Aug	13	4.3	0	2	0	0	2	12	0	12	Cards
1997	21 Aug	27	9.0	0	2	0	0	2	20	0	20	Tables
1998	20 Aug	9	3.0	0	3	0	0	3	10	0	10	Tables
1999	26 Aug	40	13.3	6	4	0	0	10	27	0	27	Tables
2000	25 Aug	34	11.3	3	5	0	2	10	18	1	19	Tables
2001	24 Aug	41	13.7	5	6	0	3	14	37	2	39	Tables
2002	23 Aug	85	28.3	15	30	1	1	47	79	3	82	Tables
2003	22 Aug	31[f]	I	2	11	0	4	17	37	4	41	Tables

[f] *0.2 miles below Six-mile bridge to Lostine River Ranch bridge (2.8 miles).*

Appendix Table A-10. Minam River, Grande Ronde River basin, spring Chinook salmon index survey counts from 1954 through 2003. Index survey units: I = Elk Creek Survey (1 mile), II = Camp One Survey (0.5 mile), III = Rock Creek Survey (0.5 mile), IV = Little Pot Survey (0.5 mile), V = Splash Dam Survey (1 mile), VI = Salmon Hole to Bridge at Red's Horse Ranch 1984-2003 (1.4 miles), VII = Bridge at Red's Horse Ranch to Bluff 1984-2003 (3.4), VI-VII = from 1954-1983 Salmon Hole to Little Minam River (6.5 miles), VIII = Little Minam River, falls to 0.25 miles below Big Canyon Creek (1.5 miles). Abbreviations are as follows: M = male, F = female, J = jack, U = unknown sex, A = adults, J = jacks, Ref. = reference, ND = no data, NS = no survey, I = incomplete survey of the index survey units. Abbreviations for the references are given in Table 1, page 14.

		Redds								Total	Redds/	Dead fish				Total	Live fish		Total	
Year	Date	I	II	III	IV	V	VI	VII	VIII	redds	mile	M	F	J	U	dead	A	J	live	Ref.
1954	16-17 Aug	NS	NS	NS	NS	NS	[+	38]	28	I	8.3	ND	ND	0	ND	17	67	51	118	EOS
1955	23 Aug	NS	NS	NS	NS	NS	[+	51]	13	I	8.0	ND	ND	4	ND	17	51	81	132	EOS
1956	30 Aug	NS	NS	NS	NS	NS	[+	116]	NS	I	17.8	ND	ND	9	ND	41	72	46	118	EOS
1957	30 Aug	NS	NS	NS	NS	NS	[+	224]	109	I	41.6	ND	ND	54	ND	655	98	30	128	EOS
1958	27 Aug	NS	NS	NS	NS	NS	[+	16][a]	NS	I	3.1	ND	ND	3	ND	8	42	6	48	EOS
1959	27-28 Aug	NS	NS	NS	NS	NS	[+	132]	54[b]	I	2.4	ND	ND	2	ND	25	121	40	161	EOS
1960	29 Aug	NS	NS	NS	NS	NS	[+	52]	20	I	9.0	ND	ND	0	ND	10	107	14	121	EOS
1961	2 Sep	NS	NS	NS	NS	NS	[+	19]	18	I	4.6	ND	ND	1	ND	3	5	0	5	EOS
1962	29 Aug	NS	NS	NS	NS	NS	[+	86]	32	I	14.8	ND	ND	6	ND	67	77	32	109	EOS
1963	26 Aug	NS	NS	NS	NS	NS	[+	43]	20	I	7.9	ND	ND	2	ND	22	46	27	73	EOS
1964[c]	28 Aug	NS	NS	NS	NS	NS	[+	83]	25	I	13.5	ND	ND	9	ND	57	110	37	147	EOS
	3 Sep	[+	+	+	+	68][d]	ND	ND	ND	I	4.7	ND	ND	ND	ND	2	ND	8	7	LD
1965	27 Aug	ND	ND	ND	ND	ND	[+	48]	27	I	9.4	ND	ND	1	ND	9	84	17	101	EOS
	24 25 Aug	[+	+	+	+	78][d]	ND	ND	ND	I	6.0	ND	ND	ND	ND	2	ND	0	57	LD
1966	26 Aug	ND	ND	ND	ND	ND	[+	44]	25	I	8.6	ND	ND	0	ND	12	182	43	225	EOS
	24-25 Aug	[+	+	+	+	77][d]	ND	ND	ND	I	5.9	ND	ND	ND	ND	7	ND	3	29	LD

[a] *Survey starts at Red's Horse Ranch.*

[b] *Includes extensive section IX on Little Minam River, Below Big Canyon Creek to mouth.*

[c] *Excessive precipitation caused flash floods on Catherine and Eagle Creeks and on the Minam River on July 30, 1964. Nine miles of Catherine Creek were surveyed in order to determine flood damage to fish life. There were 63 adult Chinook salmon found dead in this section of stream. Another 20 adult Chinook salmon were reported salvaged by the public the night of the flood. It is believed the flood did kill some fish on the Minam River.*

[d] *Upper Minam River: 1964, new survey upstream from falls and splash dam, surveyed to determine if fish passage improvement work at the falls by the Fish Commission would permit more salmon to utilize the upper river spawning gravels (14.5 miles); 1965-69, 13 miles; 1970-1979, 1981-1985, 6.0 miles.*

Appendix Table A-10. Continued.

		Redds								Total	Redds/	Dead fish				Total	Live fish		Total	
Year	Date	I	II	III	IV	V	VI	VII	VIII	redds	mile	M	F	J	U	dead	A	J	live	Ref.
1967	28 Aug	ND	ND	ND	ND	ND	[+	18]	7	I	3.1	ND	ND	4	ND	18	34	17	51	EOS
	25 Sep[e]	[+	+	+	+	32][d]	ND	ND	ND	I	2.5	ND	ND	ND	ND	4	ND	0	0	LD
1968	28 Aug	ND	ND	ND	ND	ND	[+	77]	10	I	10.9	ND	ND	9	ND	45	196	69	265	EOS
	1 Sep	[+	+	+	+	30][d]	ND	ND	ND	I	2.3	3	4	ND	ND	7	191	5	196	LD
1969	28 Aug	ND	ND	ND	ND	ND	[+	75]	7	I	10.3	ND	ND	6	ND	78	93	28	121	EOS
	4 Sep	[+	+	+	+	106][d]	ND	ND	ND	I	8.2	6	8	1	25	40	0	0	0	LD
1970	27 Aug	ND	ND	ND	ND	ND	[+	93]	8	I	12.6	ND	ND	6	ND	42	103	50	153	EOS
	2 Sep	[+	+	+	+	82][d]	ND	ND	ND	I	13.7	ND	ND	0	ND	22	5	0	5	LD
1971	1 Sep	[+	+	+	+	49][d]	[+	60]	11	120	8.6	ND	ND	3	ND	20	68	16	84	EOS/LD
1972	30 Aug	[+	+	+	+	66][d]	[+	72]	19	157	11.2	ND	ND	8	ND	83	57	5	62	EOS/LD
1973	29-30 Aug	[+	+	+	+	48][d]	[+	70]	9	127	9.1	ND	ND	2	ND	28	93	6	99	EOS/LD
1974	28-29 Aug	[+	+	+	+	36][d]	10	5[f]	22	73	5.2	ND	ND	1	ND	21	24	0	24	EOS/LD
1975	27-28 Aug	[+	+	+	+	25][d]	12	13[f]	13	63	4.5	ND	ND	0	ND	9	25	0	25	EOS/LD
1976	1-2 Sep	[+	+	+	+	24][d]	[+	28]	NS	I	4.2	ND	ND	ND	ND	ND	ND	4	ND	LD
1977	(g)	ND	ND	ND	ND	ND	[+	14]	NS	I	2.2	ND	ND	ND	ND	ND	ND	ND	ND	LD
1978	29-31 Aug	[+	+	+	+	72][d]	[+	65]	NS	I	6.3	ND	ND	ND	ND	ND	ND	0	ND	LD
1979	26-27 Aug	[+	+	+	+	6][d]	[+	3]	NS	I	0.7	ND	ND	ND	ND	ND	ND	0	ND	LD
1980	29-30 Aug	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1981	25-27 Aug	[+	+	+	+	12][d]	[+	2]	NS	I	1.1	ND	ND	ND	ND	ND	ND	0	ND	LD
1982	31 Aug-2 Sep	[+	+	+	+	13][d]	[+	9]	NS	I	1.8	ND	ND	ND	ND	ND	ND	0	ND	LD
1983	29-31 Aug	[+	+	+	+	13][d]	[+	8]	NS	I	1.7	ND	ND	ND	ND	ND	ND	1	ND	LD
1984	29-30 Aug	5	1	1	5	5 [d]	[+	6]	NS	I	2.1	ND	ND	ND	ND	ND	ND	0	ND	LD
1985	28-29 Aug	[+	+	+	+	62][d]	[+	54]	NS	I	10.7	ND	ND	ND	ND	ND	ND	2	ND	LD
1986	27-29 Aug	0	1	15	6	5	21	14	NS	I	7.5	ND	ND	ND	ND	19	8[h]	1[h]	9[h]	LD
1987	25-28 Aug	1	NS	8	12	5	8	56	NS	I	11.5	1	3	1	1	6	27	2	29	Cards

[e] *Report indicates 9/25, but this may be a typographical error.*
[f] *Bridge at Red's Horse Ranch to Little Minam River (5.1 miles).*
[g] *Report indicates surveys in 1977 were conducted "between 30-Aug and 2-Sep."*
[h] *Live fish counts were only reported from section VI.*

Appendix Table A-10. Continued.

		Redds								Total	Redds/	Dead fish				Total	Live fish		Total	
Year	Date	I	II	III	IV	V	VI	VII	VIII	redds	mile	M	F	J	U	dead	A	J	live	Ref.
1988	24-25 Aug	12	4	9	6	6	9	41	NS	I	10.5	13	12	0	4	29	27	0	27	Cards
1989	29-31 Aug	3	1	3	0	3	4	19	NS	I	4.0	3	7	0	0	10	18	0	18	Cards
1990	28-30 Aug	2	8	2	3	2	0	36	NS	I	6.4	4	2	0	0	6	31	1	32	Cards
1991	27, 29 Aug	5	6	0	4	5	4	13	NS	I	4.5	4	4	0	0	8	13	0	13	Cards
1992	25-27 Aug	2	2	2	4	4	1	1	3	19	1.6	1	5	0	0	6	12	0	12	Cards
1993	24-26 Aug	10	4	6	8	6	3	26	6	69	7.0	8	8	0	2	18	42	0	42	Cards
1994	21-23 Aug	1	0	2	1	0	1	0	0	5	0.5	1	1	0	0	2	2	0	2	Cards
1995	29-31 Aug	1	0	0	0	0	0	9	3	13	1.3	1	0	0	0	1	9	0	9	Cards
1996	28-30 Aug	1[i]	1	2[i]	4	4	10	35	5	62	6.3	1	9	0	0	10	45	0	45	Cards
1997	26-27 Aug	1	2	6	3	7	3	14	5	41	4.2	6	6	0	0	12	36	0	36	[r]
1998	25-26 Aug	7	2	6	0	5	2	9	4	35	3.6	0	4	0	0	4	6	0	6	[r]
1999	24-26 Aug	1	1	0	2	3	4	15	5	31	3.2	2	5	0	0	7	10	2	12	[r]
2000	29-31 Aug	2	2	5	6	18	7	23	0	63	6.4	4	4	1	0	9	105	2	107	[r]
2001	28-30 Aug	4	9	8	14	17	18	32	8	110	11.2	1	7	0	0	8	66	1	67	[r]
2002	27-28 Aug	15	11	18	10	12	14	51	12	143	14.6	13	33	0	3	49	70	1	71	[r]
2003	26-28 Aug	8	10	20	11	9	11	17	13	99	10.1	7	17	0	0	24	40	0	40	[r]

[i] *Includes redds counted in pre-survey.*

Appendix Table A-11. Wenaha River, Grande Ronde River Basin, spring Chinook salmon index survey counts from 1949 through 2003. Index survey unit: III = South Fork of the Wenaha River, Milk Creek to Forks (6.0 miles). Abbreviations are as follows: M = male, F = female, J = jack, U = unknown sex, A = adults, J = jacks, Ref. = reference, ND = no data, NS = no survey, I = incomplete survey of the index survey units. Abbreviations for the references are given in Table 1, page 14.

		Redds	Redds/	Dead fish				Total	Live fish		Total	
Year	Date	III	mile	M	F	J	U	dead	A	J	live	Ref.
1949	15 Aug	35	5.8	ND	ND	ND	ND	0	ND	ND	22	EOS
1950	17 Aug	49	8.2	ND	ND	ND	ND	0	ND	ND	35	EOS
1951	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1952	15 Aug	103	17.2	ND	ND	0	ND	2	28	1	29	EOS
1953	30-31 Aug	116	19.3	ND	ND	ND	ND	22	ND	ND	69	EOS
1954	23 Aug	56	9.3	ND	ND	0	ND	2	52	19	71	EOS
1955	30 Aug	32	5.3	ND	ND	2	ND	4	21	37	58	EOS
1956	28 Aug	107	17.8	ND	ND	0	ND	10	126	12	138	EOS
1957	28 Aug	293	48.8	ND	ND	3	ND	189	239	14	253	EOS
(a)	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1963	10 Sep	132	22.0	ND	ND	3[b]	ND	14	ND	ND	7	LD
1964	9 Sep	165	27.5	ND	ND	ND	ND	50	ND	ND	16[c]	WD
1965	9 Sep	79	13.2	ND	ND	ND	ND	16	ND	ND	10[c]	WD
1966	1 Sep	278	46.3	ND	ND	ND	ND	88	ND	ND	247[c]	WD
1967	28 Aug	185	30.8	ND	ND	ND	ND	23	164	6	170	WD
1968	31 Aug	128	21.3	ND	ND	ND	ND	27	58	44	102	WD
1969	1 Sep	254	42.3	ND	ND	ND	ND	60	113	8	121	WD
1970	31 Aug	279	46.5	ND	ND	ND	ND	63	162	8	170	WD
1971	31 Aug	164	27.3	ND	ND	ND	ND	23	109	12	121	WD
1972	30 Aug	71	11.8	ND	ND	ND	ND	18	62	1	63	WD
1973	30 Aug	205	34.2	ND	ND	ND	ND	12	121	2	123	WD
1974	30 Aug	49	8.9	ND	ND	ND	ND	1	13	4	17	WD
1975	28 Aug	30	5.0	ND	ND	ND	ND	2	15	0	15	WD
1976	1 Sep	20	3.3	ND	ND	ND	ND	5	3	1	4	WD
1977	1 Sep	60	10.0	ND	ND	ND	ND	7	38	0	38	WD
1978	6 Sep	77	12.8	ND	ND	ND	ND	ND	ND	0	ND	WD
1979	28 Aug	5	0.8	ND	ND	ND	ND	ND	ND	0	ND	WD
1980	3 Sep	24	4.0	ND	ND	ND	ND	ND	ND	0	ND	WD
1981	3 Sep	20	3.3	ND	ND	ND	ND	ND	ND	0	ND	WD
1982	2 Sep	27	4.5	ND	ND	ND	ND	ND	ND	0	ND	WD
1983	7 Sep	23	3.8	ND	ND	ND	ND	10	8	0	8	WD
1984	10 Sep	12	2.0	ND	ND	ND	ND	1	5	2	7	WD
1985	5 Sep	36	6.0	ND	ND	ND	ND	3	16	1	17	WD
1986	3 Sep	68	11.3	1	6	0	7	14	15	0	15	Tables
1987	7-8 Sep	62	10.3	2	6	0	0	8	5	0	5	Cards
1988	6 Sep	98	16.3	10	12	0	1	23	8	0	8	Cards
1989	5 Sep	9	1.5	1	2	0	0	3	5	0	5	Cards

[a] *No surveys conducted from 1958-1962.*
[b] *Report did not indicate if 3 jacks were alive or dead.*
[c] *Report did not indicate if jacks were included in total live and dead fish counts.*

Appendix Table A-11. Continued.

Year	Date	Redds III	Redds/ mile	Dead fish M	F	J	U	Total dead	Live fish A	J	Total live	Ref.
1990	3 Sep	31	5.2	2	5	0	0	7	12	0	12	Cards
1991	2 Sep	28	4.7	4	2	0	0	7	4	0	4	Cards
1992	7 Sep	58	9.7	5	8	0	0	13	19	0	19	Cards
1993	7 Sep	46	5.5	0	6	0	1	7	9	0	9	Cards
1994	6 Aug	12	2.0	0	0	0	0	0	2	0	2	Cards
1995	5 Sep	3	0.5	0	0	0	0	0	1	0	1	Cards
1996	3 Sep	28	4.7	1	2	0	0	3	16	0	16	Cards
1997	2 Sep	26	4.3	0	3	0	0	3	10	0	10	Tables
1998	1 Sep	24	4.0	8	3	0	0	11	13	0	13	Tables
1999	7 Sep	5	0.8	0	1	0	0	1	2	2	4	Tables
2000	5 Sep	55	9.2	0	4	0	0	4	27	0	27	Tables
2001	4 Sep	88	14.7	2	9	0	0	11	22	0	22	Tables
2002	3 Sep	65	10.8	1	7	0	0	8	8	2	10	Tables
2003	2 Sep	69	11.5	0	4	0	0	4	14	1	15	Tables

APPENDIX B

Imnaha River Basin Index Surveys

Appendix Table B-1. Imnaha River, Imnaha River Basin, spring Chinook salmon index survey counts from 1949 through 2003. Index survey units: III = Blue Hole to Indian Crossing Campground (2 miles), IV = Indian Crossing Campground to Mac's Mine (7.7 miles). Abbreviations are as follows: M = male, F = female, J = jack, U = unknown sex, A = adults, J = jacks, Ref. = reference, ND = no data, NS = no survey, I = incomplete survey of the index survey units. Abbreviations for the references are given in Table 1, page 14.

		Redds		Total	Redds/	Dead fish				Total	Live fish		Total	
Year	Date	III	IV	redds	mile	M	F	J	U	dead	A	J	live	Ref.
1949	18 Aug	64	167	231	23.8	8	5	0	4	17	ND	ND	143	EOS
1950	21 Aug	42[a]	80	I	12.6	8	3	0	0	11	ND	ND	99	EOS
1951[b]	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1952	17 Aug	159	267	426	43.9	ND	ND	1	ND	48	549	14	563	EOS
1953	25 Aug	68	280	348	35.9	ND	ND	ND	ND	72	265	83	348	EOS
1954	20-21 Aug	108	256	364	37.5	ND	ND	13	ND	112	300	66	366	EOS
1955	24-25 Aug	171	527	698	72.0	ND	ND	22	ND	231	533	164	697	EOS
1956	25 Aug	80	126[c]	I	35.8	ND	ND	3	ND	53	229	40	269	EOS
1957	26 Aug	227	520	747	77.0	ND	ND	14	ND	350	762	43	805	EOS
1958	26 Aug	ND[d]	129[e]	I	25.8	ND	ND	2	ND	67	112	20	132	EOS
1959	25 Aug	19	96	115	11.9	ND	ND	3	ND	38	134	32	166	EOS
1960	27-28 Aug	48	275	323	33.3	ND	ND	1	ND	73	450	37	487	EOS
1961	29-30 Aug	39	182	221	22.8	ND	ND	9	ND	58	150	74	224	EOS
1962	27 Aug	41	207	248	25.6	ND	ND	9	ND	85	244	54	298	EOS
1963	25 Aug	30	103	133	13.7	ND	ND	6	ND	40	107	28	135	EOS
1964	30 Aug	20	230	250	25.8	ND	ND	10	ND	170	227	35	262	EOS
1965	24 Aug	15	174	189	19.5	ND	ND	2	ND	15	194	55	249	EOS
1966	28 Aug	20	203	223	23.0	ND	ND	18	ND	142	184	58	242	EOS
1967	27 Aug	35	180	215	22.2	ND	ND	12	ND	114	358	103	461	EOS
1968	27 Aug	13	228	241	24.8	ND	ND	16	ND	174	415	105	520	EOS
1969	27 Aug	61	241	302	31.1	ND	ND	11	ND	246	454	41	495	EOS
1970	26 Aug	53	123	176	18.1	ND	ND	4	ND	59	224	104	328	EOS
1971	31 Aug	61	305	366	37.7	ND	ND	13	ND	155	363	20	383	EOS
1972	29 Aug	49	287	336	34.6	ND	ND	12	ND	202	451	36	487	EOS
1973	29 Aug	93	427	520	53.6	ND	ND	11	ND	525	385	36	421	EOS
1974	28 Aug	61	216	277	28.6	ND	ND	2	ND	127	255	3	258	EOS
1975	25 Aug	28	121	149	15.4	ND	ND	ND	ND	38	120	5	125	EOS
1976	27 Aug	[127	+]	127	13.1	ND	ND	ND	ND	35	172	20	172	WD
1977	25 Aug	[143	+]	143	14.7	ND	ND	ND	ND	39	269	5	274	WD
1978	29 Aug	96	319	415	42.8	ND	ND	ND	ND	ND[f]	ND	0	ND[f]	WD
1979	22 Aug	[52	+]	52	5.4	ND	ND	ND	ND	ND[f]	ND	4	ND[f]	WD
1980	26 Aug	7	33	40	4.1	ND	ND	ND	ND	ND[f]	ND	0	ND[f]	WD
1981	26 Aug	17	82	99	10.2	ND	ND	ND	ND	ND[f]	ND	2	ND[f]	WD
1982	26 Aug	37	92	129	13.3	ND	ND	ND	ND	ND[f]	ND	2	ND[f]	WD
1983	25 Aug	24	71	95	9.8	ND	ND	ND	ND	16	78	3	81	WD

[a] *Imnaha Rapids (above Blue Hole) down to Indian Crossing Campground.*
[b] *No surveys were made in 1951.*
[c] *Survey stopped 1.25 miles above Coverdale Campground (3.75 miles).*
[d] *One of the field books was lost, data missing.*
[e] *Indian Crossing Campground to Coverdale Campground (5.0 miles).*
[f] *Total fish, 1978-1982: 487, 39, 61, 105, 125.*

Appendix Table B-1. Continued.

		Redds		Total	Redds/	Dead fish				Total	Live fish		Total	
Year	Date	III	IV	redds	mile	M	F	J	U	dead	A	J	live	Ref.
1984	29 Aug	43	70	113	11.6	ND	ND	ND	ND	48	60	6	66	WD
1985	27 Aug	[145	+]	145	14.9	ND	ND	ND	ND	43	104	15	119	WD
1986	28 Aug	24	103	127	13.1	ND	ND	ND	ND	19	30	4	34	WD
1987	26 Aug	25	87	112	11.5	5	6	0	0	11	104	8	112	Cards
1988	25 Aug	35	100	135	13.9	20	56	1	2	79	55	1	56	Cards
1989	28 Aug	16	24	40	4.1	7	2	0	0	9	20	1	21	Cards
1990	24 Aug	14	29	43	4.4	3	3	0	0	6	45	1	46	Cards
1991	30 Aug	12	39	51	5.3	5	11	3	0	19	21	4	25	Cards
1992	28 Aug	17	58	75	7.7	3	9	1	1	14	68	3	71	Cards
1993	27 Aug	34	185	219	22.6	46	51	0	2	99	119	2	121	Cards
1994	26 Aug	8	20	28	2.9	1	1	0	0	2	20	0	20	Cards
1995	25 Aug	5	10	15	1.5	0	0	0	0	0	11	2	13	Cards
1996	23 Aug	14	38	52	5.4	2	3	0	0	5	38	4	42	Cards
1997	22 Aug	16	85	101	10.4	4	6	0	1	11	87	1	88	Tables
1998	21 Aug	16	23	39	4.0	1	7	0	2	10	28	0	28	Tables
1999	27 Aug	14	73	87	9.0	21	26	1	0	48	53	9	62	Tables
2000	24 Aug	19	63	82	8.5	15	25	1	0	41	145	32	177	Tables
2001	23 Aug	45	137	182	18.8	75	78	0	10	163	270	8	278	Tables
2002	22 Aug	127	225	352	36.3	107	113	0	1	221	522	6	528	Tables
2003	21 Aug	83	186	269	27.7	68	74	0	7	149	336	11	347	Tables

Appendix Table B-2. Big Sheep Creek, Imnaha River Basin, spring Chinook salmon index survey counts from 1964 through 2003. Survey unit: I = 140 Bridge to Echo Canyon (4.0 miles). Abbreviations are as follows: M = male, F = female, J = jack, U = unknown sex, A = adults, J = jacks, Ref. = reference, ND = no data. Abbreviations for the references are given in Table 1, page 14.

		Redds	Redds/	Dead fish				Total	Live fish		Total	
Year	Date	I	mile	M	F	J	U	dead	A	J	live	Ref.
1964	24 Aug	34	8.5	ND	ND	ND	ND	6	ND	ND	30[a]	WD
1965	27 Aug	26	6.5	ND	ND	ND	ND	7	ND	ND	12[a]	WD
1966	27 Aug	61	15.3	ND	ND	ND	ND	4	ND	ND	79[a]	WD
1967	27 Aug	30	7.5	ND	ND	ND	ND	12	38	8	46	WD
1968	23 Aug	36	9.0	ND	ND	ND	ND	6	34	3	37	WD
1969	23 Aug	30	7.5	ND	ND	ND	ND	3	ND	ND	4[a]	WD
1970	24 Aug	55	13.8	ND	ND	ND	ND	7	39	8	47	WD
1971	23 Aug	57	14.3	ND	ND	ND	ND	4	31	9	40	WD
1972	26 Aug	28	7.0	ND	ND	ND	ND	2	25	0	25	WD
1973	25 Aug	31	7.8	ND	ND	ND	ND	0	18	1	19	WD
1974	24 Aug	8	2.0	ND	ND	ND	ND	1	1	0	1	WD
1975	23 Aug	14	3.5	ND	ND	ND	ND	1	7	0	7	WD
1976	23 Aug	24	6.0	ND	ND	ND	ND	0	14	6	20	WD
1977	23 Aug	5	1.3	ND	ND	ND	ND	1	9	0	9	WD
1978	22 Aug	14	3.5	ND	ND	ND	ND	ND	ND	0	ND	WD
1979	25 Aug	0	0.0	ND	ND	ND	ND	ND	ND	0	ND	WD
1980	29 Aug	0	0.0	ND	ND	ND	ND	ND	ND	0	ND	WD
1981	29 Aug	2	0.5	ND	ND	ND	ND	ND	ND	0	ND	WD
1982	21 Aug	9	2.3	ND	ND	ND	ND	ND	ND	0	ND	WD
1983	27 Aug	11	2.8	ND	ND	ND	ND	3	3	0	3	WD
1984	25 Aug	7	1.8	ND	ND	ND	ND	0	3	0	3	WD
1985	27 Aug	6	1.5	ND	ND	ND	ND	0	2	0	2	WD
1986	29 Aug	15	3.8	ND	ND	ND	ND	5	8	0	8	WD
1987	28 Aug	3	0.8	0	0	0	0	0	3	0	3	Cards
1988	19 Aug	14	3.5	0	1	0	0	1	4	0	4	Cards
1989	26 Aug	1	0.3	0	0	0	0	0	1	0	1	Cards
1990	26 Aug	0	0.0	0	0	0	0	0	0	0	0	Cards
1991	26 Aug	1	0.3	0	0	0	0	0	0	0	0	Cards
1992	26 Aug	0	0.0	0	0	0	0	0	0	0	0	Cards
1993[b]	26 Aug	1	0.3	0	0	0	0	0	0	0	0	Cards
1994	26 Aug	0	0.0	0	0	0	0	0	0	1	1	Cards
1995	25 Aug	0	0.0	0	0	0	0	0	0	0	0	Cards
1996	25 Aug	1	0.3	0	0	0	0	0	1	0	1	Cards
1997[b]	24 Aug	9	2.3	1	2	0	1	4	10	0	10	Tables
1998[b]	19 Aug	0	0.0	0	0	0	0	0	0	0	0	Tables
1999	25 Aug	0	0.0	0	0	0	0	0	0	0	0	Tables
2000[b]	23 Aug	0	0.0	0	0	0	1	1	0	0	0	Tables
2001[b]	22 Aug	0	0.0	0	0	0	0	0	1	0	1	Tables
2002[b]	21 Aug	3	0.8	2	1	0	0	3	1	0	1	Tables
2003[b]	20 Aug	1	0.3	0	2	0	0	2	1	0	1	Tables

[a] *Did not indicate if jacks were included in total live and dead fish counts.*

[b] *Chinook salmon outplanted from the Imnaha Facility: 15 M, 33 F, 1 J in 1993; 45 M, 36 F in 1997; 14 M, 11 F in 1998; 250 J in 2000; 44 M, 68 F, 90 J in 2001; 55 M, 89 F, 6 J in 2002; and 44 M, 46 F in 2003.*

Appendix Table B-3. Lick Creek, Imnaha River Basin, spring Chinook salmon index survey counts from 1964 through 2003. Index survey unit: I = Lick Creek Campground to mouth (4.0 miles). Abbreviations are as follows: M = male, F = female, J = jack, U = unknown sex, A = adults, J = jacks, Ref. = reference, ND = no data. Abbreviations for the references are given in Table 1, page 14.

		Redds	Redds/	Dead fish				Total	Live fish		Total	
Year	Date	I	mile	M	F	J	U	dead	A	J	live	Ref.
1964	27 Aug	14	3.5	ND	ND	ND	ND	2	10	0	10	WD
1965	24 Aug	25	6.3	ND	ND	ND	ND	0	4	0	4	WD
1966	23 Aug	47	11.8	ND	ND	ND	ND	7	45	0	45	WD
1967	24 Aug	30	7.5	ND	ND	ND	ND	16	27	5	32	WD
1968	23 Aug	34	8.5	ND	ND	ND	ND	10	29	2	31	WD
1969	26 Aug	4	1.0	ND	ND	ND	ND	1	ND	ND	ND	WD
1970	26 Aug	50	12.5	ND	ND	ND	ND	7	16	1	17	WD
1971	24 Aug	13	3.3	ND	ND	ND	ND	4	7	3	10	WD
1972	23 Aug	27	6.8	ND	ND	ND	ND	15	3	0	3	WD
1973	23 Aug	16	4.0	ND	ND	ND	ND	5	6	0	6	WD
1974	23 Aug	12	3.0	ND	ND	ND	ND	3	5	0	5	WD
1975	22 Aug	11	2.8	ND	ND	ND	ND	3	3	0	3	WD
1976	25 Aug	17	4.3	ND	ND	ND	ND	3	17	3	20	WD
1977	29 Aug	5	1.3	ND	ND	ND	ND	1	5	0	5	WD
1978	29 Aug	32	8.0	ND	ND	ND	ND	ND	ND	0	ND	WD
1979	21 Aug	4	1.0	ND	ND	ND	ND	ND	ND	0	ND	WD
1980	27 Aug	4	1.0	ND	ND	ND	ND	ND	ND	0	ND	WD
1981	25 Aug	2	0.5	ND	ND	ND	ND	ND	ND	0	ND	WD
1982	27 Aug	0	0.0	ND	ND	ND	ND	ND	ND	0	ND	WD
1983	29 Aug	0	0.0	ND	ND	ND	ND	3	0	0	0	WD
1984	27 Sep	2	0.5	ND	ND	ND	ND	0	0	0	0	WD
1985	19 Aug	3	0.8	ND	ND	ND	ND	0	4	0	4	WD
1986	26 Aug	2	0.5	ND	ND	ND	ND	0	1	0	1	WD
1987	25 Aug	0	0.0	0	0	0	0	0	0	0	0	WD
1988	24 Aug	0	0.0	0	0	0	0	0	0	0	0	Cards
1989	22 Aug	0	0.0	0	0	0	0	0	0	0	0	Cards
1990	22 Aug	0	0.0	0	0	0	0	0	0	0	0	Cards
1991	29 Aug	1	0.3	0	0	0	0	0	1	0	1	Cards
1992	28 Aug	0	0.0	0	0	0	0	0	0	0	0	Cards
1993	25 Aug	0	0.0	0	0	0	0	0	0	0	0	Cards
1994	8 Sep	0	0.0	0	0	0	0	0	0	0	0	Cards
1995	24 Aug	0	0.0	0	0	0	0	0	0	0	0	Cards
1996	24 Aug	0	0.0	0	0	0	0	0	0	0	0	Cards
1997[a]	20 Aug	29	7.3	4	3	0	0	7	46	0	46	Tables
1998[a]	19 Aug	4	1.0	1	0	0	0	1	2	0	2	Tables
1999	25 Aug	0	0.0	0	0	0	0	0	0	0	0	Tables
2000[a]	23 Aug	0	0.0	0	0	0	0	0	0	3	3	Tables
2001[a]	22 Aug	5	1.3	2	9	0	1	12	81	0	81	Tables
2002[a]	21 Aug	19	4.8	4	4	0	0	8	29	0	29	Tables
2003[a]	20 Aug	10	2.5	3	3	0	0	6	27	14	41	Tables

[a] *Chinook salmon outplanted from the Imnaha Facility: 69 M, 37 F in 1997; 7 M, 6 F, 1 J in 1998; 50 J in 2000; 46 M, 72 F, 136 J in 2001; 16 M, 37 F, 1 J in 2002; and 36 M, 40 F, 199 J in 2003.*

APPENDIX C

Grande Ronde River Basin
Index, Extensive, and Supplemental Surveys

Appendix Table C-1. Upper mainstem Grande Ronde River, Grande Ronde River Basin, spring Chinook salmon index, extensive, and supplemental survey counts from 1986 through 2003. Survey units: I = Three Penny Claim to Forest Service Boundary (3.0 miles), II = Forest Service Boundary to Vey Meadows 5125 Bridge (5.0 miles), III = Vey Meadows Bridge to Starkey Bridge (12.5 miles). Abbreviations are as follows: M = male, F = female, J = jack, U = unknown sex, A = adults, J = jacks, Ref. = reference, ND = no data, NS = no survey, I = incomplete survey of the index survey units. Abbreviations for the references are given in Table 1, page 14.

			New redds			Cum.	redds/	Dead fish				Total	Live fish		Total	
Year	Date	No.	I	II	III	redds	mile	M	F	J	U	dead	A	J	live	Ref.
1986	3 Sep	1	18	19	11	48	2.3	3	5	0	0	8	39	0	39	Tables
1987[b]	20 Aug	1	NS	14	NS	14	I	0	0	0	0	0	66	0	66	Cards
	1 Sep	2	65[a]	41	42	162	7.9	11	27	0	1	39	126	2	128	Cards
	10 Sep	3	NS	23	NS	185	I	6	7	0	0	13	13	0	13	Cards
1988[b]	30 Aug	1	77	22	5	104	5.1	36	30	3	11	80	18	4	22	Cards
	6 Sep	2	NS	6	NS	110	I	1	0	1	0	2	9	0	9	Cards
	16 Sep	3	NS	6	NS	116	I	1	1	0	0	2	4	0	4	Cards
1989[c]	16 Aug	1	[0	+]	0	0	0.0	2	1	0	4	7	0	0	0	Cards
1990	27-28 Aug	1	3	1	0	4	0.2	1	0	0	1	2	11	0	11	Cards
	4 Sep	2	NS	9	NS	13	I	1	0	0	0	1	15	1	16	Cards
	11 Sep	3	18	1	NS	32	I	6	9	0	0	15	2	0	2	Cards
1991	4 Sep	1	1	9	0	10	0.5	2	2	1	0	5	9	0	9	Cards
	11 Sep	2	NS	4	NS	14	I	0	2	0	0	2	1	0	1	Cards
	18 Sep	3	NS	0	NS	14	I	0	2	0	0	2	0	0	0	Cards
1992	2 Sep	1	76	21	2	99	4.8	13	3	0	0	16	67	0	67	Cards
	9 Sep	2	10	2	NS	111	I	17	20	0	0	37	26	0	26	Cards
	17 Sep	3	2	3	NS	116	I	7	18	0	0	25	1	0	1	Cards
1993	3 Sep	1	49	39	4	92	4.5	12	16	0	7	35	12	2	14	Cards
	10 Sep	2	6	4	NS	102	I	0	4	0	0	4	1	0	1	Cards
	16 Sep	3	1	0	NS	103	I	0	3	0	0	3	0	0	0	Cards
1994	30 Aug	1	1	0	0	1	0.2	0	0	0	0	0	0	0	0	Cards
	7 Sep	2	0	NS	NS	1	I	0	0	0	0	0	0	0	0	Cards
	14 Sep	3	1	2	NS	4	I	0	0	0	0	0	0	0	0	Cards

[a] *East Fork to Forest Service Boundary.*
[b] *Chinook salmon outplanted from Lookingglass Hatchery: 224 M, 271 F, 3 J in 1987; and 281 M, 235 F, 6 J in 1988.*
[c] *Conducted after flash flood on 8 August 1989, high turbidity prevented supplemental surveys.*

Appendix Table C-1. Continued.

Year	Date	No.	New redds I	New redds II	New redds III	Cum. redds	redds/ mile	Dead fish M	Dead fish F	Dead fish J	Dead fish U	Total dead	Live fish A	Live fish J	Total live	Ref.
1995	28 Aug	1	0	NS	0	0	I	0	0	0	0	0	0	0	0	Cards
	5 Sep	2	0	5	NS	5	I	0	1	0	0	1	0	0	0	Cards
	12 Sep	3	0	2	NS	7	I	0	0	0	0	0	0	0	0	Cards
1996	26 Aug	1	2	NS	0	2	I	0	0	0	0	0	1	0	1	Cards
	3 Sep	2	9	NS	NS	11	I	0	0	0	0	0	4	0	4	Cards
	9-10 Sep	3	0	11	NS	22	I	1	0	0	0	1	5	0	5	Cards
1997	25 Aug	1	10	NS	NS	10	I	0	1	0	0	1	10	0	10	Tables
	2 Sep	2	1	NS	1	12	I	2	1	0	0	3	8	0	8	Tables
	8 Sep	3	2	NS	5	19	I	0	1	0	0	1	12	1	13	Tables
	18 Sep	4	NS	NS	0	19	I	1	3	0	0	4	0	0	0	Tables
1998	24 Aug	1	12	NS	0	12	I	2	2	0	0	4	21	0	21	Tables
	31 Aug	2	8	NS	1	21	I	4	5	0	0	9	16	0	16	Tables
	8 Sep	3	3	NS	1	25	I	5	12	0	0	17	6	0	6	Tables
1999	30 Aug	1	0	NS	0	0	I	0	0	0	1	1	0	0	0	Tables
	7 Sep	2	0	NS	0	0	I	0	0	0	0	0	0	0	0	Tables
	13 Sep	3	0	NS	0	0	I	0	0	0	0	0	0	0	0	Tables
2000	28 Aug	1	4	NS	0	4	I	0	0	0	0	0	13	1	14	Tables
	5 Sep	2	1	NS	5	10	I	0	0	0	0	0	14	0	14	Tables
	11 Sep	3	1	NS	7	18	I	0	0	0	0	0	16	1	17	Tables
	19, 21 Sep	4	0	2[d]	0	20	1.0	1	10	1	0	12	2	0	2	Tables
2001	27 Aug	1	2	NS	0	2	I	0	1	0	0	1	20	0	20	Tables
	4 Sep	2	4	NS	2	8	I	0	1	0	0	1	18	0	18	Tables
	10 Sep	3	1	0[e]	6	15	0.7	2	2	0	1	5	21	0	21	Tables
2002	26 Aug	1	6	NS	0	6	I	0	0	0	0	0	9	1	10	Tables
	3 Sep	2	6	NS	0	12	I	3	4	0	0	7	7	0	7	Tables
	9 Sep	3	0	NS	2	14	I	0	2	0	0	2	1	0	0	Tables

[d] *Surveyed by CTUIR biologists from a helicopter on 18 September.*
[e] *Surveyed by CTUIR biologists from a helicopter.*

Appendix Table C-1. Continued.

			New redds			Cum.	redds/	Dead fish				Total	Live fish		Total	
Year	Date	No.	I	II	III	redds	mile	M	F	J	U	dead	A	J	live	Ref.
2003	30 Jul	1	0	NS	NS	0	I	2	0	0	0	2	0	0	0	Tables
	11 Aug	2	2	NS	0[f]	2	I	6	4	0	1	11	3	1	4	Tables
	25 Aug	3	3	NS	1	6	I	1	0	0	0	1	7	3	10	Tables
	2 Sep	4	5	NS	0	11	I	1	0	0	0	1	8	0	8	Tables
	8 Sep	5	0	NS	9	20	I	1	5	0	0	6	8	1	9	Tables
	15 Sep	6	0	NS	5[g]	25	I	0	3	0	0	3	5	1	6	Tables
	23 Sep	7	NS	NS	4[g]	29	I	2	1	0	0	3	3	0	3	Tables

[f] *Forest Service Boundary below Vey Meadows to Spoolcart Campground (6.9 miles).*
[g] *CTUIR fish weir to Spoolcart Campground (5.7 miles).*

Appendix Table C-2. Catherine Creek, Grande Ronde River Basin, spring Chinook salmon index, extensive, and supplemental survey counts from 1986 through 2003. Survey units: I = North Fork Catherine Creek Campground to Forks (3.0 miles), II = South Fork Catherine Creek, near Bottle Creek to 1.5 mile upstream of mouth (1.1 miles), III = South Fork Catherine Creek 1.5 mile upstream of mouth to Forks (1.5 miles), IV = Forks to 7735 Bridge (2.5 miles), V = 7735 Bridge to Highway 203 Bridge (2.0 miles), VI = Highway 203 Bridge to Badger Flat Road Bridge (3.0 miles), VII = Badger Flat Road Bridge to Second Bridge in Union (6.4 miles). Abbreviations are as follows: M = male, F = female, J = jack, U = unknown sex, A = adults, J = jacks, Ref. = reference, ND = no data, NS = no survey, I = incomplete survey of the index survey units. Abbreviations for the references are given in Table 1, page 14.

			New redds							Cum.	Redds/	Dead fish				Total	Live fish		Total	
Year	Date	No.	I	II	III	IV	V	VI	VII	redds	mile	M	F	J	U	dead	A	J	live	Ref.
1986	4 Sep	1	8[a]	0[b]	21[a]	[47[a]	+	+]	11[b]	87	4.5	5	6	0	0	11	44	5	49	(a, b)
	10 Sep	2	NS	NS	NS	NS	7	NS	NS	94	I	ND	ND	0	ND	1	12	0	12	Tables[b]
1987[c]	21 Aug	0	NS	NS	NS	NS	15	NS	NS	15	I	0	1	0	0	1	17	0	17	Cards
	2 Sep	1	14	6	35	28	40	35	46	219	11.2	31	38	1	7	77	101	6	107	Cards
	11 Sep	2	NS	NS	NS	NS	6	NS	NS	225	I	6	10	0	0	16	1	0	1	Cards
1988[c]	31 Aug -2 Sep	1	38	0	39	35	37	27	33	209	10.7	76	79	0	16	171	42	0	42	Cards
	7 Sep	2	NS	NS	NS	NS	3	NS	NS	212	I	2	3	0	0	5	0	0	0	Cards
	15 Sep	3	NS	NS	NS	NS	0	NS	NS	212	I	0	0	0	0	0	1	0	1	Cards
1989[c]	29 Aug	1	6	0	1	17	8	6	4	42	2.2	2	5	0	0	7	24	0	24	Cards
	7 Sep	2	NS	NS	NS	NS	3	NS	NS	45	I	2	4	0	0	6	2	0	2	Cards
	14 Sep	3	NS	NS	NS	NS	4	NS	NS	49	I	1	1	0	0	2	0	0	0	Cards
1990	29 Aug	1	6	3	7	10	7	2	2	37	1.9	1	4	0	0	5	34	1	35	Cards
	5 Sep	2	NS	NS	NS	NS	2	NS	NS	39	I	1	2	0	0	3	1	0	1	Cards
	12 Sep	3	NS	NS	NS	NS	1	NS	NS	40	I	1	0	0	0	1	0	0	0	Cards
1991	3 Sep	1	3	0	1	4	9	2	0	19	1.0	4	5	0	0	9	15	2	17	Cards
	10 Sep	2	NS	NS	NS	NS	1	NS	NS	20	I	1	3	1	0	5	1	0	1	Cards
	17 Sep	3	NS	NS	NS	NS	0	NS	NS	20	I	0	2	0	1	3	0	0	0	Cards
1992	3 Sep	1	5	0	0	14	18	4	1	42	2.2	4	1	0	0	5	50	0	50	Cards
	10 Sep	2	NS	NS	NS	NS	6	NS	NS	48	I	0	2	0	0	2	14	0	14	Cards
	18 Sep	3	NS	NS	NS	NS	1	NS	NS	49	I	0	2	0	0	2	2	0	2	Cards
1993	2 Sep	1	7	0	2	17	31	6	19	82	4.2	11	12	0	0	23	30	0	30	Cards
	8 Sep	2	NS	NS	NS	NS	2	NS	NS	84	I	2	2	0	0	4	1	0	1	Cards
	15 Sep	3	NS	NS	NS	NS	0	NS	NS	84	I	1	1	0	0	2	0	0	0	Cards

[a] *La Grande District field notes 1986.*
[b] *Research and Development tables 1986.*
[c] *Chinook salmon outplanted from Lookingglass Hatchery: 268 M, 431 F, 1 J in 1987; 281 M, 426 F, 4 J in 1988; and 37 M, 44 F in 1989.*

Appendix Table C-2. Continued.

			New redds							Cum.	Redds/	Dead fish				Total	Live fish		Total	
Year	Date	No.	I	II	III	IV	V	VI	VII	redds	mile	M	F	J	U	dead	A	J	live	Ref.
1994	29 Aug	1	0	0	0	4	0	0	0	4	0.2	0	0	0	0	0	5	0	5	Cards
	6 Sep	2	NS	NS	NS	NS	3	NS	NS	7	I	1	0	0	0	1	2	0	2	Cards
	12 Sep	3	NS	NS	NS	7	1	NS	NS	15	I	2	2	0	0	4	5	0	5	Cards
1995	29 Aug	1	0	0	0	2	5	0	0	7	0.4	0	1	0	0	1	5	0	5	Cards
	6 Sep	2	NS	NS	NS	6	3	NS	NS	16	I	0	0	0	0	0	1	0	1	Cards
	13 Sep	3	NS	NS	NS	2	2	NS	NS	20	I	0	3	0	1	4	0	0	0	Cards
1996	27 Aug	1	1	0	0	1	5	2	1	10	0.5	0	1	0	0	1	12	1	13	Cards
	4 Sep	2	NS	NS	NS	0	3	NS	NS	13	I	0	0	0	0	0	5	0	5	Cards
	11 Sep	3	NS	NS	NS	0	2	NS	NS	15	I	0	4	0	1	5	1	0	1	Cards
1997	26 Aug	1	7	0	2	6	4	2	2	23	1.2	2	2	0	0	4	28	1	29	Tables
	3 Sep	2	1	0	0	2	2	3	5	36	1.8	11	11	0	0	22	25	1	26	Tables
	10 Sep	3	0	0	0	2	3	2	3	46	2.4	6	8	0	0	14	11	0	11	Tables
1998	25 Aug	1	4	0	0	3	0	2	0	9	0.5	0	1	0	0	1	8	1	9	Tables
	1 Sep	2	2	0	0	4	4	4	2	25	1.3	1	3	0	1	5	22	4	26	Tables
	11 Sep	3	1	0	0	1	2	4	1	34	1.7	7	6	0	0	13	6	1	7	Tables
1999	31 Aug	1	1	0	0	6	8	2	2	19	1.0	0	5	0	0	5	17	0	17	Tables
	8 Sep	2	1	0	0	3	1	6	3	33	1.7	2	2	0	0	4	16	0	16	Tables
	15 Sep	3	0	0	0	1	1	3	2	40	2.1	3	5	0	0	8	8	0	8	Tables
2000	29 Aug	1	2	0	0	0	4	1	2	9	0.5	1	0	0	0	1	14	0	14	Tables
	6 Sep	2	1	0	0	1	2	4	6	23	1.2	0	0	0	2	2	17	0	17	Tables
	12 Sep	3	0	0	0	1	2	2	6	34	1.7	2	3	0	2	7	22	2	24	Tables
2001	28 Aug	1	10	0	1	12	9	1	1	34	1.7	0	2	0	0	2	58	2	60	Tables
	5 Sep	2	7	0	0	5	29	3	18	96	4.9	9	6	1	0	16	105	4	109	Tables
	11 Sep	3	0	0	0	3	6	8	20	133	6.8	7	18	1	0	26	62	3	65	Tables
2002	27 Aug	1	6	0	1	36	28	15	6	92	4.7	13	8	0	3	24	96	2	98	Tables
	4 Sep	2	7	0	4	12	10	7	13	145	7.4	24	60	1	9	94	39	0	39	Tables
	10 Sep	3	5	0	0	5	1	0	2	158	8.1	4	22	0	4	30	8	0	8	Tables

Appendix Table C-2. Continued.

				New redds						Cum.	Redds/	Dead fish				Total	Live fish		Total	
Year	Date	No.	I	II	III	IV	V	VI	VII	redds	mile	M	F	J	U	dead	A	J	live	Ref.
2003	12 Aug	1	1	NS	0	0	0	0	0	1	I	1	3	0	1	5	41	4	45	Tables
	26 Aug	2	6	0	2	13	3	0	0[d]	25	1.3	4	4	0	4	12	85	0	85	Tables
	3 Sep	3	15	0	4	27	27	17	1[d]	116	6.2	18	31	2	0	51	97	3	100	Tables
	9 Sep	4	1	0	5	9	7	10	8[d]	156	8.3	49	46	5	0	100	44	2	46	Tables
	16 Sep	5	NS	NS	NS	0	2	4	NS	162	I	7	16	0	0	23	6	1	7	Tables
	25 Sep	6	NS	NS	NS	2	0	1	2[d]	167	I	1		0	0	3	1	0	1	Tables

[d] *Access was denied to a 0.8 mile section in Unit VII; 5.6 miles was surveyed in this section.*

Appendix Table C-3. Lookingglass Creek, Grande Ronde River Basin, spring Chinook salmon index, extensive and supplemental survey counts from 1987 through 2003. Index survey unit: I = Summer Creek to Little Lookingglass Creek (6.2 miles). Extensive survey units: II = mouth of Little Lookingglass Creek to Lookingglass Hatchery intake (1.6 miles) III = Lookingglass Hatchery intake to mouth (2.6 miles) IV = Little Lookingglass Creek lower 3 miles (3.0 miles). Abbreviations are as follows: M = male, F = female, J = jack, U = unknown sex, A = adults, J = jacks, Ref. = reference, ND = no data, NS = no survey, I = incomplete survey of the index survey units. Abbreviations for the references are given in Table 1, page 14.

			New Redds				Cum.	Dead fish				Total	Live fish		Total	
Year	Date	No.	I	II	III	IV	redds	M	F	J	U	dead	A	J	live	Ref.
1987	3 Sep	1	18	NS	NS	NS	18	1	2	0	0	3	6	0	6	Cards
	23 Sep	2	NS	[37	+]	NS	45	5	9	0	56	70	3	0	3	Cards
1988	1 Sep	1	[53	+]	42	NS	95	26	35	2	6	69	33	4	37	Cards
1989	8 Sep	1	18	3	NS	NS	21	0	4	0	1	5	4	0	4	Cards
	11 Sep	2	NS	NS	20	NS	41	0	4	0	0	4	4	0	4	Cards
1990	30 Aug	1	19	6	3	NS	28	1	1	0	0	2	34	1	35	Cards
1991	9 Sep	1	7	0	7	NS	14	10	6	0	2	18	7	1	8	Cards
1992	9 Sep	1	21	5	11	4[a]	41	5	4	0	2	11	23	1	24	Cards
1993	9 Sep	1	89	11	NS	NS	100	28	49	1	1	79	2	0	2	Cards
	10 Sep	2	NS	NS	19	30[a]	149	12	41	3	0	56	3	0	3	Cards
1994	6 Sep	1	14	15	NS	11[a]	40	4	9	0	3	16	8	0	8	Cards
	7 Sep	2	NS	NS	7	NS	47	0	1	0	1	2	5	0	5	Cards
1995	8 Sep	1	2	NS	NS	NS	2	0	1	0	0	1	0	0	0	Cards
	12 Sep	2	NS	0	1	0	3	0	0	0	0	0	2	0	2	Cards
1996[b]	9 Sep	1	23	NS	NS	NS	23	0	0	0	0	0	24	0	24	Cards
	10 Sep	2	NS	0	7	0	30	0	2	0	0	2	0	0	0	Cards
1997	8 Sep	1	24	0	4	0	28	1	3	0	0	4	5	0	5	Tables
1998	8 Sep	1	1	0	4	0	5	0	0	0	0	0	3	0	3	Tables
1999[c]	26 Aug	1	NS	[0	+]	NS	0	0	0	0	0	0	1	0	1	Tables
	1 Sep	2	0	NS	NS	NS	0	0	0	0	0	0	0	0	0	Tables
	3 Sep	2	NS	[3	+]	NS	3	0	0	0	0	0	1	0	1	Tables
	14 Sep	4	0	0	0	0	3	0	0	0	0	0	0	0	0	Tables

[a] *Survey began 4.0 miles upstream of the mouth of Little Lookingglass Creek.*

[b] *Sixteen fish were removed before the index survey date (Dead Fish: 1M, 1F; Live Fish: 5M, 9F).*

[c] *Chinook salmon were trapped at Lookingglass Hatchery and not allowed to spawn in Lookingglass Creek above the hatchery.*

Appendix Table C-3. Continued.

Year	Date	No.	New Redds I	II	III	IV	Cum. redds	Dead fish M	F	J	U	Total dead	Live fish A	J	Total live	Ref.
2000[c]	12 July	1	[0	+]	NS	NS	0	0	0	0	0	0	0	0	0	Tables
	22 Aug	2	0	NS	5	0	5	0	0	0	0	0	34	0	34	Tables
	30 Aug	3	NS	[26	+]	NS	31	4	7	0	0	11	ND	ND	88	Tables
	5 Sep	4	NS	NS	23	NS	54	14	14	0	0	28	ND	ND	ND	Tables
	7 Sep	5	0	0	28	0	82	19	17	2	0	38	ND	ND	ND	Tables
	11 Sep	6	NS	NS	3	NS	85	6	16	2	0	24	ND	ND	ND	Tables
2001[c]	24 Aug	1	NS	NS	12	NS	12	0	0	0	0	0	ND	ND	ND	Tables
	29 Aug	2	NS	NS	39	NS	51	2	1	0	0	3	ND	ND	ND	Tables
	31 Aug	3	NS	NS	11	NS	62	2	0	0	0	2	ND	ND	ND	Tables
	4 Sep	4	NS	NS	16	NS	78	12	17	0	0	29	ND	ND	ND	Tables
	7 Sep	5	0	0	8	0	86	7	18	0	0	25	27	0	27	Tables
	10 Sep	6	NS	NS	0	NS	86	3	13	0	0	16	ND	ND	ND	Tables
	14 Sep	7	NS	NS	0	NS	86	3	14	0	0	17	3	0	3	Tables
2002[c]	12 Jul	1	NS	NS	0	NS	0	0	0	0	1	1	2	0	2	Tables
	20 Jul	2	NS	NS	0	NS	0	0	0	0	0	0	0	0	0	Tables
	8 Aug	3	NS	NS	0	NS	0	0	0	0	0	0	0	0	0	Tables
	15 Aug	4	NS	NS	2	NS	2	0	0	0	1	1	2	0	2	Tables
	21 Aug	5	NS	NS	1	NS	3	0	0	0	0	0	3	0	3	Tables
	28 Aug	6	NS	NS	8	NS	11	1	1	0	0	2	9	0	9	Tables
	4 Sep	7	NS	NS	3	NS	14	3	2	0	0	5	5	0	5	Tables
	6 Sep	8	0	0	3	0	17	4	1	0	0	5	11	0	11	Tables
	11 Sep	9	NS	NS	0	NS	17	0	4	0	0	4	1	0	1	Tables
	16 Sep	10	NS	NS	0	NS	17	0	1	0	0	1	0	0	0	Tables
	28 Sep	11	NS	NS	1	NS	18	0	0	0	1	1	1	0	1	Tables

Appendix Table C-3. Continued.

Year	Date	No.	New Redds I	II	III	IV	Cum. redds	Dead fish M	F	J	U	Total dead	Live fish A	J	Total live	Ref.
2003[c]	27 Aug	1	NS	NS	3	NS	3	1	0	0	0	1	2	1	3	Tables
	5 Sep	2	0	0	6	0	9	1	0	0	1	2	5	1	6	Tables
	8 Sep	3	NS	NS	0	NS	9	1	1	0	0	2	4	1	5	Tables
	11 Sep	4	NS	NS	0	NS	9	1	2	0	1	4	1	0	1	Tables
	17 Sep	5	NS	NS	0	NS	9	1	1	0	0	2	0	0	0	Tables
	22 Sep	6	NS	NS	1	NS	10	0	0	0	0	0	1	1	2	Tables

Appendix Table C-4. Upper mainstem Wallowa River, Grande Ronde River Basin, spring Chinook salmon index and supplemental survey counts from 1995 through 2003. Index survey units: I = McClarren Lane or Dorrance Road Bridge to Eggleson Lane Bridge (1.5 miles), II = Eggleson Lane Bridge to hatchery intake (or Second Railroad Trestle, 3.0 miles). Abbreviations are as follows: M = male, F = female, J = jack, U = unknown sex, A = adults, J = jacks, Ref. = reference, ND = no data, NS = no survey, I = incomplete survey of the index survey units. Abbreviations for the references are given in Table 1, page 14.

			New redds		Cum.	Redds/	Dead fish				Total	Live fish		Total	
Year	Date	No.	I	II	redds	mile	M	F	J	U	dead	A	J	live	Ref.
1995	21 Aug	1	0	0	0	0.0	0	0	0	0	0	0	0	0	Cards
	7 Sep	2	0	0	0	0.0	0	0	0	0	0	0	0	0	Cards
1996	21 Aug	1	0	0	0	0.0	0	0	0	0	0	0	0	0	Cards
1997	18 Aug	1	1	1	2	0.4	1	0	0	0	1	0	0	0	Tables
	16 Sep	2	0	10	12	2.7	0	0	0	0	0	1	0	1	Tables
1998	17 Aug	1	0	0	0	0.0	0	0	0	0	0	0	0	0	Tables
	29 Sep	2	2	10	12	2.7	1	2	1	1	5	2	0	2	Tables
1999	23 Aug	1	0	0	0	0.0	0	0	0	0	0	0	0	0	Tables
	22 Sep	2	[3	+]	3	0.7	0	0	0	0	0	0	0	0	Tables
2000	21 Aug	1	0	0	0	0.0	0	0	0	0	0	0	0	0	Tables
2001	20 Aug	1	0	0	0	0.0	0	0	0	0	0	7	0	7	Tables
	14 Sep	2	4	25	29	6.4	0	0	0	0	0	0	0	0	Tables
2002	19 Aug	1	1	0	1	0.2	0	0	0	0	0	5	0	5	Tables
	11 Sep	2	28	42	71	15.8	6	10	1	1	18	59	0	59	Tables
2003	18 Aug	1	0	0	0	0	0	0	0	1	1	4	0	4	Tables
	10 Sep	2	22	37	59	13.1	5	7	0	2	14	70	8	78	Tables

Appendix Table C-5. Bear Creek, Grande Ronde River Basin, spring Chinook salmon index and extensive survey counts from 1993 through 2003. Extensive survey unit: I = Guard Station up two miles (2.0 miles). Index survey units: II = Guard Station to Baker Gulch (2.3 miles), III = Baker Gulch to Boundary Campground (1.7 miles), IV = Boundary Campground to 8250 bridge (2.5 miles). Abbreviations are as follows: M = male, F = female, J = jack, U = unknown sex, A = adults, J = jacks, Ref. = reference, ND = no data, NS = no survey, I = incomplete survey of the index survey units. Abbreviations for the references are given in Table 1, page 14.

		Redds				Cum.	Redds/	Dead fish				Total	Live fish		Total	
Year	Date	I	II	III	IV	redds	mile	M	F	J	U	dead	A	J	live	Ref.
1993	24 Aug	9	2	1	6	18	2.1	2	3	0	0	5	2	0	2	Cards
1994	23 Aug	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	Cards
1995	22 Aug	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	Cards
1996	20 Aug	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	Cards
1997	19 Aug	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	Tables
1998	18 Aug	0	1	0	0	1	0.1	0	0	0	0	0	3	0	3	Tables
1999	24 Aug	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	Tables
2000	22 Aug	0	0	0	0	0	0.0	0	0	0	0	0	1	0	1	Tables
2001	21 Aug	0	0	1	0	1	0.1	0	0	0	0	0	3	0	3	Tables
2002	20 Aug	0	5	2	2	9	1.1	1	5	0	0	6	4	0	4	Tables
	18 Sep	NS	NS	NS	1	10	1.2	1	0	0	1	2	0	0	0	Tables
2003	19 Aug	0	1	0	1	2	0.2	1	1	0	0	2	2	0	2	Tables

Appendix Table C-6. Hurricane Creek, Grande Ronde River Basin, spring Chinook salmon index and supplemental survey counts from 1986 through 2003. Index survey units: I = Dorrance Road Bridge to Eggleson Lane Bridge (1.25 miles), II = Eggleson Lane Bridge to mouth (2.25 miles). Abbreviations are as follows: M = male, F = female, J = jack, U = unknown sex, A = adults, J = jacks, Ref. = reference, ND = no data, NS = no survey, I = incomplete survey of the index survey units. Abbreviations for the references are given in Table 1, page 14.

			New redds		Cum.	Redds/	Dead fish				Total	Live fish		Total	
Year	Date	No.	I	II	redds	mile	M	F	J	U	dead	A	J	Live	Ref.
1986	25 Aug	1	[5	+]	5	1.4	ND	ND	ND	ND	0	3	1	4	Tables
	1 Sep	2	6	NS	11	I	ND	ND	ND	ND	0	9	0	9	Tables
1987	17 Aug	1	5	NS	5	I	0	0	0	0	0	12	0	12	Cards
	24 Aug	2	11	1	17	4.9	1	0	0	0	1	20	1	21	Cards
	4 Sep	3	8	NS	25	I	5	6	0	0	11	20	1	21	Cards
1988	22 Aug	1	5	4	9	2.6	0	1	0	0	1	23	0	23	Cards
	2 Sep	2	36	NS	45	I	5	3	0	0	8	24	1	25	Cards
	12 Sep	3	9	NS	54	I	10	8	1	0	19	11	1	12	Cards
1989	21 Aug	1	2	0	2	0.6	0	0	0	0	0	5	0	5	Cards
	31 Aug	2	14	NS	16	I	0	0	0	0	0	32	1	33	Cards
	12 Sep	3	13	NS	29	I	6	7	0	0	13	13	0	13	Cards
1990	21 Aug	1	0	0	0	0.0	0	0	0	0	0	1	0	1	Cards
	30 Aug	2	6	NS	6	I	0	0	0	0	0	23	2	25	Cards
	7 Sep	3	18	NS	24	I	4	2	1	0	7	21	0	21	Cards
1991	23 Aug	1	4	0	4	1.1	0	0	0	0	0	2	0	2	Cards
	29 Aug	2	3	NS	7	I	0	0	0	0	0	4	0	4	Cards
	5 Sep	3	4	NS	11	I	0	0	0	0	0	3	0	3	Cards
	12 Sep	4	1	NS	12	I	1	5	0	0	6	4	1	5	Cards
1992	24 Aug	1	0	1	1	0.3	0	0	0	0	0	6	0	6	Cards
	2 Sep	2	10	NS	11	I	0	0	0	0	0	12	0	12	Cards
	11 Sep	3	4	NS	15	I	0	1	0	0	1	5	0	5	Cards
1993	23 Aug	1	12	7	19	5.4	0	2	0	1	3	20	0	20	Cards
	2 Sep	2	11	NS	30	I	1	5	0	1	7	5	0	5	Cards
	9 Sep	3	2	NS	32	I	0	2	0	1	3	0	0	0	Cards
1994	22 Aug	1	0	0	0	0.0	0	0	0	0	0	0	0	0	Cards
	1 Sep	2	0	NS	0	I	0	0	0	0	0	0	0	0	Cards
	8 Sep	3	1	NS	1	I	0	0	0	0	0	0	0	0	Cards

Appendix Table C-6. Continued.

			New redds		Cum.	Redds/	Dead fish				Total	Live fish		Total	
Year	Date	No.	I	II	redds	mile	M	F	J	U	dead	A	J	Live	Ref.
1995	21 Aug	1	[0	+]	0	0.0	0	0	0	0	0	0	0	0	Cards
	30 Aug	2	0	NS	0	I	0	0	0	0	0	0	1	1	Cards
	5 Sep	3	0	NS	0	I	0	0	0	0	0	0	0	0	Cards
1996	26 Aug	1	[3	+]	3	0.9	0	1	0	0	1	2	0	2	Cards
1997	9 Sep	1	[9	+]	9	2.6	0	4	0	0	4	4	0	4	Tables
1998	25 Aug	1	[0	+]	0	0.0	0	0	0	0	0	0	0	0	Tables
	2 Sep	2	[0	+]	0	0.0	0	0	0	0	0	0	0	0	Tables
1999	15 Sep	1	[6	+]	6	1.7	0	2	0	0	2	3	1	4	Tables
2000	31 Aug	1	[12	+]	12	3.4	1	0	0	0	1	13	4	17	Tables
	13 Sep	2	[10	+]	22	6.3	3	2	0	0	5	10	0	10	Tables
2001	29 Aug	1	[7	+]	7	2.0	0	0	0	1	1	26	1	27	Tables
	12 Sep	2	[23	+]	30	8.6	6	7	0	0	13	18	0	18	Tables
2002	28 Aug	1	[8	+]	8	2.3	0	0	0	0	0	12	1	13	Tables
	13 Sep	2	[3	+]	11	3.1	1	3	0	0	4	2	0	2	Tables
2003	27 Aug	1	[3	+]	3	0.9	0	0	0	0	0	6	3	9	Tables
	12 Sep	2	[20	+]	23	6.6	3	4	1	0	8	19	2	21	Tables

Appendix Table C-7. Lostine River, Grande Ronde River Basin, spring Chinook salmon index and extensive survey counts from 1949 through 1975. Survey units: I = Forks to Lapover Meadows (3.0 miles), II = Lapover Meadows to Williamson Campground (5.0 miles), IV = Six-mile Bridge to Lostine River Ranch Bridge (3.0 miles). Abbreviations are as follows: M = male, F = female, J = jack, U = unknown sex, A = adults, J = jacks, Ref. = reference, ND = no data, NS = no survey, I = incomplete survey of the index survey units. Abbreviations for the references are given in Table 1, page 14.

		New redds			Cum.	Dead fish				Total	Live fish		Total	
Year	Date	I	II	IV	redds	M	F	J	U	dead	A	J	live	Ref.
1949	Aug 16	0	37[a]	63[b]	100	ND	ND	ND	ND	13	ND	ND	28	EOS
1950	19-20 Aug	NS	34	46[c]	80	2	ND	ND	ND	9	ND	ND	22[d]	EOS
1951	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1952	16 Aug	NS	68	47[c]	115	ND	ND	0	ND	3	29	5	34	EOS
1953	27 Aug	NS	82	46[c]	128	ND	ND	ND	ND	29	0	0	0	EOS
1954	19 Aug	NS	57	89[c]	146	ND	ND	7	ND	40	88	13	101	EOS
1955	21 Aug	NS	76	107[c]	183	ND	ND	9	ND	61	52	16	68	EOS
1956	23 Aug	NS	25	55[c]	80	ND	ND	4	ND	23	71	28	99	EOS
1957	21 Aug	NS	82	157	239	ND	ND	ND	ND	92	51	14	65	EOS
1958[e]	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	EOS
1959	26 Aug	NS	37	66	103	ND	ND	4	ND	69	62	22	84	EOS
1960	26 Aug	NS	22	73	95	ND	ND	4	ND	58	37	2	39	EOS
1961	28 Aug	NS	19	25	44	ND	ND	1	ND	8	19	16	35	EOS
1962	26 Aug	NS	13	40	53	ND	ND	7	ND	31	28	19	47	EOS
1963	24 Aug	NS	49	48	97	ND	ND	8	ND	38	61	44	105	EOS
1964	21 Aug	17	NS	(f)	I	ND	ND	ND	ND	0	ND	ND	11	WD
	29 Aug	NS	72	114	203	ND	ND	8	ND	138	115	8	123	EOS
1965	23 Aug	NS	27	65	92	ND	ND	1	ND	8	36	39	75	EOS
	1 Sep	10	NS	NS	102	ND	ND	ND	ND	2	0	0	0	WD
1966	25 Aug	5	NS	NS	5	ND	ND	ND	ND	0	ND	ND	12	WD
	27 Aug	NS	75	107	182	ND	ND	21	ND	176	45	21	66	EOS
1967	24 Aug	26	NS	NS	26	ND	ND	ND	ND	10	3	0	3	WD
	26 Aug	NS	52	99	177	ND	ND	24	ND	138	116	46	162	EOS
1968	24 Aug	4	NS	NS	4	ND	ND	ND	ND	3	4	0	4	WD
	26 Aug	NS	18	106	128	ND	ND	8	ND	87	186	26	212	EOS
1969	23 Aug	3	NS	NS	3	ND	ND	ND	ND	0	3	0	3	WD
	26 Aug	NS	6	99	108	ND	ND	5	ND	104	51	19	70	EOS
1970	25 Aug	NS	4	76	80	ND	ND	6	ND	50	81	33	114	EOS
1971	30 Aug	NS	6	76	82	ND	ND	6	ND	46	57	10	67	EOS
1972	28 Aug	NS	2	125	127	ND	ND	5	ND	107	104	5	109	EOS
1973	28 Aug	NS	29	138	167	ND	ND	5	ND	209	68	4	72	EOS
1974	27 Aug	NS	3	114	117	ND	ND	1	ND	46	76	2	78	EOS
1975	26 Aug	NS	0	33	33	ND	ND	0	ND	15	33	4	37	EOS

[a] *Lapover Meadows to Guard Station and from 0.25 mile above Williamson cabin to 0.25 mile below.*
[b] *In a 1.5 mile section through the swamp area above the dam.*
[c] *Surveys ended within a 1/2 mile of the present day Lostine River Ranch bridge site (1950, down 3.25 miles; 1952, to 4 mile post; 1953, to 3.5 mile post; 1954, downstream for 3 miles; 1955, to farm bridge at 3.5 mile; 1956, to white farm house).*
[d] *Reports did not indicate if jacks were included in dead fish counts.*
[e] *No survey conducted in 1958 due to flash flood.*
[f] *Counts are not consistent with EOS survey (263 redds, 12 dead and 245 live salmon).*

Appendix Table C-8. Lostine River, Grande Ronde River Basin, spring Chinook salmon index, extensive, and supplemental survey counts from 1986 through 2003. Survey units: I = Forks to Lapover Meadows (3.0 miles), II = Lapover Meadows to Williamson Campground (5.0 miles), III = Pole Bridge (or Falls) to Six-mile Bridge (2.0 miles), IV = Six-mile Bridge to Lostine River Ranch Bridge (3.0 miles), V = Lostine River Ranch Bridge to Westside Diversion Ditch (1.6 miles), VI = Westside Diversion Ditch to Wallowa River Road (4 miles), VII = Wallowa River Road to McLain Ranch Red Barn (2.7 miles), VIII = McLain Ranch Red Barn to mouth (2.7 miles). Abbreviations are as follows: M = male, F = female, J = jack, U = unknown sex, A = adults, J = jacks, Ref. = reference, ND = no data, NS = no survey, I = incomplete survey of the index survey units. Abbreviations for the references are given in Table 1, page 14.

			New redds								Cum.	Redds/	Dead fish				Total	Live fish		Total	
Year	Date	No.	I	II	III	IV	V	VI	VII	VIII	redds	mile	M	F	J	U	dead	A	J	live	Ref.
1986	27 Aug	1	0	0	6[a]	48	[5	+]	[2	+]	61	2.9	6	7	1	0	14	63	4	67	WD
1987	17 Aug	1	NS	NS	NS	27	NS	NS	NS	NS	27	I	3	10	0	0	13	54	2	56	WD
	27 Aug	2	NS	NS	2	22	4	NS	7	6	68	I	3	14	0	1	18	67	0	67	Cards
	9 Sep	3	NS	NS	NS	7	NS	NS	NS	NS	75	I	1	4	0	1	6	1	0	1	Cards
1988	23 Aug	1	NS	4[b]	18	107	30	NS	0	5	164	7.8	27	43	0	9	79	83	5	88	Cards
	2 Sep	2	NS	NS	NS	16	NS	NS	NS	NS	180	I	6	13	0	1	20	10	0	10	Cards
	12 Sep	3	NS	NS	NS	2	NS	NS	NS	NS	182	I	1	2	0	0	3	2	0	2	Cards
1989	23 Aug	1	NS	4	1	20	0	1[c]	0	0	26	1.2	7	7	0	1	15	16	0	16	Cards
	31 Aug	2	NS	NS	NS	21	NS	NS	NS	NS	47	I	0	2	1	0	3	27	0	27	Cards
	12 Sep	3	NS	NS	NS	6	NS	NS	NS	NS	53	I	4	3	0	0	7	2	0	2	Cards
1990	23 Aug	1	NS	2	0	16	0	NS	1	0	19	0.9	2	3	0	0	5	15	0	15	Cards
	30 Sep	2	NS	NS	NS	5	NS	NS	NS	NS	24	I	1	0	0	0	1	12	1	13	Cards
	7 Sep	3	NS	NS	NS	2	NS	NS	NS	NS	26	I	6	2	0	0	8	1	0	1	Cards
1991	27 Aug	1	NS	2	2	11	5	NS	0	0	20	1.0	6	11	0	0	17	9	2	11	Cards
	5 Sep	2	NS	NS	NS	6	NS	NS	NS	NS	26	I	4	2	0	0	6	1	0	1	Cards
	12 Sep	3	NS	NS	NS	2	NS	NS	NS	NS	28	I	0	1	0	0	1	1	0	1	Cards
1992	26 Aug	1	NS	2	1	14	3	NS	1	1	22	1.0	5	6	0	0	11	29	0	29	Cards
	2 Sep	2	NS	NS	NS	14	NS	NS	NS	NS	36	I	6	1	0	0	7	22	0	22	Cards
	11 Sep	3	NS	NS	NS	1	NS	NS	NS	NS	37	I	5	9	0	0	14	7	0	7	Cards

[a] *Williamson Campground to Six-mile Bridge (5.0 miles).*
[b] *Bowman trail to Williamson Campground (3.5 miles).*
[c] *Westside Diversion Ditch to Chapman's House (0.75 miles).*

Appendix Table C-8. Continued.

			New redds								Cum.	Redds/	Dead fish				Total	Live fish		Total	
Year	Date	No.	I	II	III	IV	V	VI	VII	VIII	redds	mile	M	F	J	U	dead	A	J	live	Ref.
1993	26 Aug	1	NS	11	0	66	10	6	0	2	95	4.5	7	18	0	0	25	47	0	47	Cards
	4 Sep	2	NS	NS	NS	7	NS	NS	NS	NS	102	I	3	14	0	0	17	7	0	7	Cards
	13 Sep	3	NS	NS	NS	0	NS	NS	NS	NS	102	I	1	7	0	0	8	1	0	1	Cards
1994	25 Aug	1	NS	4	0	7	0	0	0	0	11	0.5	0	2	0	0	2	9	0	9	Cards
	1 Sep	2	NS	NS	NS	2	NS	NS	NS	NS	13	I	0	1	0	1	2	4	0	4	Cards
	8 Sep	3	NS	NS	NS	3	NS	NS	NS	NS	16	I	1	2	0	0	3	5	0	5	Cards
1995	23 Aug	1	NS	0	0	6	1	0	0	0	7	0.3	0	0	0	0	0	4	0	4	Cards
	30 Aug	2	NS	NS	NS	2	NS	NS	NS	NS	9	I	0	0	0	0	0	3	0	3	Cards
	6 Sep	3	NS	NS	NS	2	NS	NS	NS	NS	11	I	1	3	0	0	4	0	0	0	Cards
1996	21 Aug	1	NS	0	0	13	3	1	0	0	17	0.8	0	2	0	0	2	18	0	18	Cards
	28 Aug	2	NS	0	0	4	1	3	0	0	25	1.2	0	7	1	0	8	7	1	8	Cards
	5 Sep	3	NS	0	0	0	0	2	0	0	27	1.3	5	4	0	0	9	4	0	4	Cards
1997	21 Aug	1	NS	5	0	27	2	0	0	1	35	1.7	2	4	0	0	6	28	0	28	Tables
	28 Aug	2	NS	0	0	8	1	0	0	1	45	2.1	7	21	1	0	29	25	1	26	Tables
	4 Sep	3	NS	0	0	2	0	1	1	0	49	2.3	10	8	1	0	19	5	0	5	Tables
1998	20 Aug	1	NS	3	0	9	0	0	0	0	12	0.6	0	4	0	0	4	11	0	11	Tables
	27 Aug	2	0	2	0	8	0	0	0	0	22	1.0	5	6	1	2	14	12	2	14	Tables
	3 Sep	3	NS	0	1	5	0	0	0	0	28	1.3	1	10	1	0	12	9	0	9	Tables
	17 Sep	4	NS	NS	NS	NS	NS	NS	NS	7[d]	35	I	1	1	0	0	2	3	0	3	Tables
	23 Sep	5	NS	NS	NS	NS	NS	NS	NS	0[d]	35	I	1	1	0	0	2	0	0	0	Tables
	1 Oct	6	NS	NS	NS	NS	NS	NS	NS	0[d]	35	I	0	2	0	0	2	0	0	0	Tables
1999	26 Aug	1	NS	0	0	40	1	0	0	0	41	2.0	9	5	0	0	14	34	2	36	Tables
	2 Sep	2	NS	0	0	2	1	0	0	0	44	2.1	6	10	0	0	16	6	1	7	Tables
	9 Sep	3	NS	0	0	1	0	0	0	1	46	2.2	4	11	0	0	15	3	0	3	Tables
	16 Sep	4	NS	NS	NS	NS	NS	NS	NS	4[d]	50	I	0	0	0	0	0	2	0	2	Tables
	24 Sep	5	NS	NS	NS	NS	NS	NS	NS	4[d]	54	I	1	0	1	0	2	1	0	1	Tables
	1 Oct	6	NS	NS	NS	NS	NS	NS	NS	3[d]	57	I	0	0	0	0	0	0	0	0	Tables

[d] *Weir to mouth (0.9 miles).*

Appendix Table C-8. Continued.

			New redds								Cum.	Redds/	Dead fish				Total	Live fish		Total	
Year	Date	No.	I	II	III	IV	V	VI	VII	VIII	redds	mile	M	F	J	U	dead	A	J	live	Ref.
2000	25 Aug	1	0[e]	1[f]	0	34	1	0	1	0	37	1.8	4	8	0	3	15	22	2	24	Tables
	1 Sep	2	0[e]	0[f]	0	10	0	0	0	2	49	2.3	7	6	2	0	15	24	4	28	Tables
	8 Sep	3	0[e]	0[f]	0	3	0	1	2	6	61	2.9	5	5	1	0	11	20	1	21	Tables
	15 Sep	4	NS	NS	NS	NS	NS	NS	NS	1[d]	62	I	4	4	1	0	9	2	1	3	Tables
	20 Sep	5	NS	NS	NS	NS	NS	NS	NS	1[d]	63	I	3	1	1	1	6	0	0	0	Tables
	29 Sep	6	NS	NS	NS	NS	NS	NS	NS	1[d]	64	I	0	1	0	0	1	0	0	0	Tables
2001	24 Aug	1	0[e]	11[f]	2	41	1	0	0	1	56	2.7	11	13	0	5	29	52	3	55	Tables
	31 Aug	2	0[e]	5[f]	0	11	2	0	0	14	88	4.2	11	12	0	0	23	79	1	80	Tables
	7 Sep	3	0[e]	5[f]	0	18	0	0	1	6	118	5.6	7	18	3	0	28	65	3	68	Tables
	14 Sep	4	NS	NS	NS	NS	NS	NS	NS	12[d]	130	I	10	14	0	0	24	42	2	44	Tables
	21 Sep	5	NS	NS	NS	NS	NS	NS	NS	0[d]	130	I	3	12	2	0	17	4	0	4	Tables
	28 Sep	6	NS	NS	NS	NS	NS	NS	NS	0[d]	130	I	0	0	0	0	0	0	0	0	Tables
2002	23 Aug	1	1[e]	19[f]	0	85	3	1	0	4	113	5.4	22	38	2	1	63	103	4	107	Tables
	30 Aug	2	0[e]	6[f]	1	23	6	0	0	4	153	7.3	32	44	1	1	78	72	5	77	Tables
	6 Sep	3	0[e]	5[f]	0	15	0	2	3	4	182	8.7	22	28	6	6	62	35	1	36	Tables
	13 Sep	4	NS	NS	NS	NS	NS	NS	NS	17[d]	199	I	0	4	0	0	4	10	0	10	Tables
	17 Sep	5	1[e]	1[f]	0	2	0	0	0	4	207	9.9	10	15	2	4	31	10	0	10	Tables
	20 Sep	6	NS	NS	NS	NS	NS	NS	NS	0[d]	207	I	0	1	0	0	1	8	0	8	Tables
	23 Sep	7	NS	NS	1	NS	NS	NS	NS	NS	208	I	ND	ND	ND	ND	ND	ND	ND	ND	Tables
	27 Sep	8	NS	NS	NS	NS	NS	NS	NS	0[d]	208	I	0	2	0	0	2	0	0	0	Tables
	8 Oct	9	NS	NS	NS	NS	1	NS	NS	NS	209	I	ND	ND	ND	ND	ND	ND	ND	ND	Tables
2003	22 Aug	1	4[e]	28[f]	0	31[g]	0	0[h]	0	0	63	3.5	6	25	0	4	35	102	9	111	Tables
	29 Aug	2	1[e]	8[f]	0	19[g]	2	1[h]	0	3	97	5.3	17	21	1	3	42	73	10	83	Tables
	5 Sep	3	0[e]	1[f]	2	6[g]	1	0[h]	0	16	123	6.8	16	23	6	0	45	86	4	90	Tables
	12 Sep	4	NS	NS	NS	NS	NS	NS	NS	23[d]	146	I	7	10	0	0	17	20	1	21	Tables
	16 Sep	5	0[e]	0[f]	0	7[g]	0	1[h]	6	31	191	10.5	7	10	4	3	24	21	5	26	Tables
	18 Sep	6	NS	NS	NS	NS	NS	NS	NS	2[d]	193	I	1	6	1	0	8	4	0	4	Tables
	26 Sep	7	NS	NS	NS	NS	NS	NS	NS	1[d]	194	I	1	2	1	0	4	0	0	0	Tables

[e] *Turkey Flat to Lapover Meadow (0.5 mile).*
[f] *Lapover Meadow to Bowman Trailhead (1.0 mile) and Walla Walla Campground to Williamson Campground (2.6 miles).*
[g] *0.2 miles below Six-mile bridge to Lostine River Ranch bridge (2.8 miles).*
[h] *Westside Diversion Ditch to Trout Farm bridge (2.3 miles).*

Appendix Table C-9. Minam River, Grande Ronde River Basin, spring Chinook salmon index, extensive, and supplemental survey counts from 1986 through 2003. Survey units: Upper Minam I = Elk Creek Survey (1 mile), II = Camp One Survey (0.5 mile), III = Rock Creek Survey (0.5 mile), IV = Little Pot Survey (0.5 mile), V = Splash Dam Survey (1 mile), VI = Salmon Hole to Bridge at Red's Horse Ranch (1.4 miles), VII = Bridge at Red's Horse Ranch to Bluff (3.4), and VIII = Little Minam River, falls to 0.25 mile below Big Canyon Creek (1.5 miles), IX = Little Minam River, 0.25 mile below Big Canyon Creek to mouth (3.5 miles). Abbreviations are as follows: M = male, F = female, J = jack, U = unknown sex, A = adults, J = jacks, Ref. = reference, ND = no data, NS = no survey, I = incomplete survey of the index survey units. Abbreviations for the references are given in Table 1, page 14.

			New redds									Cum.	Dead fish				Total	Live fish		Total	
Year	Date	No.	I	II	III	IV	V	VI	VII	VIII	IX	redds	M	F	J		dead	A	J	live	Ref.
1986	27-29 Aug	1	0	1	15	6	5	21	14	NS	NS	62	ND	ND	ND	ND	19	8[a]	1[a]	9[a]	(b)
1987	25-28 Aug	1	1	NS	8	12	5	8	56	NS	NS	90	1	3	1	1	6	27	2	29	Cards
	25 Sep	2	NS	NS	NS	NS	NS	NS	25	NS	NS	115	0	1	0	1	2	3	0	3	Cards
1988	24-25 Aug	1	12	4	9	6	6	9	41	NS	NS	87	13	12	0	4	29	27	0	27	Cards
	9 Sep	2	NS	NS	NS	NS	NS	NS	17	NS	NS	104	6	4	0	7	17	10	0	10	Cards
1989	29-31 Aug	1	3	1	3	0	3	4	19	NS	NS	33	3	7	0	0	10	18	0	18	Cards
	14 Sep	2	NS	NS	NS	NS	NS	NS	5	NS	NS	38	0	1	0	0	1	0	0	0	Cards
1990	28-30 Aug	1	2	8	2	3	2	0	36	NS	NS	53	4	2	0	0	6	31	1	32	Cards
	10 Sep	2	NS	NS	NS	NS	NS	NS	14	NS	NS	67	5	8	1	0	14	5	1	6	Cards
1991	27, 29 Aug	1	5	6	0	4	5	4	13	NS	NS	37	4	4	0	0	8	13	0	13	Cards
	9 Sep	2	NS	NS	NS	NS	NS	NS	13	NS	NS	50	2	3	0	0	5	7	0	7	Cards
1992	25-27 Aug	1	2	2	2	4	4	1	1	3	13	32	4	5	0	1	10	23	0	23	Cards
	4 Sep	2	NS	NS	NS	NS	NS	NS	77	NS	NS	109	4	4	0	0	8	86	1	87	Cards
	16 Sep	3	NS	NS	NS	NS	NS	NS	6	NS	NS	115	6	24	0	0	30	4	0	4	Cards
1993	24-26 Aug	1	10	4	6	8	6	3	26	6	16	85	9	8	0	2	19	48	0	48	Cards
	4 Sep	2	NS	NS	NS	NS	NS	NS	21	NS	NS	106	10	20	0	0	30	14	0	14	Cards
	13 Sep	3	NS	NS	NS	NS	NS	NS	4	NS	NS	110	1	1	0	0	2	0	0	0	Cards
1994	21-23 Aug	1	1	0	2	1	0	1	0	0	2	7	1	1	0	0	2	2	0	2	Cards
	2 Sep	2	NS	NS	NS	NS	NS	NS	14	NS	NS	21	1	3	0	0	4	10	0	10	Cards
	12 Sep	3	NS	NS	NS	NS	NS	NS	11	NS	NS	32	3	3	0	0	6	5	0	5	Cards
1995	29-31 Aug	1	1	0	0	0	0	0	9	3	2	15	1	1	0	0	2	5	0	5	Cards
	7 Sep	2	NS	NS	NS	NS	NS	NS	5	NS	NS	20	0	1	0	2	3	0	0	0	Cards
	14 Sep	3	NS	NS	NS	NS	NS	NS	0	NS	NS	20	0	0	0	0	0	0	0	0	Cards

[a] *Live fish counts were only reported from section VI.*

[b] *1986 surveys found in LD, Tables, and LD field notebook.*

Appendix Table C-9. Continued.

			New redds									Cum.	Dead fish				Total	Live fish		Total	
Year	Date	No.	I	II	III	IV	V	VI	VII	VIII	IX	redds	M	F	J	U	dead	A	J	live	Ref.
1996	17 Aug	0[c]	1	NS	1	NS	NS	NS	NS	NS	NS	2	0	0	0	0	0	0	0	0	Cards
	28-30 Aug	1	0	1	1	4	4	10	35	5	14	76	1	10	0	0	11	50	0	50	Cards
	3 Sep	2	2	0	NS	1	2	8	8	NS	NS	97	10	14	0	0	24	21	0	21	Cards
	9-10 Sep	3	NS	NS	1	0	0	1	4	NS	NS	103	5	12	2	0	19	4	0	4	Cards
1997	26-28 Aug	1	1	2	6	3	7	3	14	5	5	46	8	9	0	0	17	40	0	40	Tables
	2 Sep	2	0	2[d]	0	2	3	0	3	NS	NS	56	11	20	0	0	31	7	0	7	Tables
	9 Sep	3	NS	NS	NS	0	0	1	1	NS	NS	58	4	4	0	0	8	1	0	1	Tables
1998	25-27 Aug	1	7	2	6	0	5	2	9	4	4	39	0	4	0	0	4	10	0	10	Tables
	1 Sep	2	0	2[d]	0	5	1	2	9	NS	NS	58	4	6	0	0	10	17	0	17	Tables
	8 Sep	3	NS	NS	NS	0	0	1	6	NS	NS	65	6	12	0	0	18	7	0	7	Tables
1999	24-26 Aug	1	1	2[d]	0	2	3	4	15	5	1	33	2	5	0	0	7	11	2	13	Tables
	1 Sep	2	NS	NS	NS	0	1	4	7	NS	NS	45	2	6	0	0	8	3	1	4	Tables
	7 Sep	3	NS	NS	NS	0	0	0	1	NS	NS	46	1	4	1	0	6	3	0	3	Tables
2000	29-31 Aug	1	2	2[d]	5	6	18	7	23	0	11	74	5	4	1	0	10	116	2	118	Tables
	6 Sep	2	NS	NS	NS	2	3	2	30	NS	NS	111	12	26	1	1	40	70	1	71	Tables
	13 Sep	3	NS	NS	NS	0	1	7	20	NS	NS	139	12	15	0	0	27	18	0	18	Tables
2001	28-30 Aug	1	4	11[d]	8	14	17	18	32	8	16	128	1	8	0	0	9	73	1	74	Tables
	5 Sep	2	NS	NS	NS	3	5	4	23	NS	NS	163	9	21	0	0	30	62	3	65	Tables
	17 Sep	3	NS	NS	NS	0	1	3	12	NS	NS	179	3	5	3	2	13	3	0	3	Tables
2002	27-29 Aug	1	15	16[d]	18	10	12	14	51	12	15	163	13	34	0	3	50	82	2	84	Tables
	4 Sep	2	NS	NS	NS	2	0	4	12	NS	NS	181	16	25	0	3	44	20	0	20	Tables
	11 Sep	3	NS	NS	NS	0	4	3	5	NS	NS	193	6	12	2	1	21	1	0	1	Tables
2003	26-28 Aug	1	8	15[d]	20	11	9	11	17	13	8	112	7	18	0	0	25	41	0	41	Tables
	3 Sep	2	NS	NS	NS	2	3	4	21	NS	NS	142	20	10	1	1	32	28	7	35	Tables
	10 Sep	3	NS	NS	NS	1	3	1	6	NS	NS	153	12	5	1	0	18	6	1	7	Tables

[c] *Pre-survey.*

[d] *Includes redds counted in the "Sandy Beach" survey (0.2 miles) and the "Camp 1" survey (0.5 miles).*

Appendix Table C-10. Prairie Creek and Spring Creek, Wallowa River tributaries, Grande Ronde River Basin, spring Chinook salmon survey counts. Abbreviations are as follows: M = male, F = female, J = jack, U = unknown sex, A = adults, J = jacks, Ref. = reference, ND = no data, NS = no survey, I = incomplete survey of the index survey units. Abbreviations for the references are given in Table 1, page 14.

Year	Date	Stream Survey description	Total redds	Total dead	Live fish A	Live fish J	Total live	Ref.
		Prairie Creek						
1955	ND	Lower 0.4 mile of Dobbin Creek and 1 mile above mouth	a few	ND	ND	ND	a few	ESR
1955	7 Sep	Dobbin Creek observation	4	ND	ND	ND	2	ESR
1973	4 Sep	Hayes Fork	7	0	6	1	7	WD
1973	4 Sep	Pratt Fork	2	0	0	0	0	WD
1974	3 Sep	Hayes Fork	0	0	0	0	0	WD
1974	3 Sep	Pratt Fork	0	0	0	0	0	WD
1988	2 Sep	Hayes Fork Mouth to Sands Chemical Bridge	1	1	ND	ND	3	WD
1988	2 Sep	Upper Prairie Creek Dead to White house	6	5	ND	ND	1	WD
1988	2 Sep	White House to White Bridge	4	9	ND	ND	7	WD
1990	21 Aug	Hayes Fork	0	0	ND	ND	0	WD
		Spring Creek						
1955	ND	Below trout hatchery dike	1	0	2	0	2	ESR
1964	15 Sep	Lower Alder Slope Canal to Mouth	20	3	8	ND	8	WD
1965	31 Aug	Forks to Mouth	6	0	3	ND	3	WD
1966	25 Aug	Forks to Mouth	6	0	10	ND	10	WD
1967	25 Aug	Forks to Mouth	4	0	1	0	1	WD
1968	26 Aug	Hatchery Rearing Pond to mouth (1.0 miles)	1	0	1	1	2	WD
1969	27 Aug	Hatchery Rearing Pond to mouth (1.0 miles)	1	ND	ND	ND	ND	WD
1970	27 Aug	Hatchery Rearing Pond to mouth (1.0 miles)	0	0	0	0	0	WD
1971	25 Aug	Hatchery Rearing Pond to mouth (1.0 miles)	0	0	0	0	0	WD
1972	10 Sep	Hatchery Rearing Pond to mouth (1.0 miles)	4	0	1	0	1	WD
1973	28 Aug	Hatchery Rearing Pond to mouth (1.0 miles)	2	0	0	0	0	WD
1974	27 Aug	Hatchery Rearing Pond to mouth (1.0 miles)	0	0	0	0	0	WD
1975	12 Sep	Hatchery Rearing Pond to mouth (1.0 miles)	0	0	0	0	0	WD
1976	26 Aug	Hatchery Rearing Pond to mouth (1.0 miles)	1	0	0	0	0	WD
1978	31 Aug	Hatchery Rearing Pond to mouth (1.0 miles)	2	ND	ND	0	2	WD

Appendix Table C-11. Wenaha River, Grande Ronde River Basin, spring Chinook salmon index, extensive, and supplemental survey counts from 1986 through 2003. Survey units: I = North Fork of the Wenaha River (variable 3-5.5 miles), II = Milk Creek Survey (0.3 mile), III = South Fork of the Wenaha River, Milk Creek to Forks (6.0 miles), IV = Forks to Rock Creek (5.5 mi), V = Rock Creek to Butte Creek (2.8 miles), VI = Butte Creek to Crooked Creek (8.4 miles), VII = Butte Creek Survey, state line to mouth (variable 1.3 – 2.3 miles). Abbreviations are as follows: M = male, F = female, J = jack, U = unknown sex, A = adults, J = jacks, Ref. = reference, ND = no data, NS = no survey, I = incomplete survey of the index survey units. Abbreviations for the references are given in Table 1, page 14.

			New redds							Cum.	Redds/	Dead fish				Total	Live fish		Total	
Year	Date	No.	I	II	III	IV	V	VI	VII	redds	mile	M	F	J	U	dead	A	J	live	Ref.
1986	3 Sep	1	NS	NS	68	NS	NS	NS	NS	68	11.3	1	6	0	7	14	15	0	15	WD
1987	7-10 Sep	1	3	2[a]	62	26	25[b]	32	2	152	5.1	17	29	0	6	52	21	0	21	Cards
1988	5-9 Sep	1	2	1	98	21	11	32	3	168	5.6	31	34	1	3	69	22	1	23	Cards
1989	5-7 Sep	1	0	0	9	5	0	4	0	18	0.6	2	2	0	0	4	14	1	15	Cards
1990	3-5 Sep	1	3	0	31	23	8	16	2	83	2.8	6	7	0	0	13	49	1	50	Cards
1991	2-4 Sep	1	2	0	28	15	5	7	1	58	1.9	7	9	0	0	16	24	1	25	Cards
	13 Sep	2	NS	NS	NS	7[c]	NS	NS	NS	65	I	0	0	0	0	0	3	0	3	Cards
1992	7-9 Sep	1	10	NS	58	47	14	49	5	183	6.2	19	28	1	0	48	91	0	91	Cards
	14 Sep	2	NS	NS	7	2[c]	NS	NS	NS	192	I	0	8	0	0	8	6	0	6	Cards
1993	7-9 Sep	1	4	0	46	29	5	14	2	100	3.3	8	14	0	1	23	18	2	20	Cards
	16 Sep	2	NS	NS	2	2[c]	NS	NS	NS	104	I	0	7	0	0	7	0	0	0	Cards
1994	6-8 Sep	1	NS	NS	12	16	9[c]	5	NS	42	1.9	2	3	0	0	5	20	0	20	Cards
	15 Sep	2	NS	NS	2	0[c]	NS	NS	NS	44	T	0	1	0	0	1	1	0	1	Cards
1995	5-6 Sep	1	NS	NS	3	11	1	6	1	22	0.9	2	0	1	0	3	9	2	11	Cards
	13 Sep	2	0	0	2	1[c]	NS	NS	NS	25	I	0	0	0	0	0	1	0	1	Cards
1996	3-4 Sep	1	NS	NS	28	30	18	21	5	102	4.2	8	5	0	0	13	73	0	73	Cards
	12 Sep	2	NS	NS	10	3	4	10	NS	129	I	15	19	1	0	35	13	0	13	Cards
1997	2-4 Sep	1	NS	0	26	9	8	16	4	63	2.6	19	12	0	0	31	27	1	28	Tables
	11 Sep	2	NS	0	0	4	1	1	NS	69	I	9	10	1	0	20	11	0	11	Tables
1998	1-3 Sep	1	NS	0	24	9	17	12	3	65	2.7	13	8	0	1	22	44	0	44	Tables
	10 Sep	2	NS	0	2	4	1	4	NS	76	I	20	16	0	1	37	10	0	10	Tables

[a] *Three miles up from mouth.*
[b] *Survey is 0.5 mile too long.*
[c] *Forks down 3.0 miles.*

Appendix Table C-11. Continued.

			New redds							Cum.	Redds/	Dead fish				Total	Live fish		Total	
Year	Date	No.	I	II	III	IV	V	VI	VII	redds	mile	M	F	J	U	dead	A	J	live	Ref.
1999	7-9 Sep	1	NS	NS	5	4	6	5	2	22	0.9	0	4	0	0	4	6	2	8	Tables
	16 Sep	2	NS	0	0	0	1	2	NS	25	I	4	5	0	0	9	2	0	2	Tables
2000	5-7 Sep	1	NS	0	55	28	16	17	1	117	4.8	10	21	1	1	33	77	0	77	Tables
	14 Sep	2	NS	0	7	6	1	4	NS	135	I	16	20	1	1	38	6	0	6	Tables
2001	4-6 Sep	1	NS	3	88[d]	64	17	41	11	224	9.1	19	40	2	0	61	84	3	87	Tables
	13 Sep	2	NS	0	16[d]	4	6	12	NS	262	I	5	19	1	2	27	21	0	21	Tables
2002	3-5 Sep	1	20	3	66[d]	44	13	39	6	191	6.4	25	21	1	5	52	58	2	60	Tables
	12 Sep	2	NS	0	9[d]	5	2	4	NS	211	I	3	7	0	3	13	11	0	11	Tables
2003	2-4 Sep	1	NS	2	70[d]	32	13	12	0	129	5.1	5	9	0	0	14	41	2	43	Tables
	11 Sep	2	NS	0	17[d]	1	2	8	NS	157	I	0	6	0	0	7	10	0	10	Tables

[d] *Includes 0.25 miles above Milk Creek.*

APPENDIX D

Imnaha River Basin
Index, Extensive, and Supplemental Surveys

Appendix Table D-1. Imnaha River, Imnaha River Basin, spring Chinook salmon index, extensive, and supplemental survey counts from 1986 through 2003. Survey units: I = South Fork of the Imnaha River, Bear Creek to Forks (2.7 miles), II = Forks to Blue Hole (4.0 miles), III = Blue Hole to Indian Crossing Campground (2 miles), IV = Indian Crossing Campground to Mac's Mine (7.7 miles), V = Mac's Mine to Weir (5.0 miles), VI = Weir to Crazyman Creek (3.0 miles), VII = Crazyman Creek to Grouse Creek (8.0 miles), VIII = Grouse Creek to Freezeout Creek (6.0 miles). Abbreviations are as follows: M = male, F = female, J = jack, U = unknown sex, A = adults, J = jacks, Ref. = reference, ND = no data, NS = no survey. Abbreviations for the references are given in Table 1, page 14.

			New redds								Cum.	Dead fish				Total	Live fish		Total	
Year	Date	No.	I	II	III	IV	V	VI	VII	VIII	redds	M	F	J	U	dead	A	J	live	Ref.
1986	28 Aug	1	NS	NS	24	103	1	[36	+]	0	164	10	11	2	4	27	98	7	105	WD
1987	18 Aug	0[a]	NS	NS	NS	27	NS	NS	NS	NS	27	0	2	0	0	2	38	1	39	Cards
	26 Aug	1	NS	NS	25	60	9	8	6	5	140	6	8	0	0	14	151	11	162	Cards
	4 Sep	2	NS	NS	NS	8	6	NS	NS	NS	154	3	7	0	2	12	16	0	16	Cards
1988	25 Aug	1	22	10	35	100	9	13	5	0	194	27	68	1	3	99	137	4	141	Cards
	1 Sep	2	NS	NS	NS	21	NS	NS	NS	NS	215	8	26	1	0	35	20	0	20	Cards
	14 Sep	3	NS	NS	NS	38	NS	NS	NS	NS	253	3	4	0	0	7	0	0	0	Cards
1989	28 Aug	1	3	1	16	24	3	12	13	0	72	11	3	0	0	14	43	5	48	Cards
	5 Sep	2	NS	NS	NS	3	NS	NS	NS	NS	75	1	3	0	1	5	5	0	5	Cards
	15 Sep	3	NS	NS	NS	19	NS	NS	NS	NS	94	1	1	0	0	2	0	0	0	Cards
1990	24 Aug	1	0	0	14	29	2	9	0	0	54	3	4	2	0	9	84	2	86	Cards
	31 Aug	2	NS	NS	NS	29	NS	NS	NS	NS	83	5	10	0	0	15	50	0	50	Cards
	10 Sep	3	NS	NS	NS	2	NS	NS	NS	NS	85	2	10	0	2	14	1	0	1	Cards
1991	30 Aug	1	0	0	12	39	4	30	7	0	92	11	18	4	0	33	54	24	78	Cards
	6 Sep	2	NS	NS	NS	13	NS	NS	NS	NS	105	3	8	1	0	12	1	1	2	Cards
	16 Sep	3	NS	NS	NS	3	NS	NS	NS	NS	108	5	3	1	0	9	0	0	0	Cards
1992	28 Aug	1	NS	NS	17	58	16	18	8	0	117	8	11	1	2	22	164	8	172	Cards
	4 Sep	2	NS	NS	NS	23	NS	56	NS	NS	196	24	17	1	0	42	95	7	102	Cards
	11 Sep	3	NS	NS	NS	3	NS	2	NS	NS	201	17	23	1	0	41	17	1	18	Cards
1993	27 Aug	1	NS	NS	34	185	54	79	14	1	367	81	83	2	4	170	239	4	243	Cards
	7 Sep	2	NS	NS	NS	19	NS	26	NS	NS	412	31	53	1	8	93	13	0	13	Cards
	14 Sep	3	NS	NS	NS	12	18	4	NS	NS	446	29	43	4	2	36	2	0	2	Cards

[a] *Survey conducted one week early.*

Appendix Table D-1. Continued.

			New redds								Cum.	Dead fish				Total	Live fish		Total	
Year	Date	No.	I	II	III	IV	V	VI	VII	VIII	redds	M	F	J	U	dead	A	J	live	Ref.
1994	26 Aug	1	NS	NS	8	20	4	2	2	0	36	1	1	0	0	2	42	1	43	Cards
	2 Sep	2[b]	NS	NS	NS	NS	NS	22	NS	NS	58	0	2	0	0	2	18	4	22	Cards
	7 Sep	2	NS	NS	NS	26	1	NS	NS	NS	85	4	11	0	0	15	23	1	24	Cards
	13 Sep	3	NS	NS	NS	1	1	16	NS	NS	103	6	8	0	0	14	19	0	19	Cards
1995	25 Aug	1	NS	NS	5	10	1	9	7	0	32	3	3	0	1	7	22	4	26	Cards
	1 Sep	2	NS	NS	NS	4	NS	6	NS	NS	42	3	2	0	0	6	6	5	11	Cards
	11 Sep	3	NS	NS	NS	5	NS	2	NS	NS	49	1	4	1	0	6	0	2	2	Cards
1996	23 Aug	1	NS	NS	14	38	1	14[c]	4[c]	0	71	2	4	0	0	6	55	4	59	Cards
	30 Aug	2	NS	NS	1	7	5	25	NS	NS	109	8	6	0	0	14	78	5	83	Cards
	6 Sep	3	NS	NS	NS	3	2	11	NS	NS	125	8	10	2	0	20	37	2	39	Cards
1997	22 Aug	1	NS	NS	16	85	15	27	5[d]	0	148	6	7	0	1	14	157	1	158	Tables
	29 Aug	2	NS	NS	0	10	9	40	NS	NS	207	19	30	1	0	50	78	3	81	Tables
	5 Sep	3	NS	NS	NS	5	4	0	NS	NS	216	13	26	0	4	43	14	0	14	Tables
1998	21 Aug	1	NS	NS	16	23	0	4	0	0	43	3	7	0	2	12	14	3	17	Tables
	28 Aug	2	NS	3	7	30	8	9	19	0[e]	119	9	11	0	0	20	95	10	105	Tables
	4 Sep	3	NS	NS	1	7	2	8	9	0[e]	146	21	27	0	0	48	10	0	10	Tables
	15 Sep	4[f]	NS	NS	NS	ND	NS	ND	NS	NS	ND	1	2	1	2	6	2	0	2	Tables
1999	27 Aug	1	0	NS	14	73	7	22	4	0	120	29	38	2	0	69	110	15	125	Tables
	3 Sep	2	NS	NS	2	13	3	11	18[d]	NS	167	22	32	4	2	60	60	10	70	Tables
	10 Sep	3	NS	NS	0	1	6	5	6[d]	NS	185	21	21	13	0	55	21	9	30	Tables
	17 Sep	4	NS	NS	NS	NS	NS	NS	4[g]	NS	189	0	0	0	0	0	0	0	0	Tables
	27 Sep	5	NS	NS	NS	NS	NS	NS	1[g]	NS	190	0	0	0	0	0	0	0	0	Tables

[b] *Survey conducted five days early.*
[c] *Weir to upstream boundary of Garnett's property and downstream boundary of Garnett's property to Grouse Creek.*
[d] *Crazyman Creek to upstream boundary of Garnett's property and downstream boundary of Garnett's property to Grouse Creek.*
[e] *Grouse Creek to Gorge (4.0 miles).*
[f] *Carcass survey: Indian Crossing to Mac's Mine and Weir to Garnett's (no redd counts).*
[g] *Garnett's property only.*

Appendix Table D-1. Continued.

			New redds								Cum.	Dead fish				Total	Live fish		Total	
Year	Date	No.	I	II	III	IV	V	VI	VII	VIII	redds	M	F	J	U	dead	A	J	live	Ref.
2000	24 Aug	1	0	4	19	63	6	21	1[d]	0	114	18	29	5	1	53	185	40	225	Tables
	31 Aug	2	NS	NS	22	55	5	25	8[d]	NS	229	90	57	18	1	166	190	60	250	Tables
	7 Sep	3	NS	NS	2	10	9	5	6[d]	NS	261	69	60	36	2	167	40	12	52	Tables
2001	23 Aug	1	2	0[h]	45	137	10	6	3[d]	0	203	123	117	7	46	293	518	26	544	Tables
	30 Aug	2	NS	NS	31	63	18	41	42[d]	NS	398	99	95	8	16	218	782	68	850	Tables
	6 Sep	3	NS	NS	3	50	40	54	32[d]	NS	577	94	141	19	6	260	223	32	255	Tables
	21 Sep	4	NS	NS	NS	NS	NS	NS	18[g]	NS	595	0	0	0	5	5	0	0	0	Tables
	3, 9 Oct	5	NS	17[i]	NS	NS	NS	NS	NS	NS	612	ND	ND	ND	ND	ND	ND	ND	ND	Tables
2002	22 Aug	1	0	13[h]	127	225	45	52	29[d]	1	492	145	187	0	11	345	851	15	866	Tables
	29 Aug	2	NS	NS	35	302	42	94	28[d]	NS	993	335	362	6	20	723	460	23	483	Tables
	5 Sep	3	NS	NS	6	44	8	23	31[d]	NS	1,105	220	341	25	25	611	70	2	72	Tables
	25 Sep	4	NS	NS	NS	1	NS	NS	NS	NS	1,106	ND	ND	ND	ND	ND	ND	ND	ND	Tables
	26 Sep	5	NS	NS	2	NS	NS	NS	NS	NS	1,108	ND	ND	ND	ND	ND	ND	ND	ND	Tables
	2 Oct	6	NS	3[i]	NS	NS	NS	NS	NS	NS	1,111	ND	ND	ND	ND	ND	ND	ND	ND	Tables
2003	21 Aug	1	NS	48[i]	83	186	14	24	9[d]	0	364	79	87	4	25	195	679	30	709	Tables
	28 Aug	2	NS	NS	42	64	14	71	13[d]	NS	568	171	201	21	20	413	340	17	357	Tables
	4 Sep	3	NS	NS	12	41	30	47	28[d]	NS	726	62	118	31	9	220	171	11	182	Tables
	25 Sep	4	NS	NS	NS	1[j]	NS	NS	NS	NS	727	ND	ND	ND	ND	ND	ND	ND	ND	Tables

[h] *Forks to falls (0.9 miles*).
[i] *Falls to Blue Hole (3.1 miles).*
[j] *Lower 4.5 miles of Indian Crossing Campground to Mac's Mine (4.5 miles).*

Appendix Table D-2. Big Sheep Creek, Imnaha River Basin, spring Chinook salmon index, extensive, and supplemental survey counts from 1986 through 2003. Survey units: I = 140 Bridge to Echo Canyon (4.0 miles), II = Echo Canyon to Coyote Creek (9.0 miles). Abbreviations are as follows: M = male, F = female, J = jack, U = unknown sex, A = adults, J = jacks, Ref. = reference, NS = no survey. Abbreviations for the references are given in Table 1, page 14.

		New redds		Cum.	Dead fish				Total	Live fish		Total	
Year	Date	I	II	redds	M	F	J	U	dead	A	J	live	Ref.
1986	26 Aug	15	10	25	4	1	0	0	6	15	0	15	WD
1987	26 Aug	3	13	16	0	0	0	0	0	21	1	22	Cards
1988	26 Aug	14	0	14	0	1	0	0	1	6	0	6	Cards
1989	26 Aug	1	1	2	0	1	0	0	1	1	0	1	Cards
1990	26 Aug	0	NS	0	0	0	0	0	0	0	0	0	Cards
1991	26 Aug	1	NS	1	0	0	0	0	0	0	0	0	Cards
1992	25 Aug	0	NS	0	0	0	0	0	0	0	0	0	Cards
1993[a]	25 Aug	1	6	7	0	0	0	0	0	2	0	2	Cards
1994	24 Aug	0	0	0	0	0	0	0	0	0	2	2	Cards
1995	24 Aug	0	0	0	0	0	0	0	0	0	0	0	Cards
1996	22 Aug	1	0	1	0	0	0	0	0	2	0	2	Cards
1997[a]	22 Aug	9	10	19	1	2	0	1	4	21	0	21	Tables
1998[a]	19 Aug	0	0	0	0	0	0	0	0	2	0	2	Tables
1999	25 Aug	0	1	1	0	0	0	0	0	1	0	1	Tables
2000[a]	23 Aug	0	0	0	1	0	0	1	2	7	16	23	Tables
2001[a]	22 Aug	0	1	1	0	0	0	0	0	15	0	15	Tables
2002[a]	21 Aug	3	13	16	4	2	0	0	6	40	1	41	Tables
	16 Sep	3	26	45	5	8	0	2	15	1	0	1	Tables
2003[a]	20 Aug	1	0	1	0	3	0	0	3	14	1	15	Tables
	15 Sep	2	13	16	0	0	0	1	1	5	0	5	Tables

[a] *Chinook salmon outplanted from the Imnaha Facility: 15 M, 33 F, 1 J in 1993; 45 M, 36 F in 1997; 14 M, 11 F in 1998; 250 J in 2000; 44 M, 68 F, 90 J in 2001; 55 M, 89 F, 6 J in 2002; and 44 M, 46 F in 2003.*

Appendix Table D-3. Lick Creek, Imnaha River Basin, spring Chinook salmon index, extensive, and supplemental survey counts from 1997 through 2003. Survey units: I = Lick Creek Campground to mouth (4.0 miles), II = ½ mile above campground to Lick Creek Campground (0.5 mile). Abbreviations are as follows: M = male, F = female, J = jack, U = unknown sex, A = adults, J = jacks, Ref. = reference, ND = no data, NS = no survey. Abbreviations for the references are given in Table 1, page 14.

		Redds		Cum.	Redds/	Dead fish				Total	Live fish		Total	
Year	Date	I	II	redds	mile	M	F	J	U	dead	A	J	live	Ref.
1997[a]	20 Aug	29	NS	29	7.3	4	3	0	0	7	46	0	46	Cards
	29 Aug	22	NS	51	12.8	20	18	0	0	38	10	0	10	Cards
1998[a]	19 Aug	4	1[b]	5	1.1	1	0	0	0	1	4	0	4	Tables
	31 Aug	4	2[b]	11	2.6	2	0	0	0	2	3	0	3	Tables
1999	25 Aug	0	0	0	0	0	0	0	0	0	0	0	0	Tables
2000[a]	23 Aug	0	0	0	0	0	0	0	0	0	0	4	4	Tables
2001[a]	22 Aug	5	0	5	1.1	2	9	0	1	12	81	0	81	Tables
2002[a]	21 Aug	19	0	19	4.2	4	4	0	0	8	29	0	29	Tables
	16 Sep	12	0	31	6.9	2	6	0	0	8	0	0	0	Tables
	30 Sep	?[c]	NS	33	I	ND	ND	ND	ND	ND	ND	ND	ND	Tables
2003[a]	20 Aug	10	0	10	2.2	3	3	0	0	6	27	14	41	Tables
	15 Sep	1	0	11	2.4	0	0	0	0	0	1	1	2	Tables

[a] *Chinook salmon outplanted from the Imnaha Facility: 69 M, 37 F in 1997; 7 M, 6 F, 1 J in 1998; 50 J in 2000; 46 M, 72 F, 136 J in 2001; 16 M, 37 F, 1 J in 2002; and 36 M, 40 F, 199 J in 2003.*

[b] *Surveyed from 0.3 miles above campground to Lick Creek Campground.*

[c] *Surveyed from NF Road 39 downstream 1.8 miles.*

APPENDIX E

1955 and 1956 Supplemental Surveys
in Selected Survey Areas

Appendix Table E-1. Upper mainstem Grande Ronde River, Grande Ronde River Basin, spring Chinook salmon survey counts from 1955 and 1956. Survey unit different than present day survey units: X = Limber Jim Creek to old rock dam (5.0 miles). Abbreviations are as follows: M = male, F = female, J = jack, U = unknown sex, A = adults, J = jacks, Ref. = reference, ND = no data. Abbreviations for the references are given in Table 1, page 14.

			Redds	Dead fish				Total	Live fish		Total	
Year	Date	No.	X	M	F	J	U	dead	A	J	live	Ref.
1955	16 Aug	1	1[a]	0	0	0	0	0	2	0	2	Files
	21 Aug	2	2	0	0	0	0	0	0	0	0	Files
	27 Aug	3	7	0	0	0	0	0	0	0	0	EOS, Files
	2 Sep	4	3	0	0	0	0	0	0	0	0	Files
1956	20 Aug	1	1	0	1	ND	1	2	0	0	0	Files
	26 Aug	2[b]	0	0	1	ND	0	1	0	0	0	Files
	1 Sep	3	5	0	0	0	0	0	5	1	6	EOS
	7 Sep	4	23	2	0	ND	0	2	5	1	6	Files
	13 Sep	5	15	0	1	ND	0	1	3	0	3	Files

[a] *One redd noted in the 0.25 mile area just above the confluence of Limber Jim Creek, an area not included in later surveys.*
[b] *Rain and turbid water precluded value of survey. One dead fish observed but no other data were obtained.*

Appendix Table E-2. Catherine Creek, Grande Ronde River Basin, spring Chinook salmon survey counts from 1955 and 1956. Survey units: II = South Fork Catherine Creek, 0.7 mile up from road (0.7 mile), IV = Forks to 7735 Bridge (2.5 miles), V = 7735 Bridge to Highway 203 Bridge (2.0 miles), VI = Highway 203 Bridge to Badger Flat Road Bridge (3.0 miles). Abbreviations are as follows: M = male, F = female, J = jack, U = unknown sex, A = adults, J = jacks, Ref. = reference, ND = no data. Abbreviations for the references are given in Table 1, page 14.

			Redds				Total	Dead fish				Total	Live fish		Total	
Year	Date	No.	II	IV	V	VI	redds	M	F	J	U	dead	A	J	live	Ref.
1955	15 Aug	1	ND	0	0	0	0	0	1	0	0	1	2	1	3	Files
	21 Aug	2	ND	0	5	0	5	0	0	0	1	1	5	2	7	Files
	27 Aug	3	ND	[4	+]	3	7	1	1	0	0	2	3	0	3	EOS, Files
	2 Sep	4	ND	3	3	7	13	4	0	1	0	5	9	2	11	Files
	8 Sep	5	ND	4	4	0	8	1	5	1	1	8	3	0	3	Files
1956	19 Aug	1	ND	2	3	1	6	1	1	0	0	2	8	2	10	Files
	25 Aug	2	17	68	27	19[a]	131	10	17	0	0	27	89	5	94	Files
	31 Aug	3	13	[112	+]	38[a]	163	20	23	1	3	47	135	14	149	Files
	06 Sep	4	0	[47	+]	155[b]	202	34	45	0	0	79	109	0	109	Files
	11 Sep	5	1	23	58	41[b]	123	21	31	0	0	52	19	2	21	Files

[a] *Highway 203 Bridge to bend 0.25 mile below Badger Flat Bridge (3.25 miles).*
[b] *Highway 203 Bridge to lower picnic area. Map indicates that the lower picnic area and the bend 0.25 mile below Badger Flat Bridge are different locations.*

Appendix Table E-3. Lookingglass Creek, Grande Ronde River Basin, spring Chinook salmon survey counts from 1955 and 1956. Survey unit: I = Summer Creek to Little Lookingglass Creek (6.2 miles). Abbreviations are as follows: M = male, F = female, J = jack, U = unknown sex, A = adults, J = jacks, Ref. = reference. Abbreviations for the references are given in Table 1, page 14.

			Redds	Dead fish				Total	Live fish		Total	
Year	Date	No.	I	M	F	J	U	dead	A	J	live	Ref.
1955	17 Aug	1	2	0	0	0	0	0	4	3	7	Files
	22 Aug	2	11[a]	0	0	0	0	0	5	17	22	Files
	28 Aug	3	19	0	0	0	0	0	13	8	21	Files, EOS
	3 Sep	4	12[a]	0	0	0	0	0	2	3	5	Files
	9 Sep	5	16	0	1	1	1	3	3	1	4	Files
1956	15 Aug	1	13	0	0	0	0	0	10	7	17	Files
	21 Aug	2	169	2	1	0	0	3	121	56	177	Files
	27 Aug	3	102	4	3	1	0	8	102	54	156	Files
	2 Sep	4	148	4	5	0	0	9	98	0	98	Files
	8 Sep	5	57	3	5	0	0	8	3	2	5	Files

[a] *Summer Creek to Bridge.*

Appendix Table E-4. Wallowa River, Grande Ronde River Basin, spring Chinook salmon survey counts from 1955 and 1956. Survey unit: II = Eggleson Road Bridge (or second E-W road) to Hatchery Intake (or Railroad Trestle or Mouth of Hurricane Creek, 4.0 miles). Abbreviations are as follows: M = male, F = female, J = jack, U = unknown sex, A = adults, J = jacks, Ref. = reference. Abbreviations for the references are given in Table 1, page 14.

			Redds	Dead fish				Total	Live fish		Total	
Year	Date	No.	II	M	F	J	U	dead	A	J	live	Ref.
1955	14 Aug	1	4	0	0	0	0	0	1	2	3	Files
	20 Aug	2	6	0	0	0	0	0	1	0	1	Files
	26 Aug	3	29	0	0	0	0	0	1	0	1	EOS, Files
	1 Sep	4	24	1	0	0	1	2	4	1	5	Files
	7 Sep	5	19	1	0	2	3	6	6	0	6	Files
1956	17 Aug	1	3	0	0	0	0	0	3	2	5	Files
	23 Aug	2	6	0	0	0	0	0	2	0	2	Files
	29 Aug	3	5	0	1	0	0	1	2	0	2	EOS, Files
	4 Sep	4	44	2	0	0	0	2	53	0	53	Files
	10 Sep	5	23	2	3	0	0	5	11	4	15	Files
	17 Sep	6	22	2	3	0	0	5	0	0	0	Files

Appendix Table E-5. Hurricane Creek, Grande Ronde River Basin, spring Chinook salmon survey counts from 1955 and 1956. Survey units: I = Dorrance Road Bridge to Eggleson Road Bridge (1.25 miles), II = Eggleson Road Bridge to Mouth (or Fish Hatchery Lane Bridge, 2.5 miles). Abbreviations are as follows: M = male, F = female, J = jack, U = unknown sex, A = adults, J = jacks, Ref. = reference, NS = no survey. Abbreviations for the references are given in Table 1, page 14.

			Redds		Total	Dead fish				Total	Live fish		Total	
Year	Date	No.	I	II	redds	M	F	J	U	dead	A	J	live	Ref.
1955	14 Aug	1	NS	0	0	0	0	0	0	0	2	0	2	Files
	20 Aug	2	NS	7	7	1	0	0	1	2	9	5	14	Files
	26 Aug	3	NS	35	35	0	1	0	0	1	10	3	13	Files
	1 Sep	4	23	57	80	3	8	1	0	12	49	42	91	Files
	7 Sep	5	29	102	131	10	21	10	6	47	42	22	64	Files
	13 Sep	6	40	94	134	14	20	18	5	57	10	18	28	Files
1956	17 Aug	1	0	8	8	0	0	0	0	0	7	0	7	Files
	23 Aug	2	10	14	24	0	0	0	0	0	19	2	21	Files
	29 Aug	3	15	25	40	1	2	0	2	5	16	3	19	Files, EOS
	4 Sep	4	17	56	73	4	4	0	0	8	38	0	38	Files
	10 Sep	5	14	52	66	5	2	0	0	7	19	10	29	Files
	17 Sep	6	26	45	71	2	7	0	0	9	11	1	12	Files

Appendix Table E-6. Lostine River, Grande Ronde River basin, spring Chinook salmon survey counts from 1955 and 1956. Survey units: II = Lapover Meadows to Williamson Campground (5.0 miles), IV = Six-mile Bridge to Lostine River Ranch Bridge (3.0 miles). Abbreviations are as follows: M = male, F = female, J = jack, U = unknown sex, A = adults, J = jacks, Ref. = reference, NS = no survey. Abbreviations for the references are given in Table 1, page 14.

			Redds		Total	Dead fish				Total	Live fish		Total	
Year	Date	No.	II	IV[a]	redds	M	F	J	U	dead	A	J	live	Ref.
1955	9 Aug	1	47	30	77	0	7	0	0	7	46	6	52	Files
	15 Aug	2	65	70	135	5	6	1	0	12	82	58	140	Files
	21 Aug	3	76	107	183	18	29	9	5	61	51	16	67	Files
	27 Aug	4	57	107	164	20	11	6	10	47	23	1	24	Files
	2 Sep	5	96	165	261	23	13	19	3	58	6	7	13	Files
1956	11 Aug	1	7	6	13	0	1	0	1	2	28	10	38	Files
	17 Aug	2	46	66	112	3	3	0	0	6	109	14	123	Files
	23 Aug	3	25	55	80	10	11	4	2	27	71	28	99	Files, EOS
	29 Aug	4	NS	47	47	12	7	0	0	19	26	2	28	Files
	4 Sep	5	15[b]	68	83	8	11	0	5	24	1	1	2	Files

[a] *Surveys may have ended within a 0.5 mile of the present day Lostine River Ranch Bridge site (1955 EOS report indicates to farm bridge at 3.5 mile post; 1955 Files indicates to 3.5 mile post; 1956 Files indicate to white farm house*

[b] *Forks to Horse Bridge below Lapover Meadows and OFC Marker (painted pole) to Williamson Campground.*

Appendix Table E-7. Minam River, Grande Ronde River Basin, spring Chinook salmon survey counts from 1955 and 1956. Survey units: VI + VII = Salmon Hole to Little Minam River (6 miles), VIII = Little Minam River / Falls to 0.25 mile below Big Canyon Creek (= to the second burn or 2 miles down, 1.5 miles), IX = Little Minam River, 0.25 mile below Big Canyon Creek to Mouth (3.5 miles). Abbreviations are as follows: M = male, F = female, J = jack, U = unknown sex, A = adults, J = jacks, Ref. = reference, ND = no data, NS = no survey. Abbreviations for the references are given in Table 1, page 14.

			Redds			Total	Dead fish				Total	Live fish		Total	
Year	Date	No.	VI	VII	VIII	redds	M	F	J	U	dead	A	J	live	Ref.
1955	11 Aug	1	[0	+]	NS[a]	0	0	0	1	0	1	5	11	16	Files
	17 Aug	2	[6	+]	5	11	0	1	1	0	2	29	11	40	Files
	23 Aug	3[b]	[51	+]	13	64	0	10	4	3	17	51	81	132	Files
	29 Aug	4	[86	+]	1[c]	87	3	10	4	3	20	55	94	149	Files
	4 Sep	5	[153	+]	30	183	22	28	76	3	129	43	108	151	Files
	10 Sep	6[d]	[20[e]	+]	NS[a]	20	8	10	33	4	55	3	2	5	Files
1956	18 Aug	1	[17	+]	31	48	5	3	0	2	10	53	48	101	Files
	24 Aug	2	[160	+]	38	198	11	21	0	3	35	102	38	140	Files
	30 Aug	3	[116	+]	ND	116	10	18	9	4	41	72	46	118	Files
	5 Sep	4	[137	+]	49	186	53	34	0	0	87	52	25	77	Files
	12 Sep	5	[143	+]	42	185	34	23	0	0	57	1	0	1	Files

[a] *The Little Minam River was surveyed with the Minam River on all trips except the first and last.*
[b] *Surveys conducted by biologist from the Clackamas Laboratory.*
[c] *0.5 mile below Lower Falls to Second Burn (1.0 mile).*
[d] *Original plans called for a total of five surveys per stream, however, the high live fish count warranted an additional survey.*
[e] *Six of 20 redds counted were considered incomplete at time of survey.*

Appendix Table E-8. Wenaha River, Grande Ronde River Basin, spring Chinook salmon survey counts from 1955 and 1956. Index survey units: I = North Fork of the Wenaha River, 3 miles upstream (3.0 miles), III = South Fork of the Wenaha River, Milk Creek to Fork (5.5 miles). Abbreviations are as follows: M = male, F = female, J = jack, U = unknown sex, A = adults, J = jacks, Ref. = reference. Abbreviations for the references are given in Table 1, page 14.

			Redds		Total	Dead fish				Total	Live fish		Total	
Year	Date	No.	I	III	redds	M	F	J	U	dead	A	J	live	Ref.
1955	12 Aug	1	0	8	8	0	0	0	0	0	2	2	4	Files
	18 Aug	2	8	3	11	1	0	0	0	1	1	9	10	Files
	24 Aug	3	6	37	43	0	1	0	0	1	15	31	46	Files
	30 Aug	4	12	32	44	1	2	2	1	6	27	38	65	Files
	5 Sep	5	12	34	46	1	2	2	0	5	13	26	39	Files
1956	16 Aug	1	8	33	41	0	0	0	1	1	46	6	52	Files
	22 Aug	2	64	130	194	3	3	0	0	6	227	45	272	Files
	28 Aug	3	25	107	132	3	7	0	1	11	150	14	164	Files
	3 Sep	4	59	183	242	9	16	0	0	25	154	0	154	Files
	9 Sep	5	16	134	150	1	9	0	0	10	16	0	16	Files

Appendix Table E-9. Imnaha River, Imnaha River Basin, spring Chinook salmon survey counts from 1955 and 1956. Survey units: III = Blue Hole to Indian Crossing Campground (2 miles), IV = Indian Crossing Campground to Mac's Mine (7.7 miles). Abbreviations are as follows: M = male, F = female, J = jack, U = unknown sex, A = adults, J = jacks, Ref. = reference. Abbreviations for the references are given in Table 1, page 14.

			Redds		Total	Dead fish				Total	Live fish		Total	
Year	Date	No.	III	IV	redds	M	F	J	U	dead	A	J	live	Ref.
1955	12 Aug	1	110	148	258	2	4	0	0	6	237	19	256	Files
	18 Aug	2	89	447	536	30	19	4	1	54	507	70	577	Files
	24 Aug	3	171	527	698	90	91	20	11	212	533	164	697	Files
	30 Aug	4	178	618	796	76	93	35	14	218	149	54	203	Files
	5 Sep	5	144	583	727	127	161	84	36	408	27	19	46	Files
1956	13 Aug	1	0	22[a]	22	0	0	0	0	0	65	10	75	Files
	19-20 Aug	2	118	311[a]	429	4	5	0	0	9	306	36	342	Files
	25 Aug	3	80	126[b]	206	31	16	3	3	53	229	40	269	Files, EOS
	31 Aug	4	82	321[a]	403	103	65	0	0	168	481	51	532	Files
	6 Sep	5	44	620[a]	664	105	80	0	0	185	63	6	69	Files

[a] *Survey stopped 0.25 mile above Mac's Mine.*
[b] *Survey stopped 1.25 miles above Coverdale Guard Station.*

Appendix Table E-10. Big Sheep Creek, Imnaha River Basin, spring Chinook salmon survey counts from 1955 and 1956. Survey units different than present day survey units: X = Lick Creek to ford (6.0 miles), Y = ford to Carrol Creek logging road bridge (3.0 miles). Abbreviations are as follows: M = male, F = female, J = jack, U = unknown sex, A = adults, J = jacks, Ref. = reference. Abbreviations for the references are given in Table 1, page 14.

			Redds		Total	Dead fish				Total	Live fish		Total	
Year	Date	No.	X	Y	redds	M	F	J	U	dead	A	J	live	Ref.
1955	13 Aug	1	[6	+]	6	0	0	0	0	0	5	1	6	Files
	19 Aug	2	12	NS	12	0	0	0	0	0	6	2	8	Files
	26 Aug	3	[29	+]	29	0	0	0	0	0	8	4	12	Files, EOS
	31 Aug	4	[10	+]	10	0	0	1	0	1	1	2	3	Files
	6 Sep	5	[21	+]	21	0	2	2	2	6	6	3	9	Files
1956	14 Aug	1	3	4	7	0	0	0	0	0	11	1	12	Files
	20 Aug	2	131	7	138	3	4	0	0	7	61	5	66	Files
	26 Aug	3	20	9	29	5	4	1	1	11	38	1	39	Files, EOS
	1 Sep	4	48	17	65	3	8	0	0	11	47	5	52	Files
	7 Sep	5	35	13	48	4	6	0	0	10	7	4	11	Files

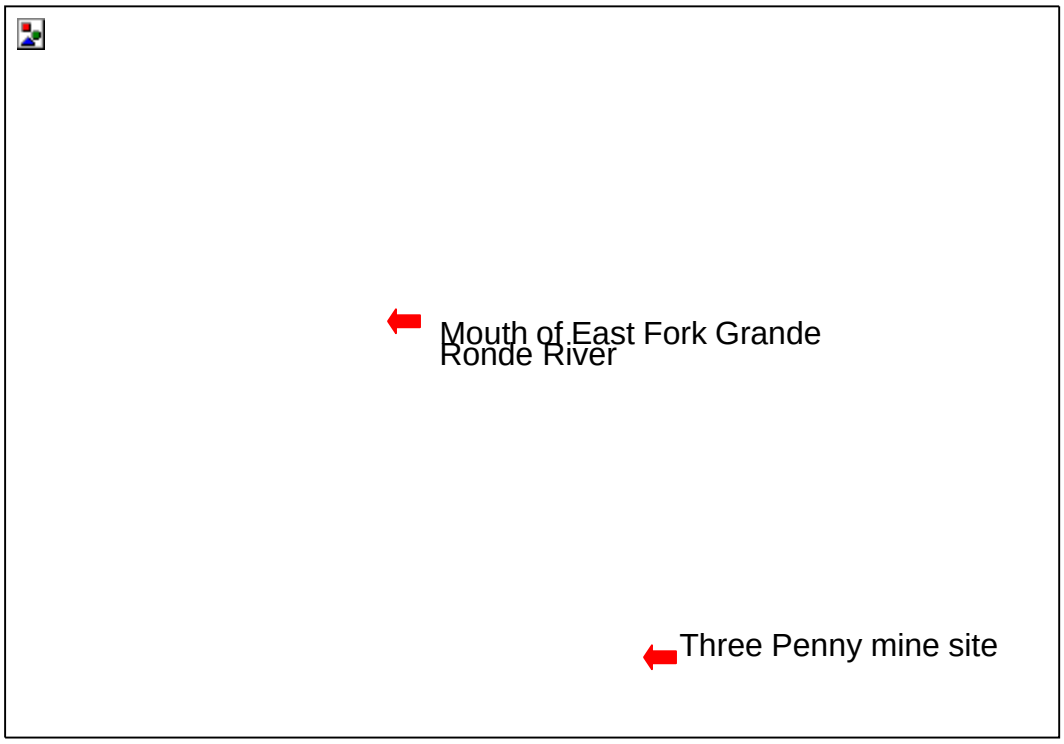
Appendix Table E-11. Eagle Creek, Powder River, Snake River Basin, spring Chinook salmon survey counts from 1955 and 1956. Survey units: I = Cougar Meadows to Two-color Guard Station (1.6 miles), II =Bradley Creek to Paddy Creek (4.5 miles), III = East Eagle Creek / Second bridge up East Eagle Creek (4.6 mile bridge) down 1.4 miles to old cabin on bluff (yellow OFC painted marker on tree). Abbreviations are as follows: M = male, F = female, J = jack, U = unknown sex, A = adults, J = jacks, Ref. = reference, NS = no survey. Abbreviations for the references are given in Table 1, page 14.

			Redds			Total	Dead fish				Total	Live fish		Total	
Year	Date	No.	I	II	III	redds	M	F	J	U	dead	A	J	live	Ref.
1955	10 Aug	1	0 [a]	1 [b]	0	1 [c]	0	0	0	0	0	2	0	2	Files
	16 Aug	2	0 [d]	0	0 [e]	0	0	0	0	0	0	1	1	2	Files
	22 Aug	3	0	4 [b]	0	4	1	0	0	1	2	0	0	0	Files [f], EOS
	28 Aug	4	2	3	1	6	0	2	0	0	2	2	1	3	Files
	3 Sep	5	NS	NS	NS	10 [g]	0	0	0	0	0	0	0	0	Files
1956	12 Aug	1	0	0	1	1	0	1	0	0	0	0	0	0	Files
	18 Aug	2	1	13	3	17	0	1	0	0	1	7	1	8	Files
	24 Aug [h]	3	5	NS	NS	5	0	0	0	0	0	2	0	2	Files, EOS
	30 Aug	4	3	NS	4	7	0	1	0	0	1	4	0	4	Files
	5 Sep [i]	5	NS	NS	7	7	0	0	0	0	0	0	0	0	Files

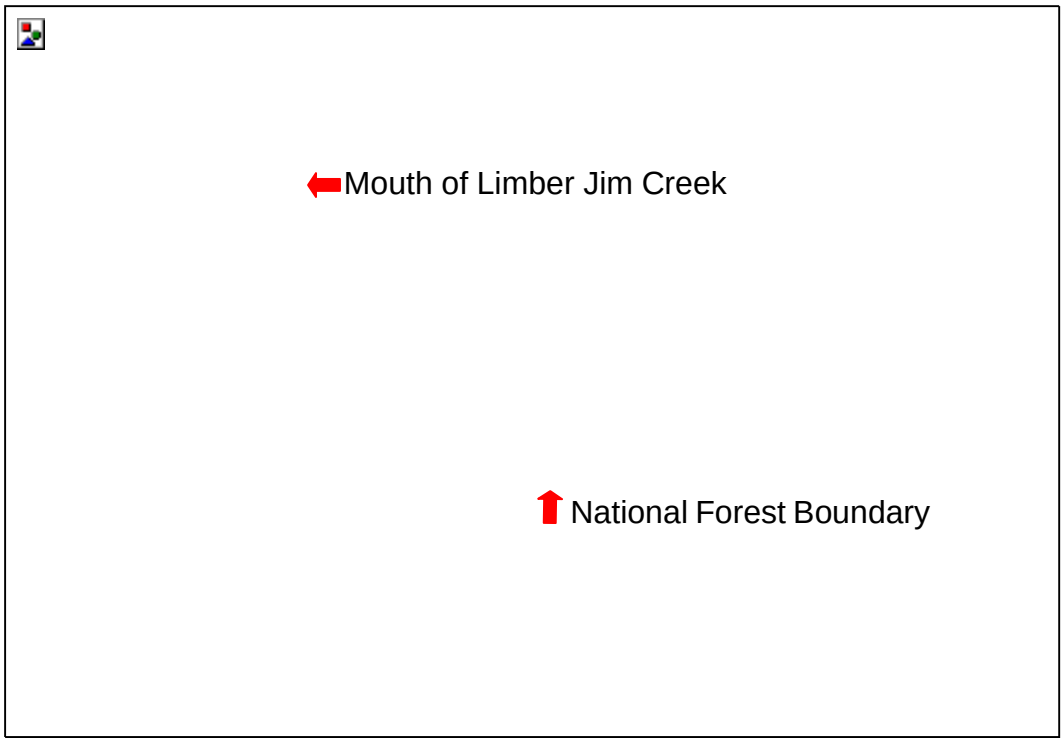
[a] *Two-color Guard Station upstream 0.5 mile.*
[b] *1.8 miles below Dixie Creek to Paddy Creek (6 miles).*
[c] I*ncomplete redd at time of survey.*
[d] *Two-color Guard Station area (0.9 mile).*
[e] *Bradley Creek to Daddy Creek (3.8 miles).*
[f] *Survey made by a crew from the Fish Commission Research Lab at Clackamas, Oregon.*
[g] *Spot checks were made from the first cattle-guard above New Bridge to Little Eagle Creek, a distance of approximately 5.0 miles.*
[h] *Boulder Park to Cougar Meadows (1.0 mile, 0 redds, 0 dead adults and jacks, 0 live adults and jacks).*
[i] *Exploratory survey: Paddy Creek 0.5 mile down (0 redds, 0 live adults, 0 live jacks).*

APPENDIX F

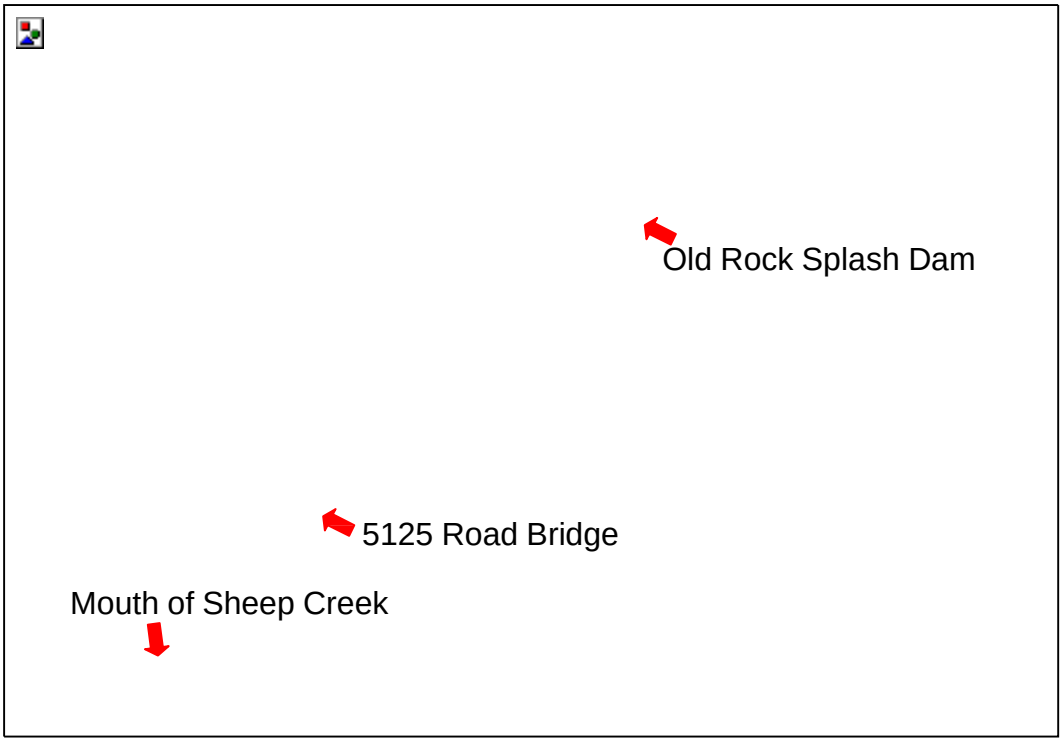
Maps of Survey Units in the
Grande Ronde and Imnaha River Basins



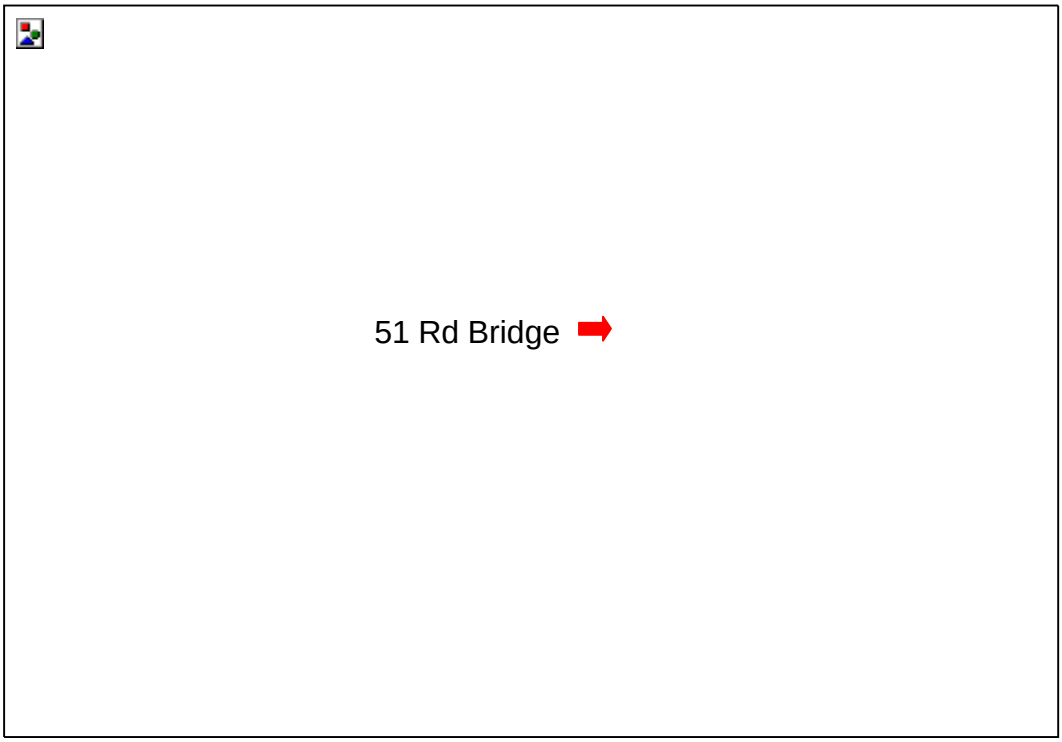
Appendix Figure F-1. Upper mainstem Grande Ronde River, Three Penny Claim mine site.



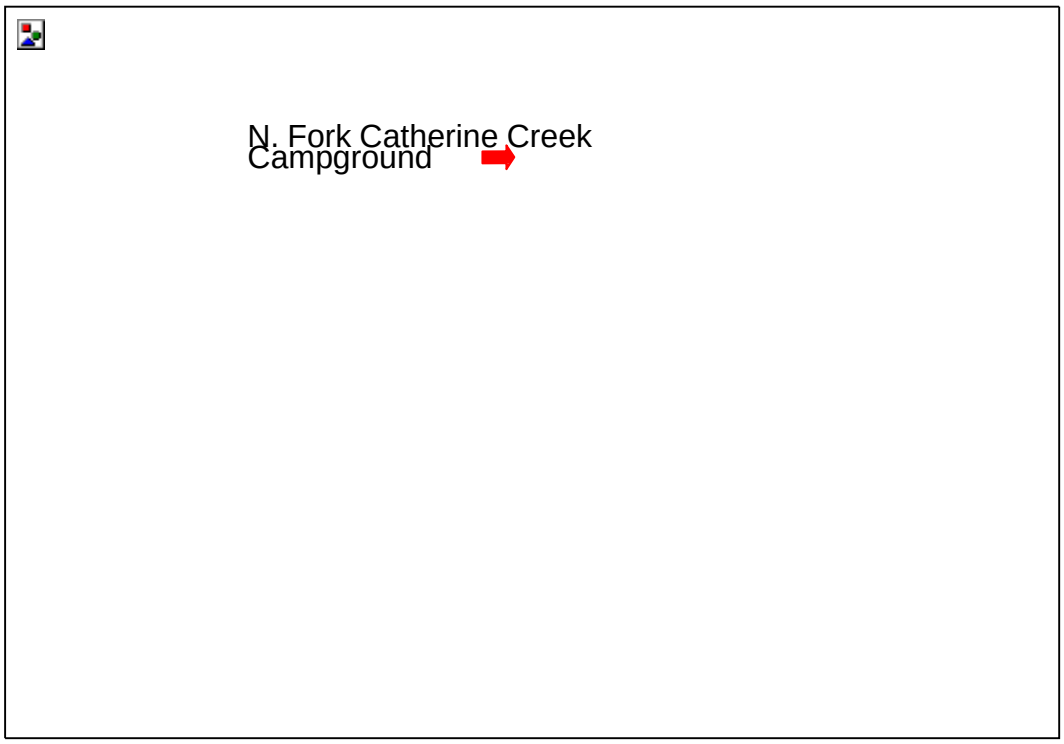
Appendix Figure F-2. Upper mainstem Grande Ronde River, National Forest boundary.



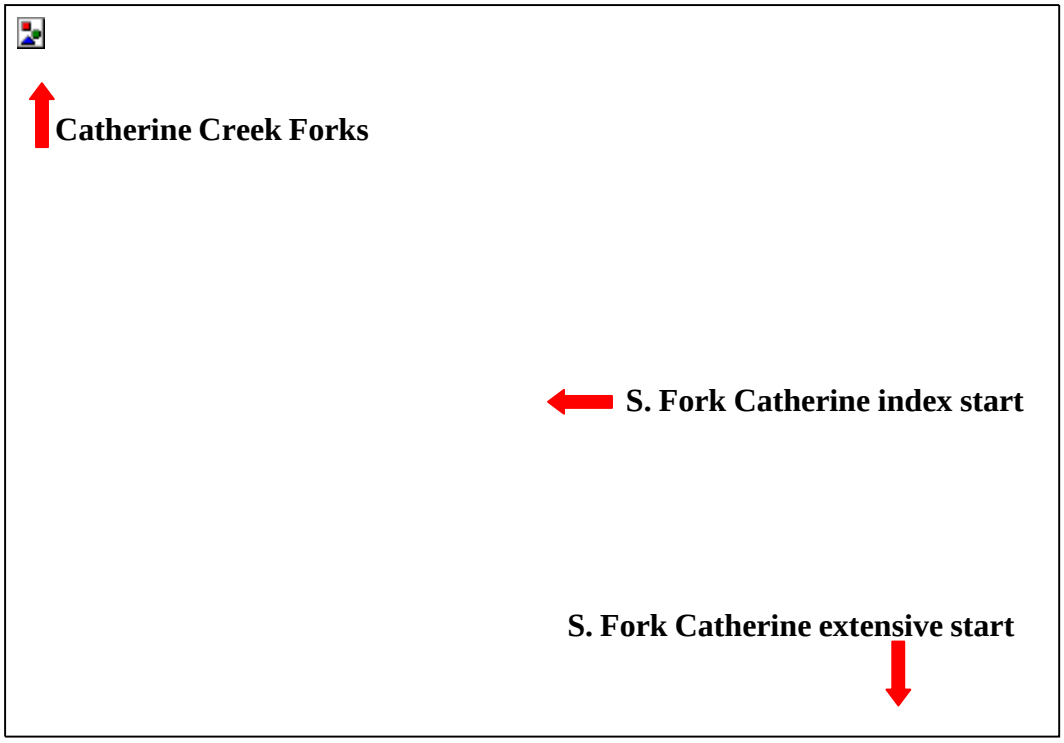
Appendix Figure F-3. Upper mainstem Grande Ronde River, 5125 Road bridge.



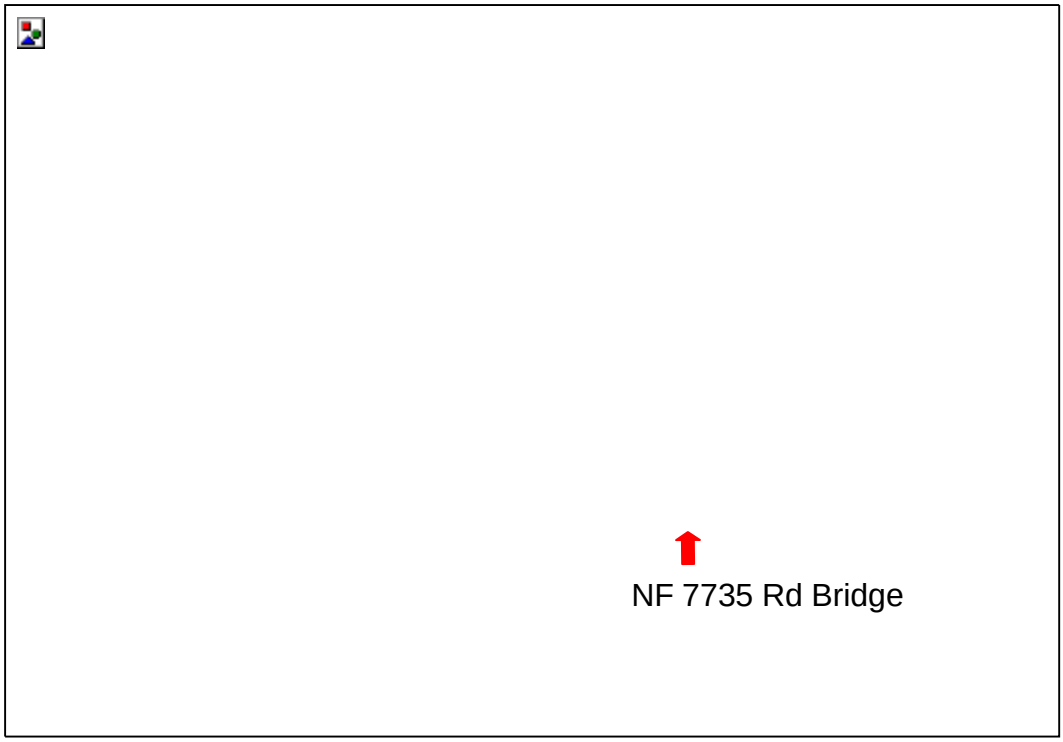
Appendix Figure F-4. Upper mainstem Grande Ronde River, NF Road 51 bridge.



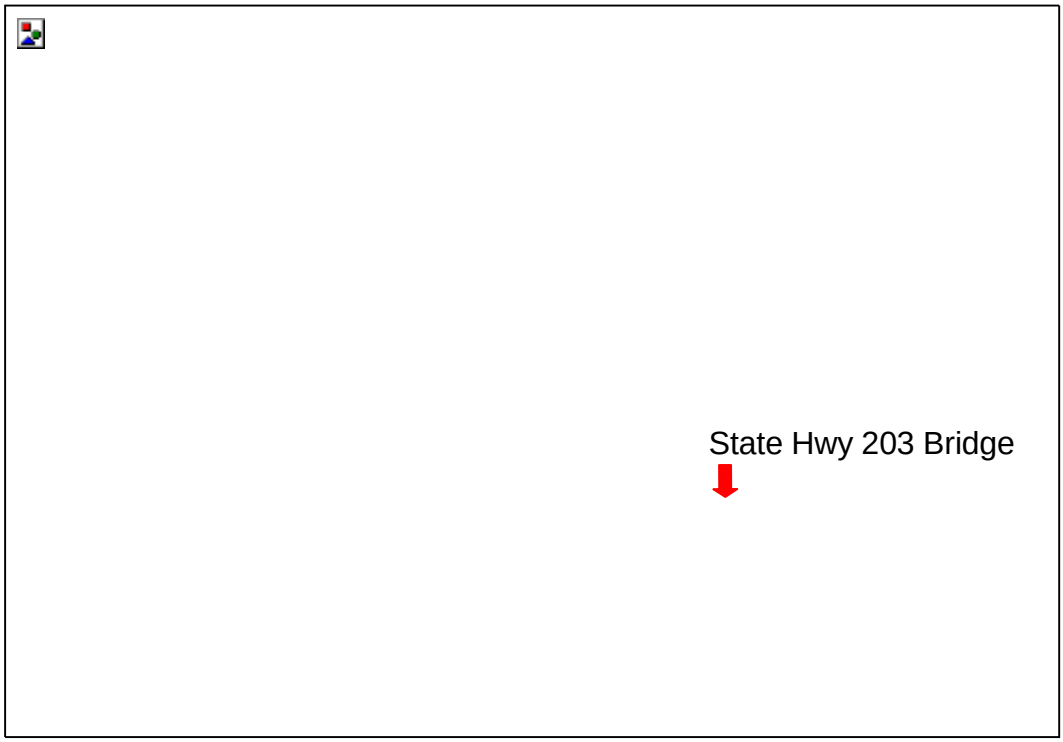
Appendix Figure F-5. North Fork Catherine Creek, North Fork Catherine Creek Campground.



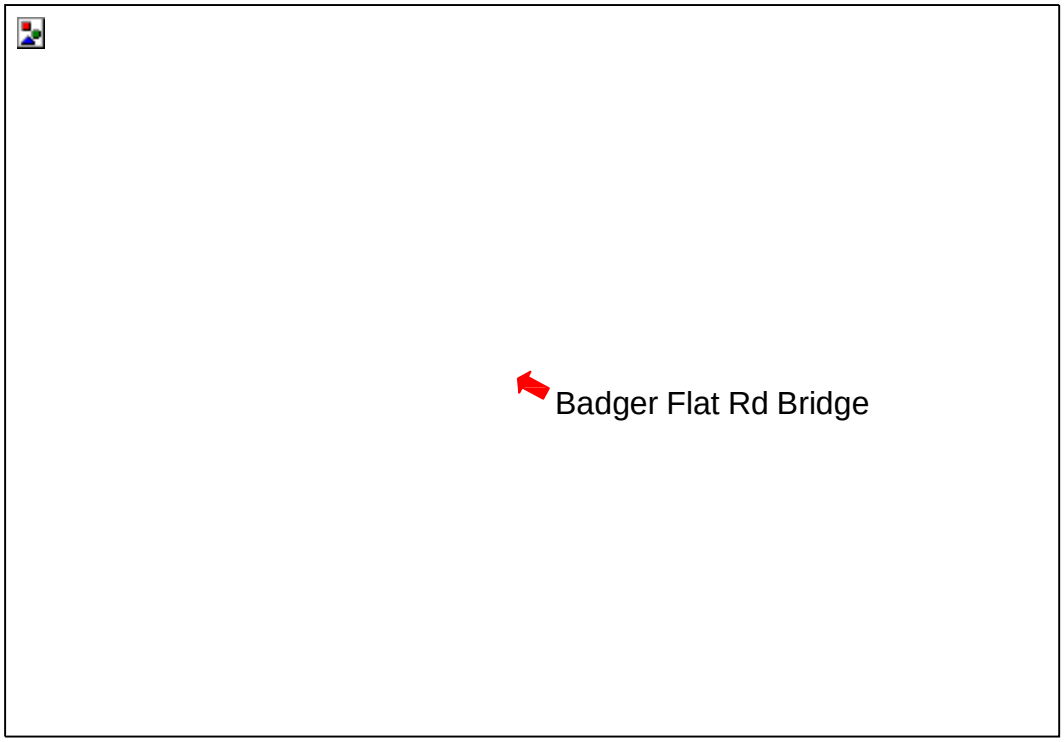
Appendix Figure F-6. South Fork Catherine Creek.



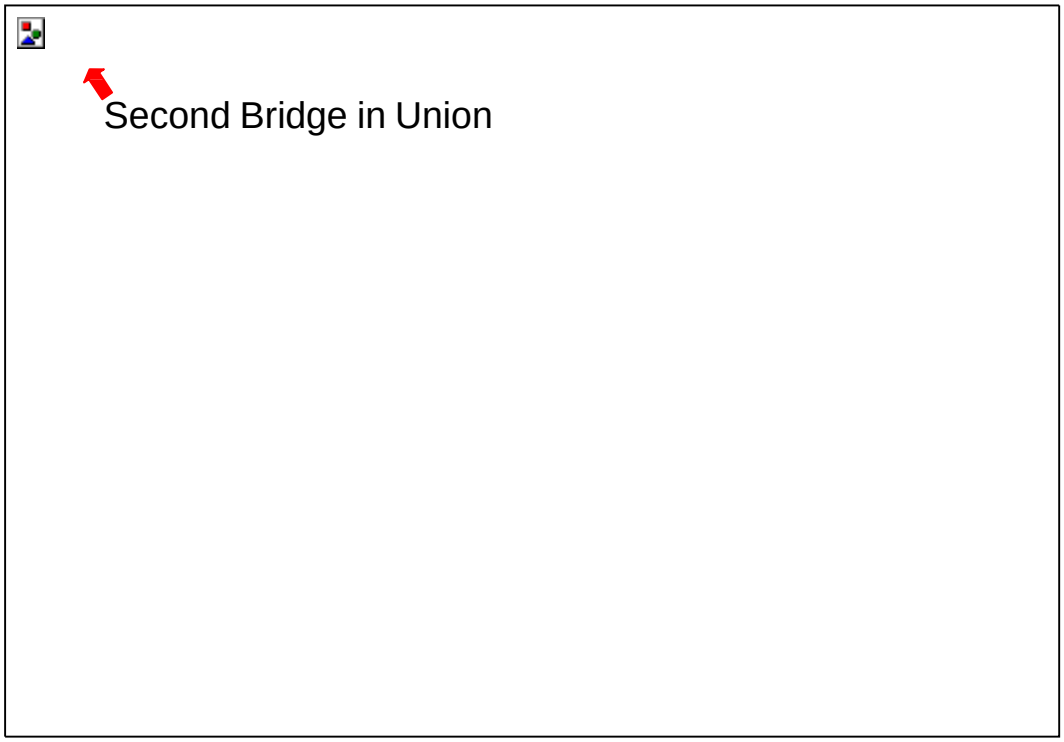
Appendix Figure F-7. Catherine Creek, NF 7735 road bridge (or Merry-Go-Round Bridge).



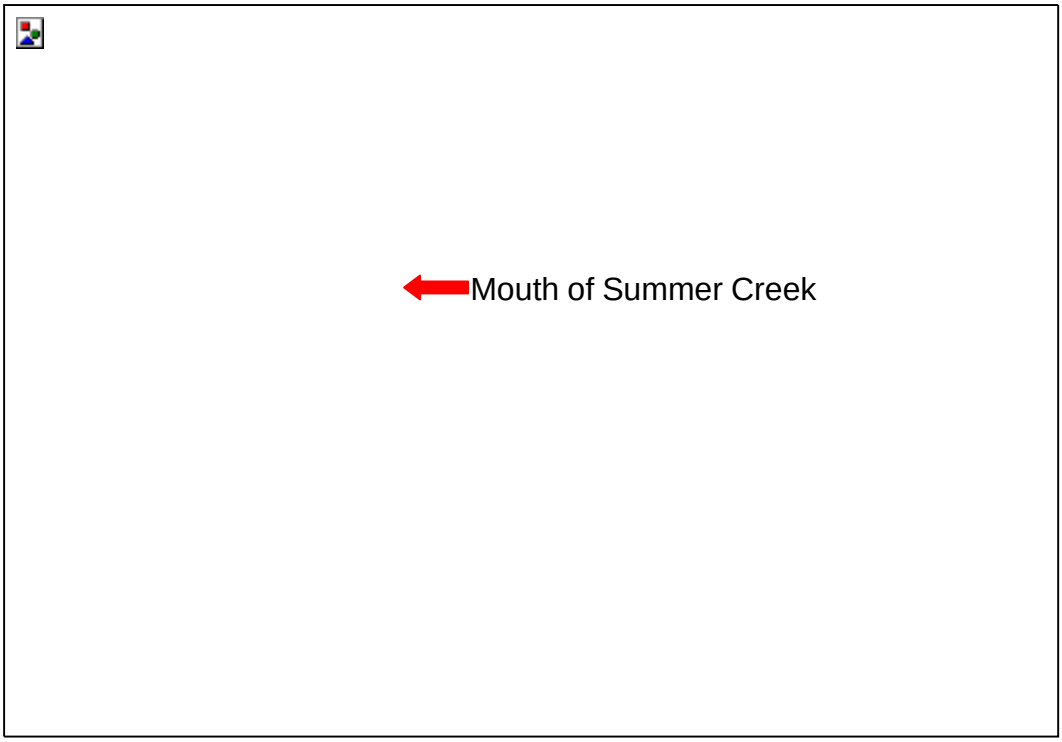
Appendix Figure F-8. Catherine Creek, State Highway 203 bridge.



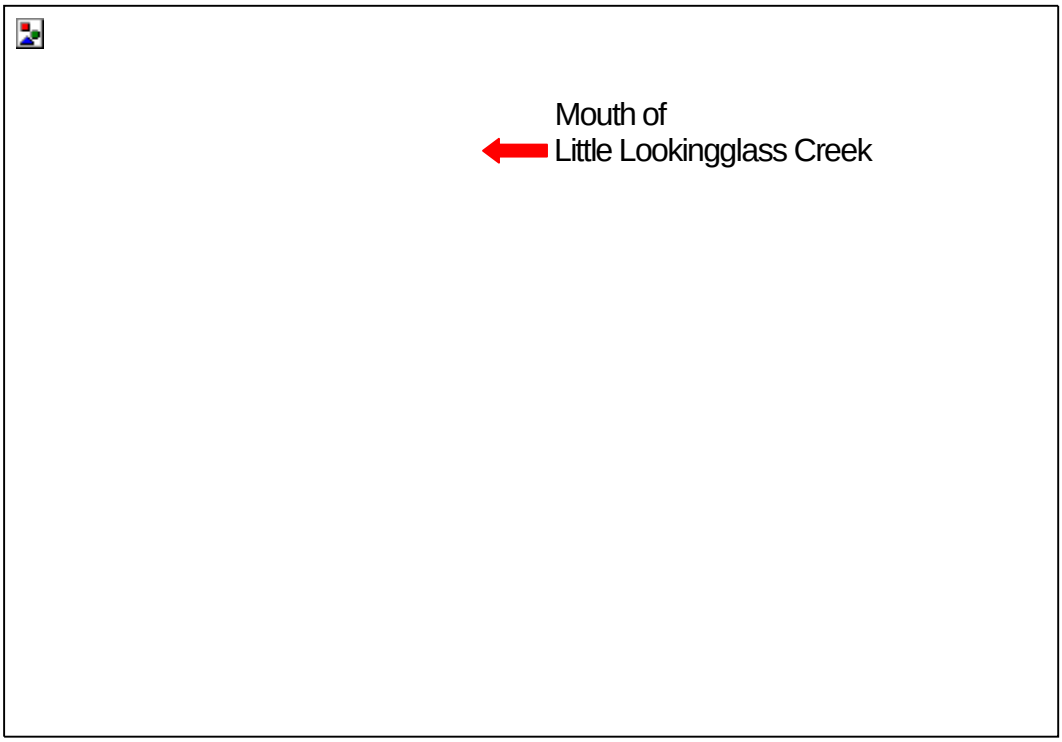
Appendix Figure F-9. Catherine Creek, Badger Flat Road.



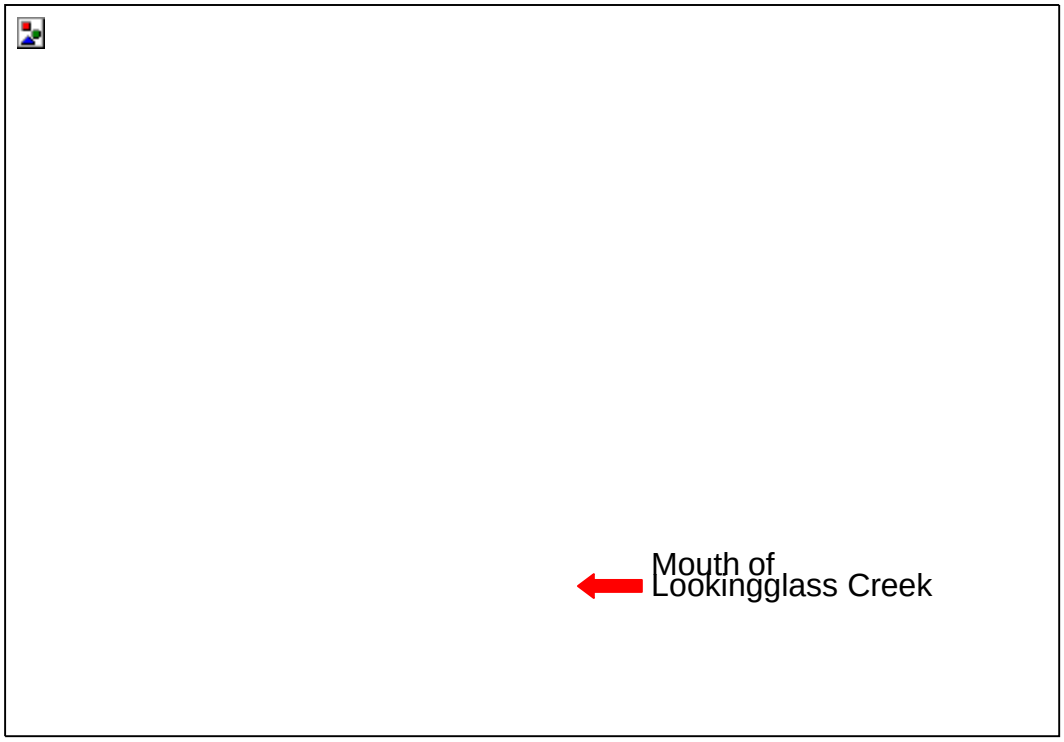
Appendix Figure F-10. Catherine Creek, second bridge in Union.



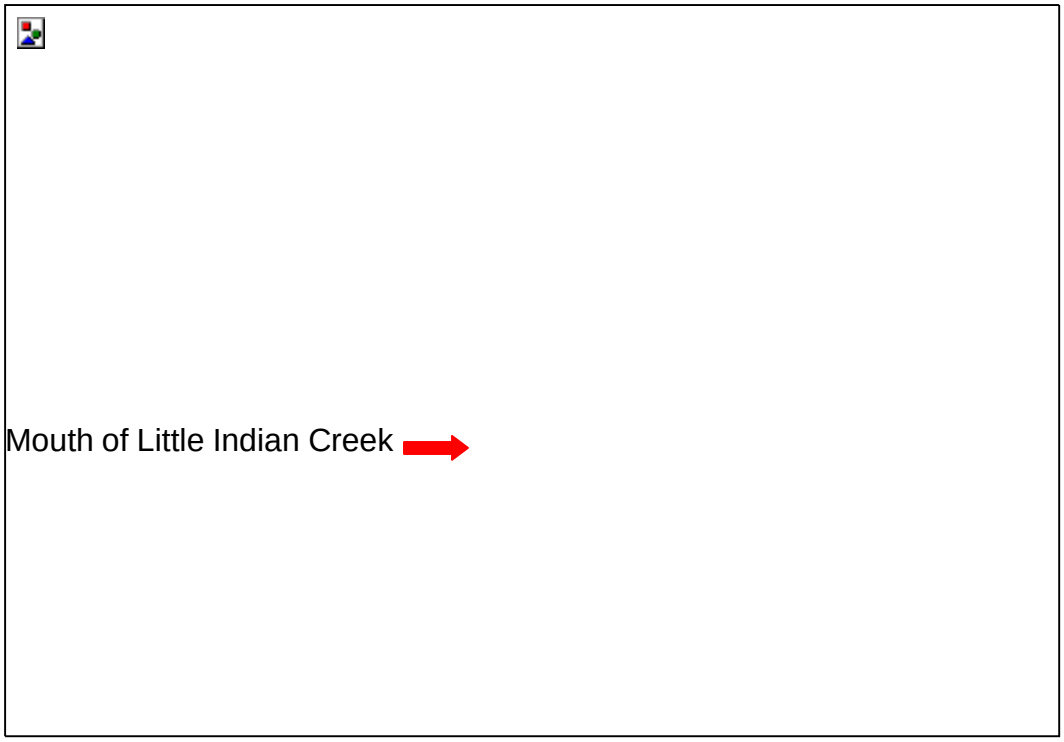
Appendix Figure F-11. Lookingglass Creek, mouth of Summer Creek.



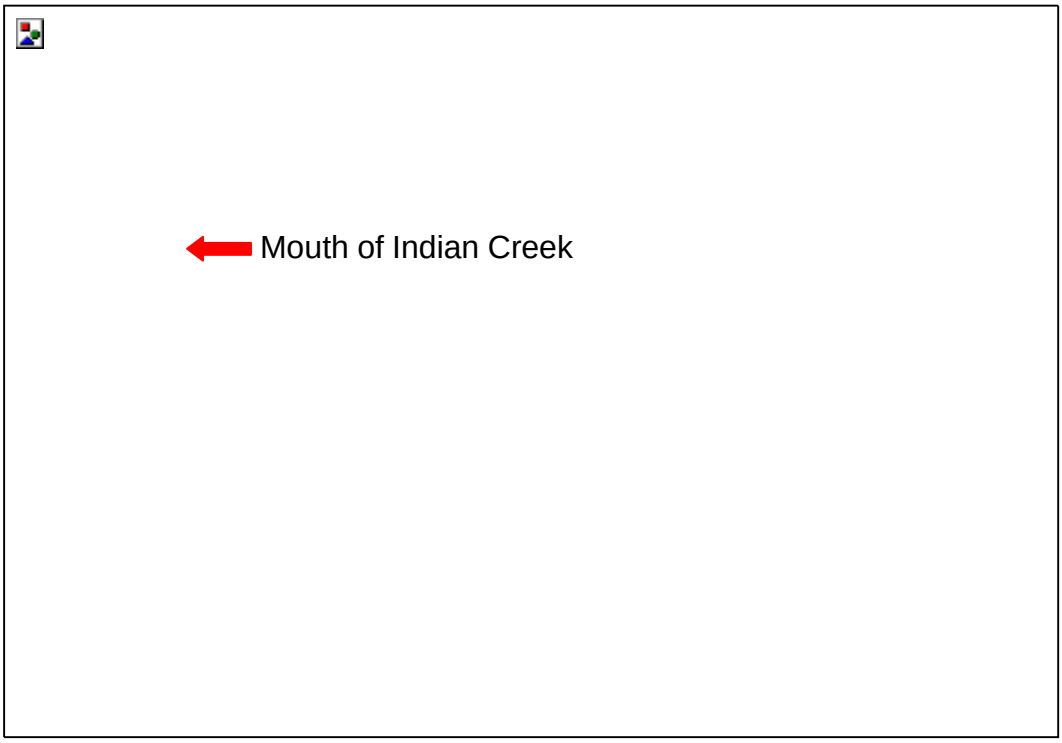
Appendix Figure F-12. Lookingglass Creek, mouth of Little Lookingglass Creek.



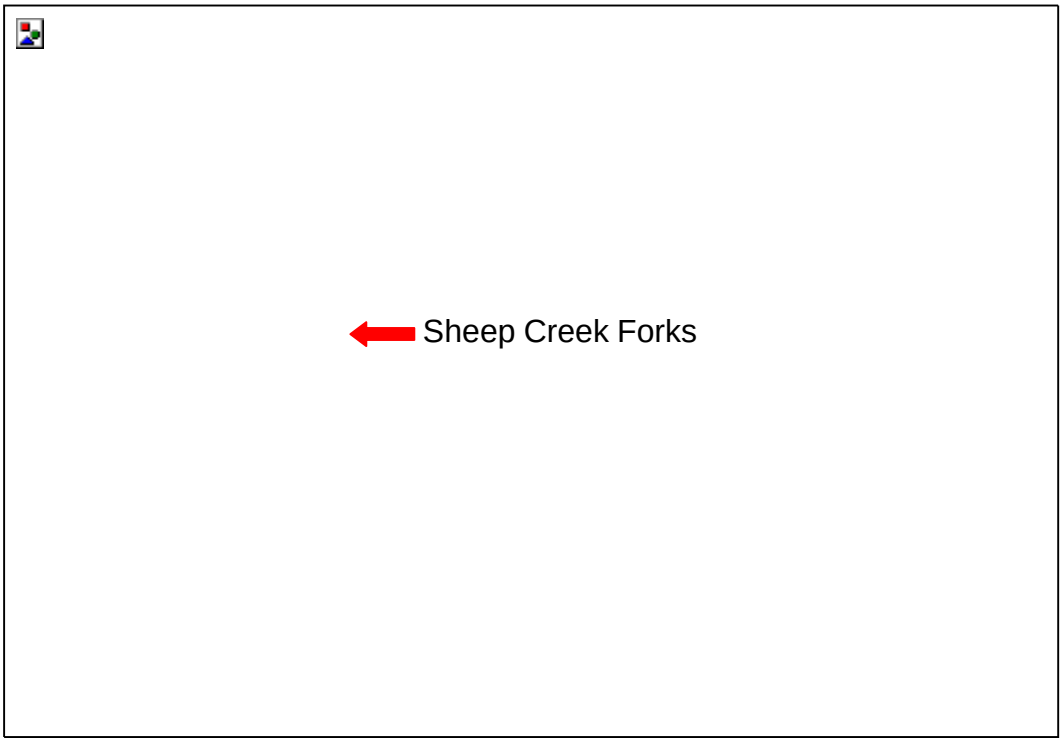
Appendix Figure F-13. Lookingglass Creek, mouth of Lookingglass Creek.



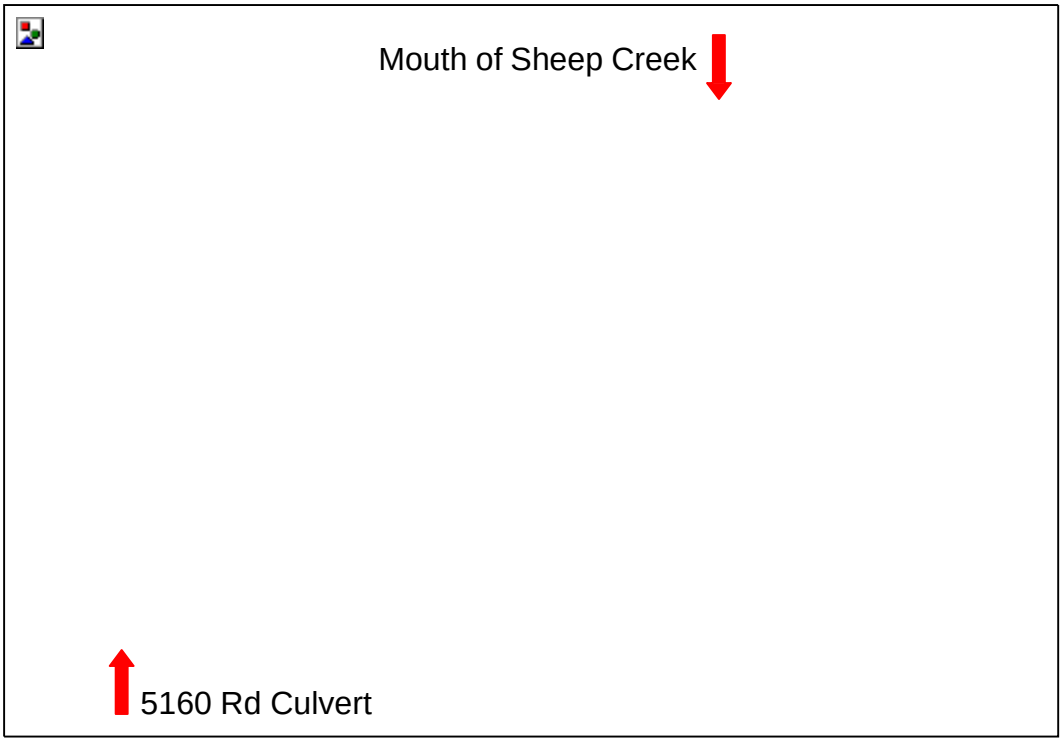
Appendix Figure F-14. Indian Creek, mouth of Little Indian Creek.



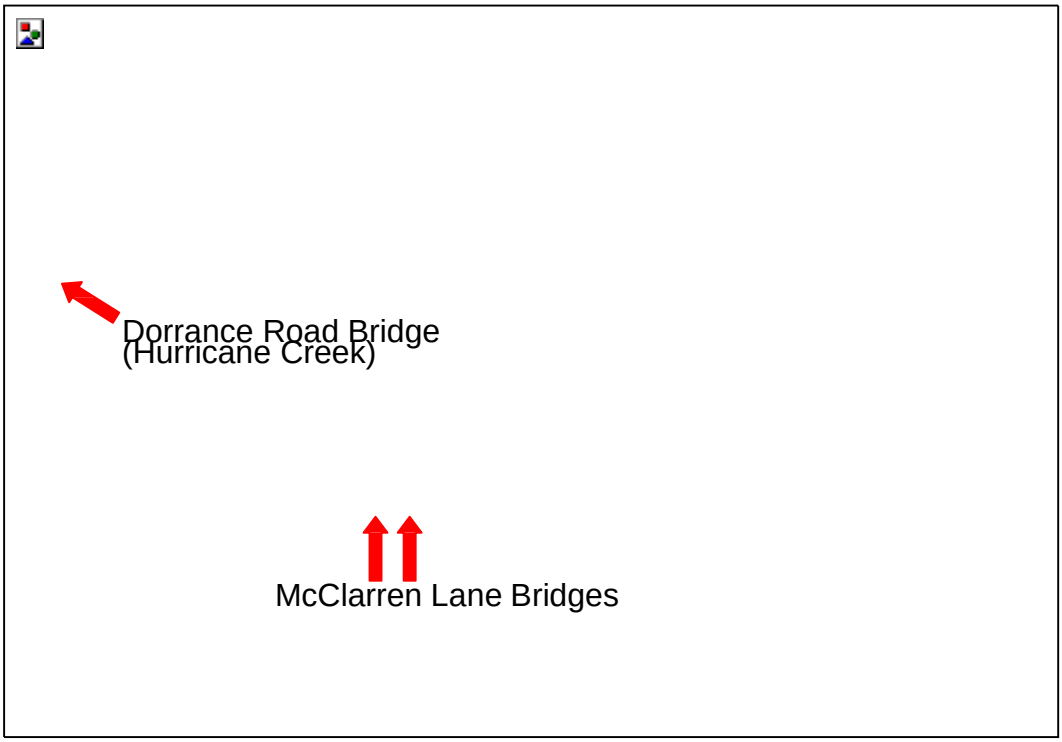
Appendix Figure F-15. Indian Creek, mouth of Indian Creek.



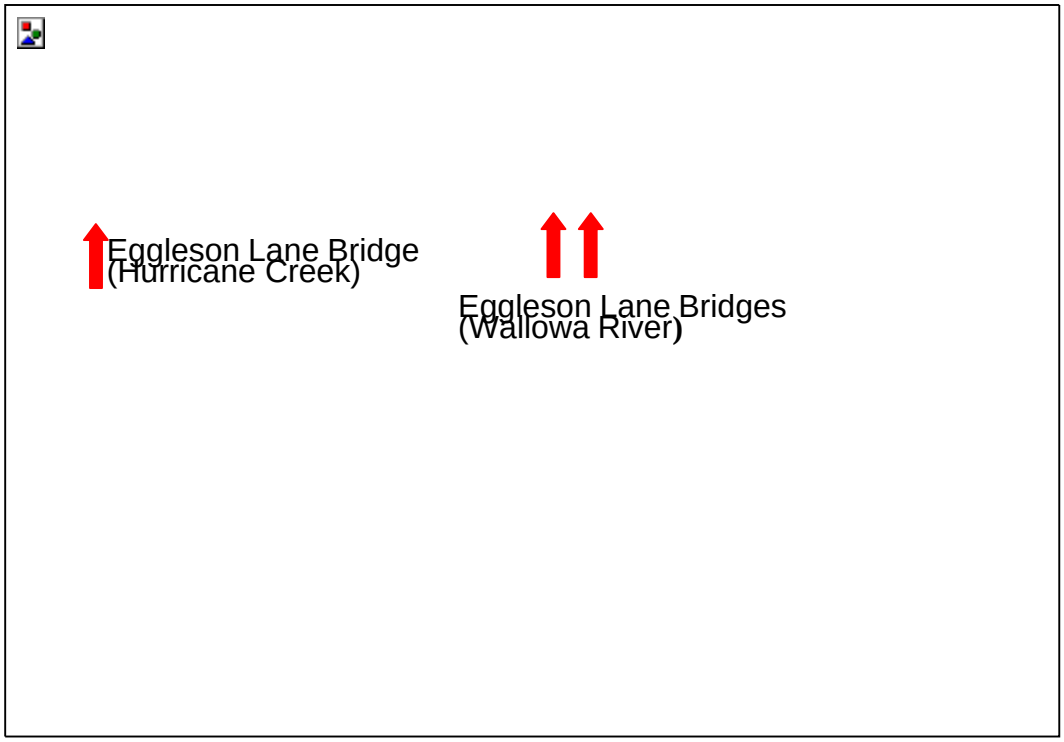
Appendix Figure F-16. Sheep Creek Forks.



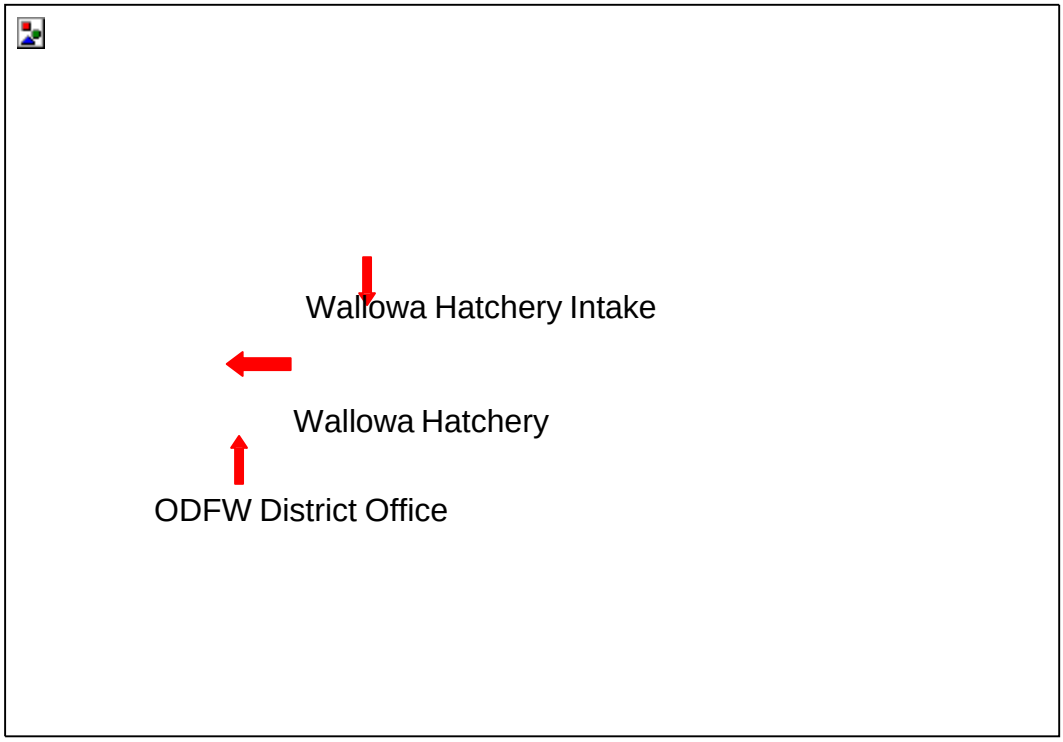
Appendix Figure F-17. Sheep Creek, 5160 Road culvert to mouth of Sheep Creek.



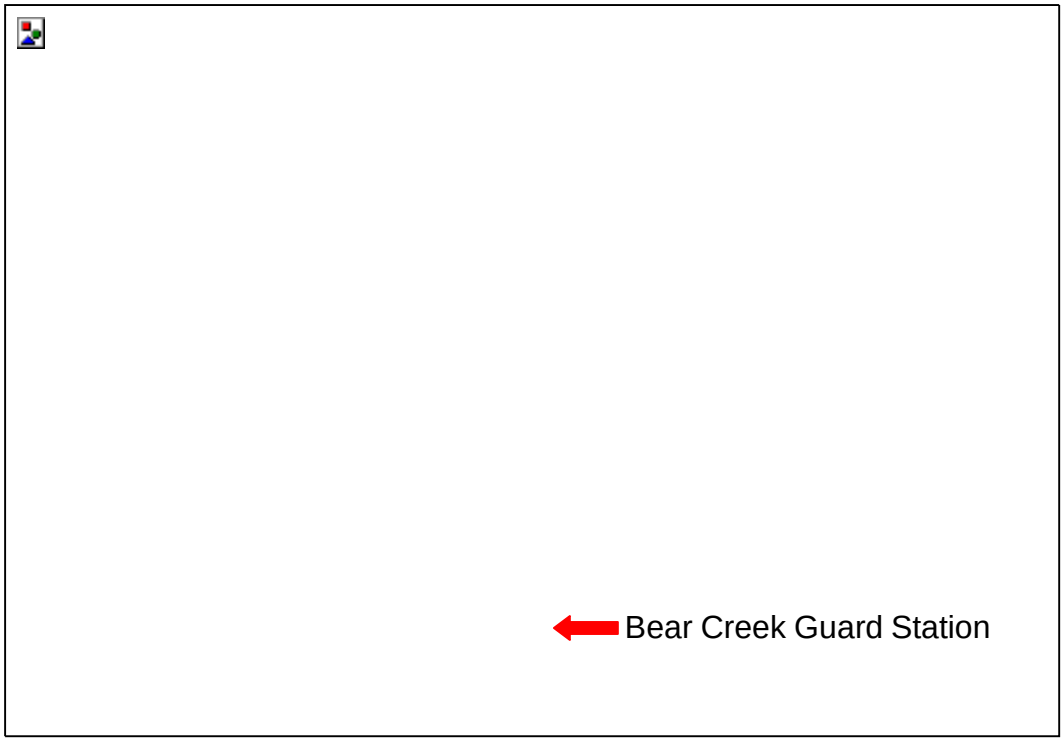
Appendix Figure F-18. Upper mainstem Wallowa River, McClarren Lane bridges.



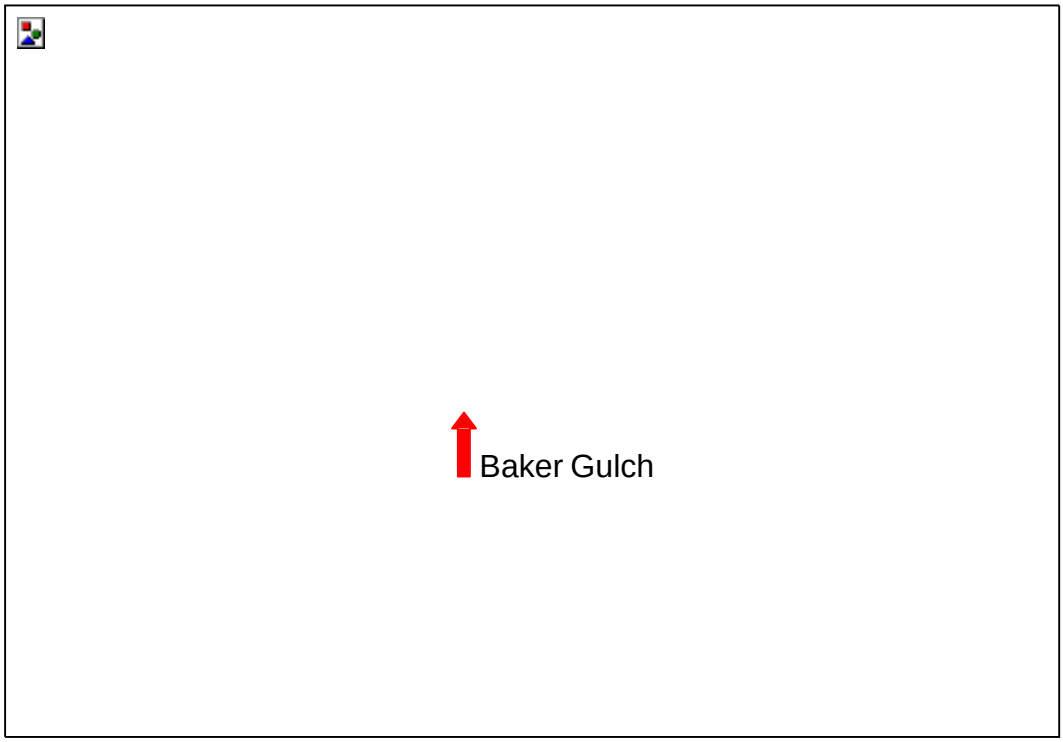
Appendix Figure F-19. Upper mainstem Wallowa River, Eggleson Lane bridges.



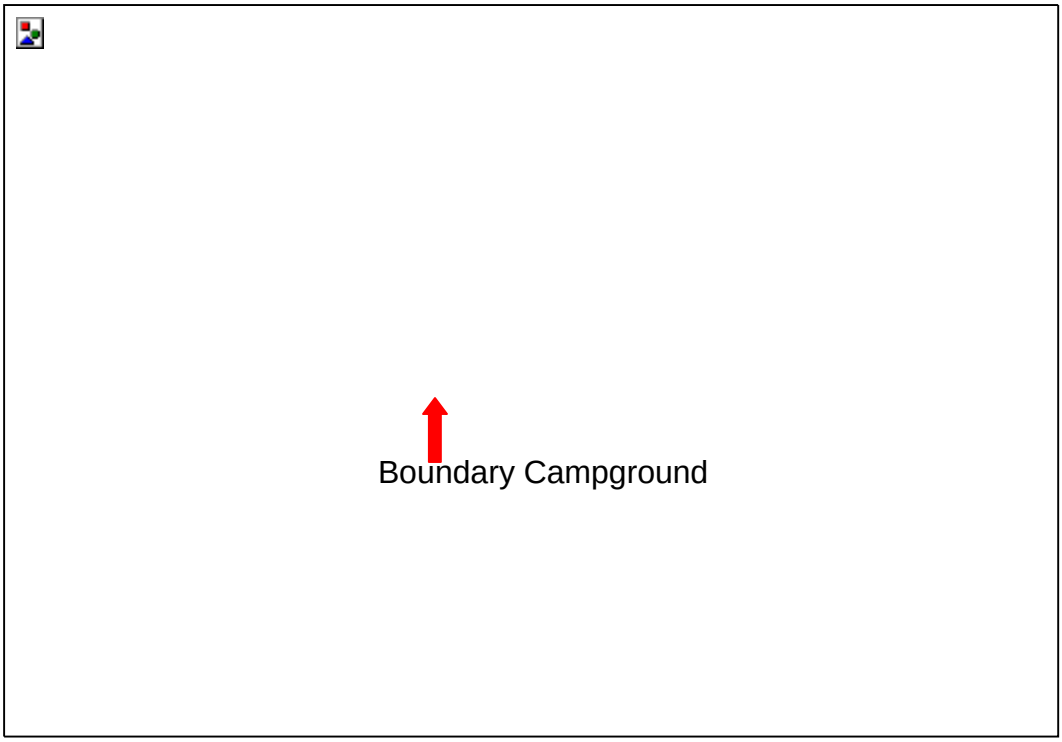
Appendix Figure F-20. Upper mainstem Wallowa River, Wallowa Hatchery intake.



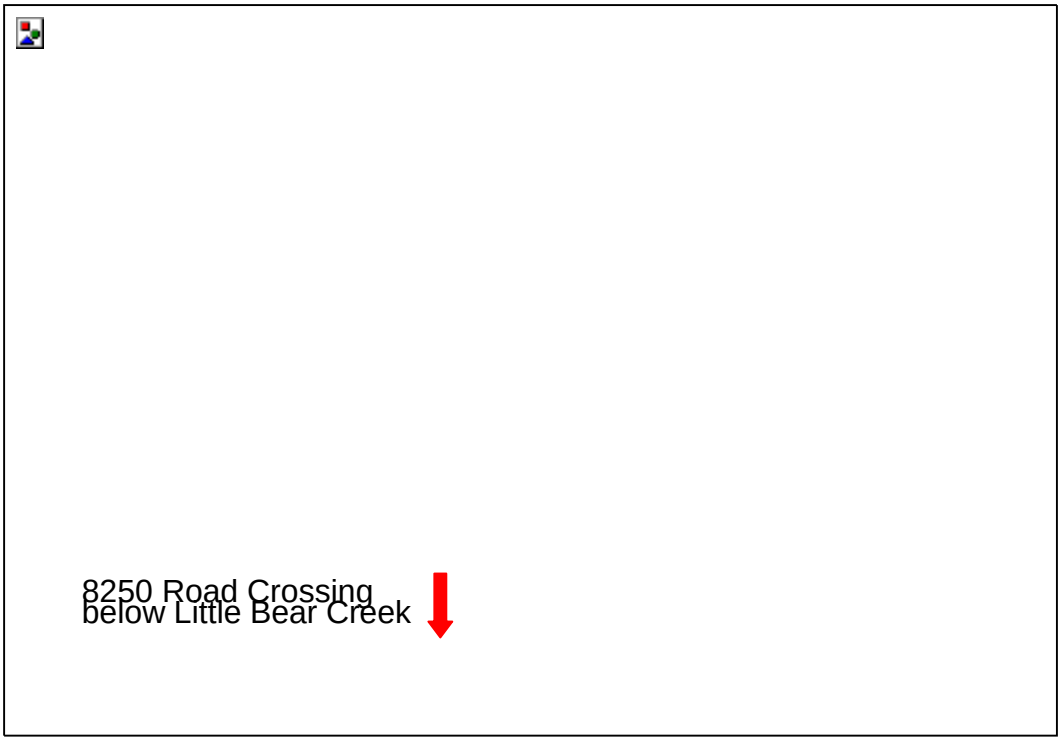
Appendix Figure F-21. Bear Creek, Guard Station.



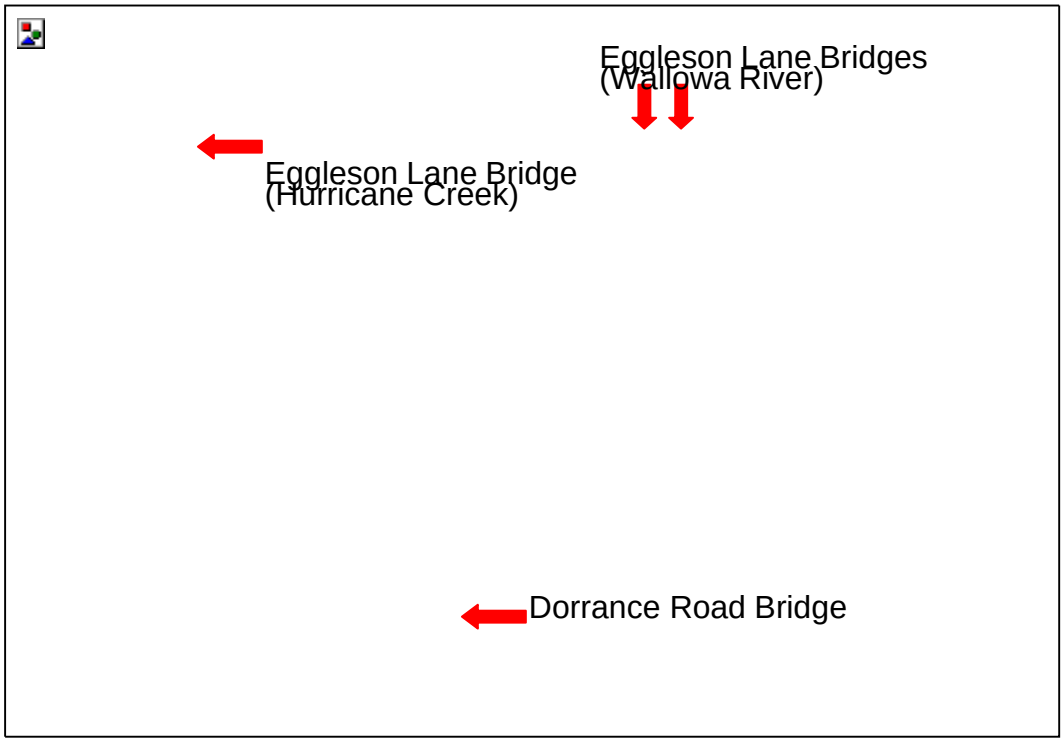
Appendix Figure F-22. Bear Creek, Baker Gulch.



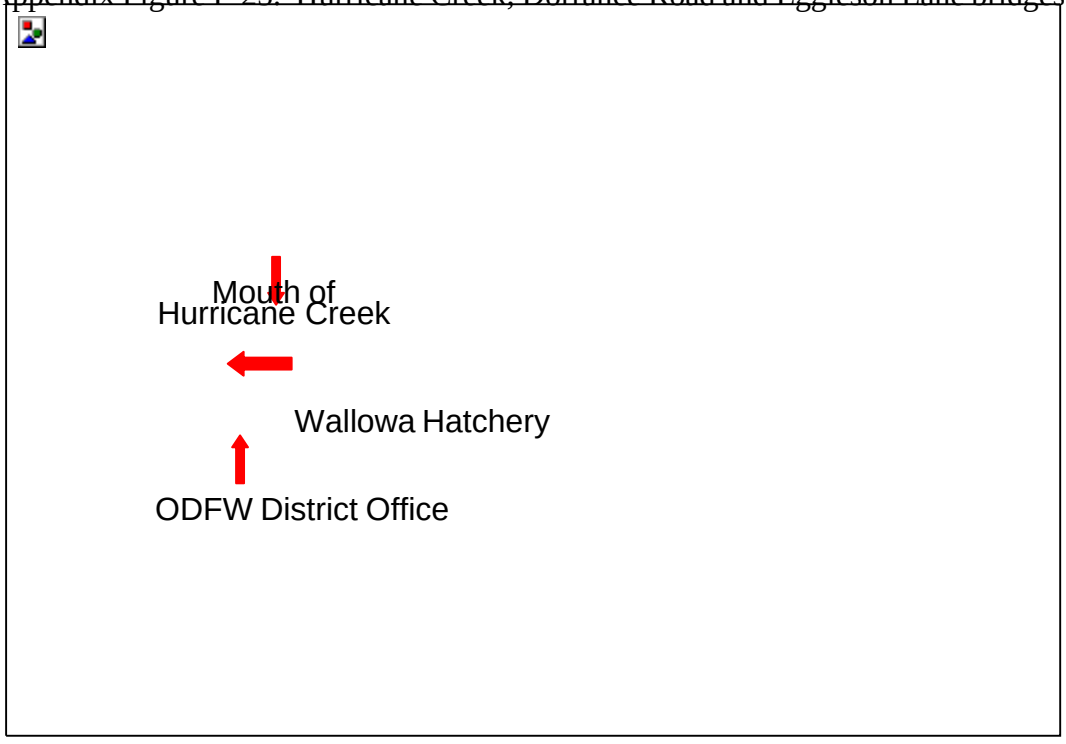
Appendix Figure F-23. Bear Creek, Boundary Campground.



Appendix Figure F-24. Bear Creek, 8250 Road crossing.

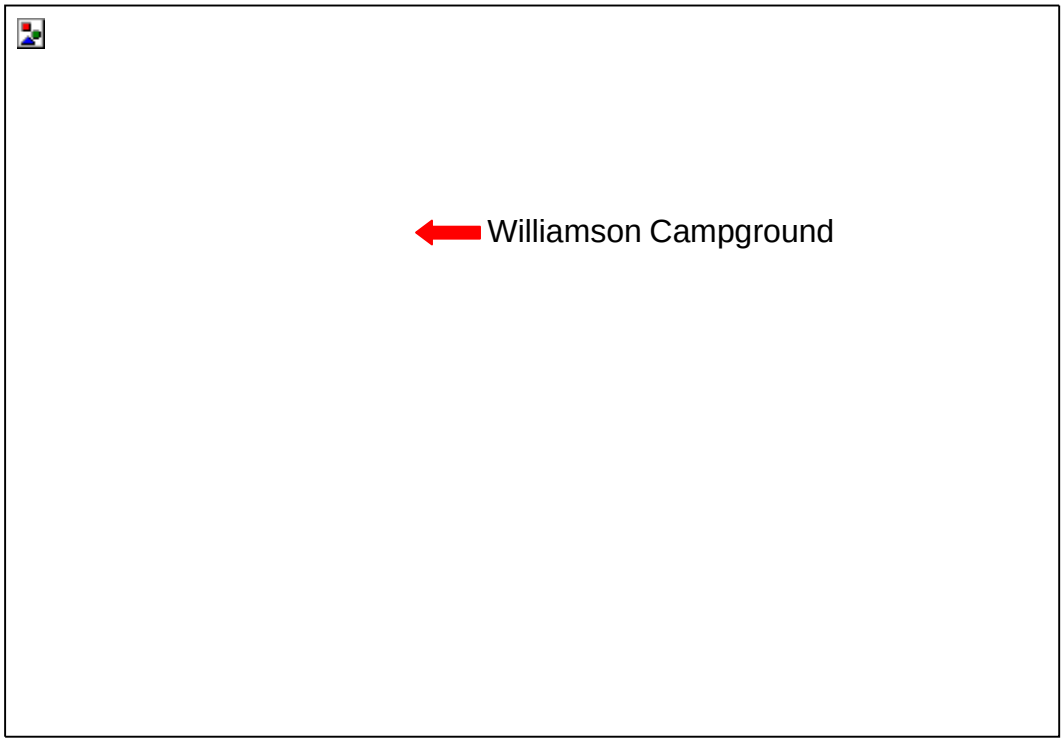


Appendix Figure F-25. Hurricane Creek, Dorrance Road and Eggleson Lane bridges.

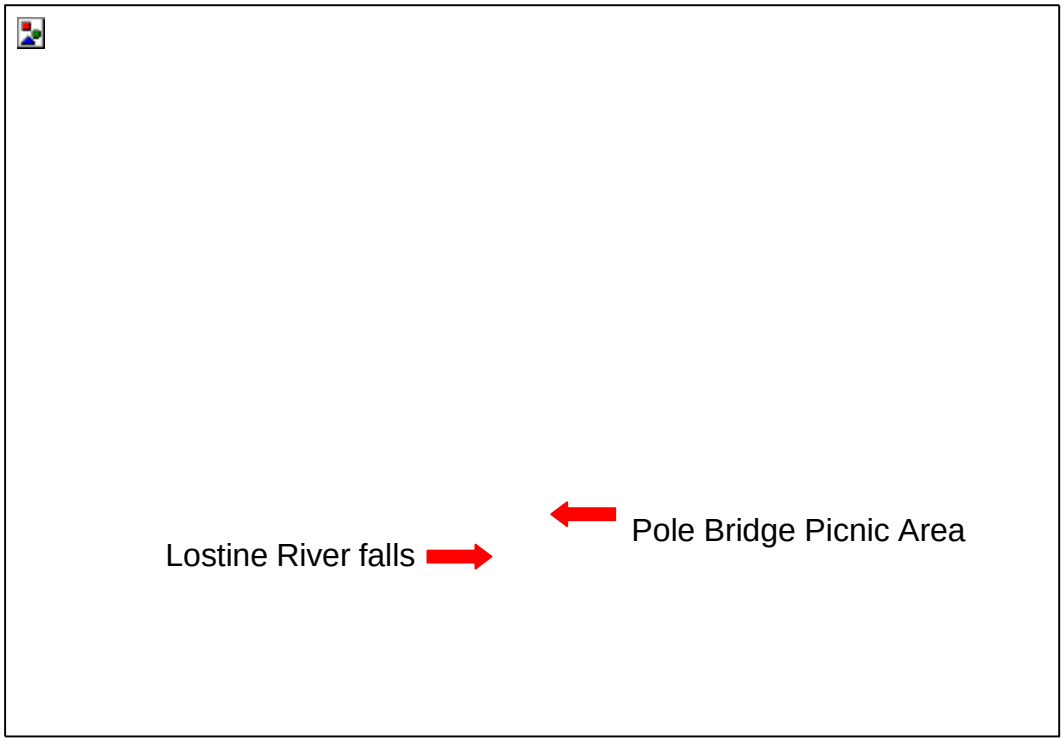


Appendix Figure F-26. Mouth of Hurricane Creek.

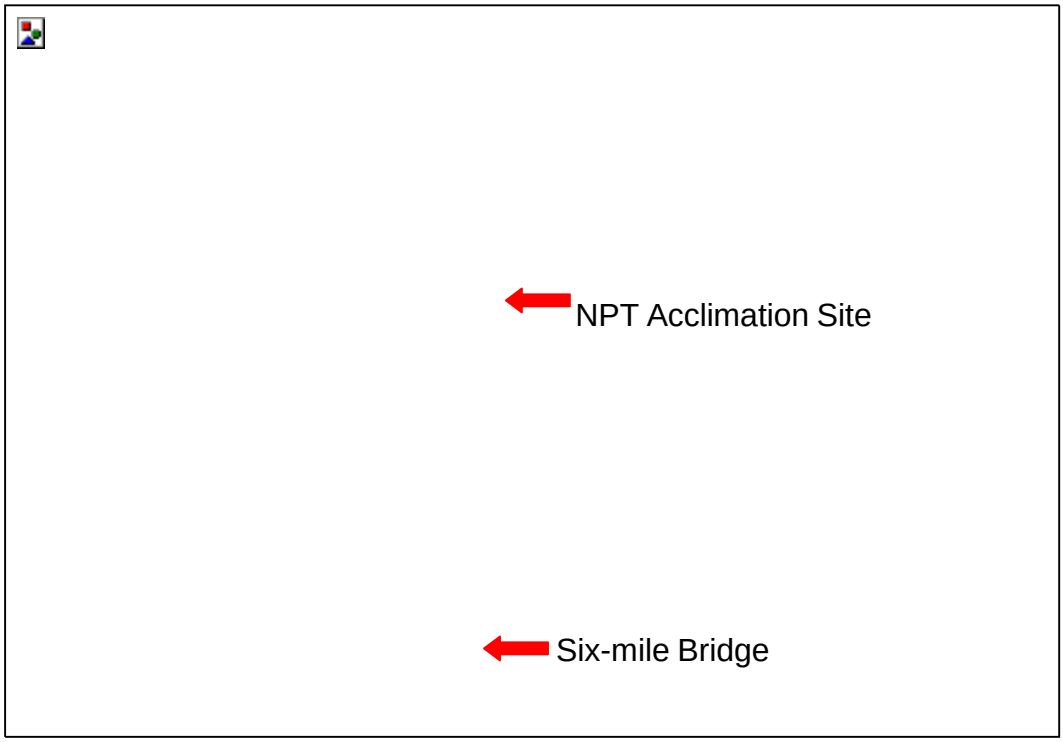
Appendix Figure F-27. Lostine River, Lapover Meadows.



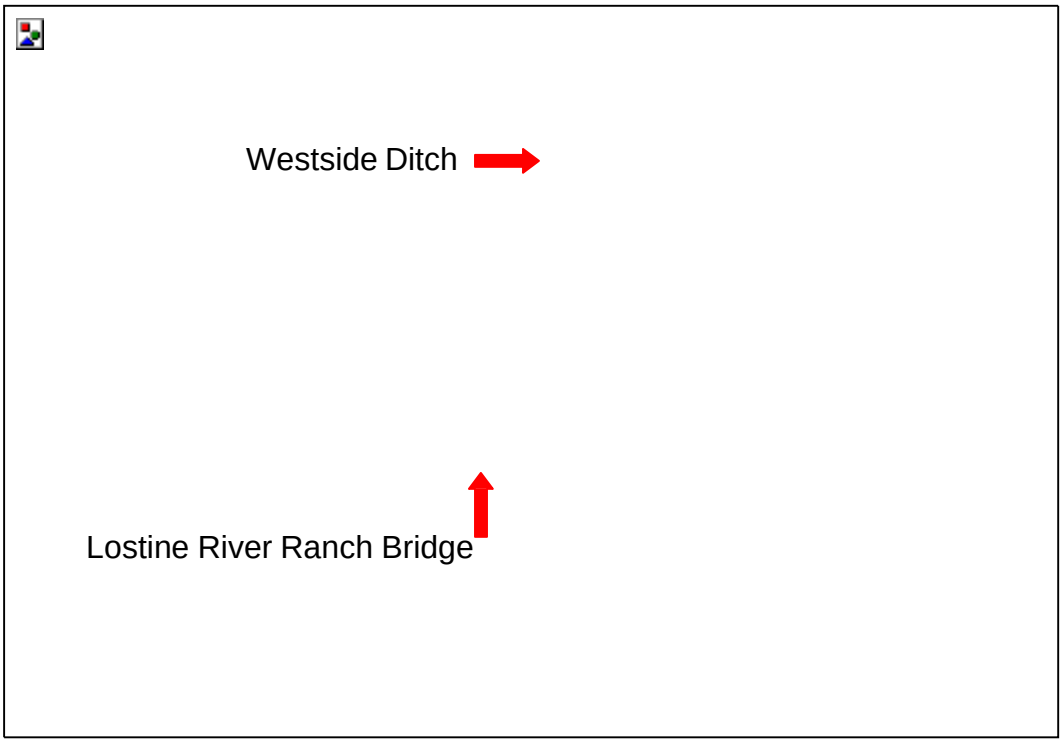
Appendix Figure F-28. Lostine River, Williamson Campground.



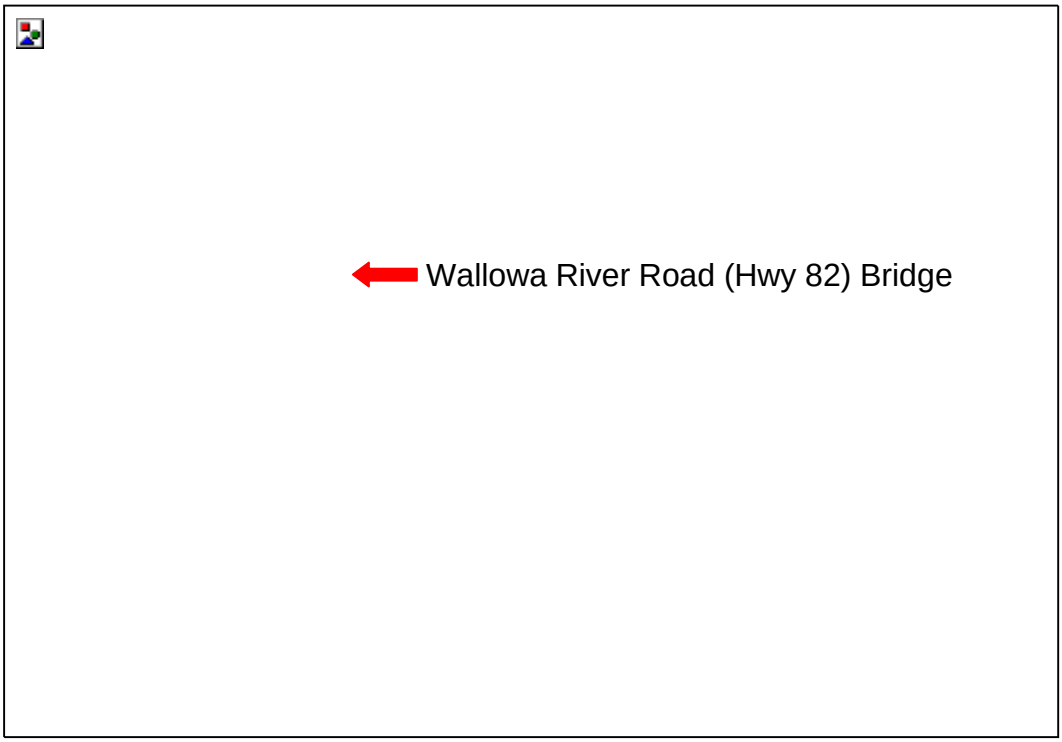
Appendix Figure F-29. Lostine River, Lostine River falls and Pole Bridge Picnic Area.



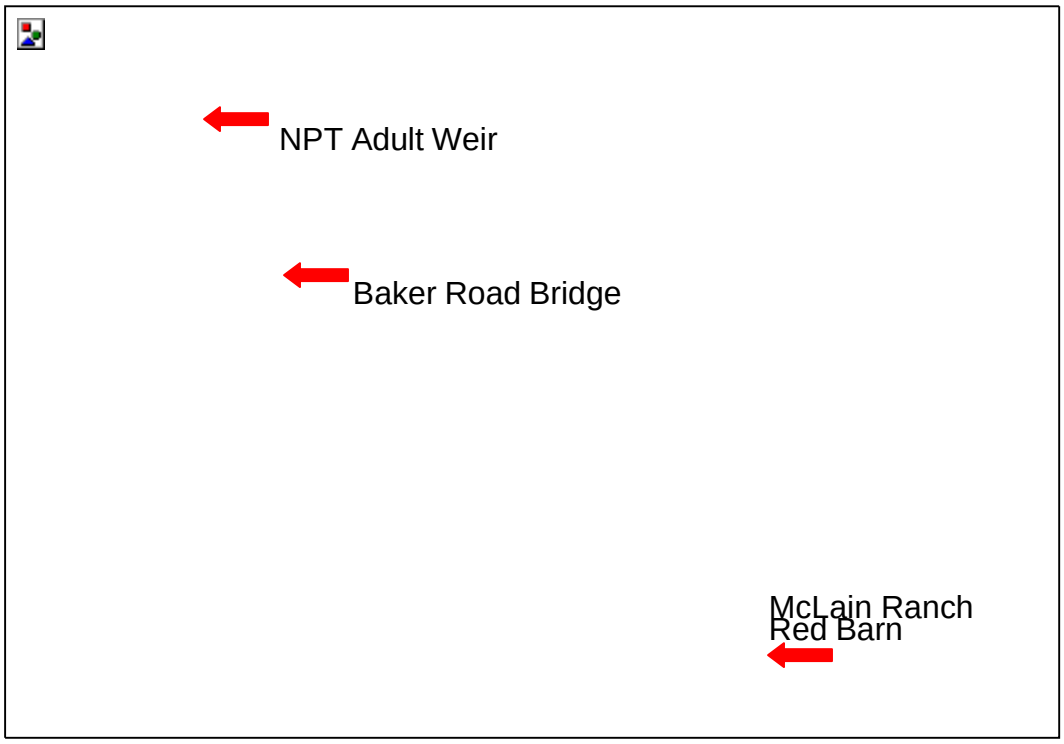
Appendix Figure F-30. Lostine River, "Six-mile" bridge.



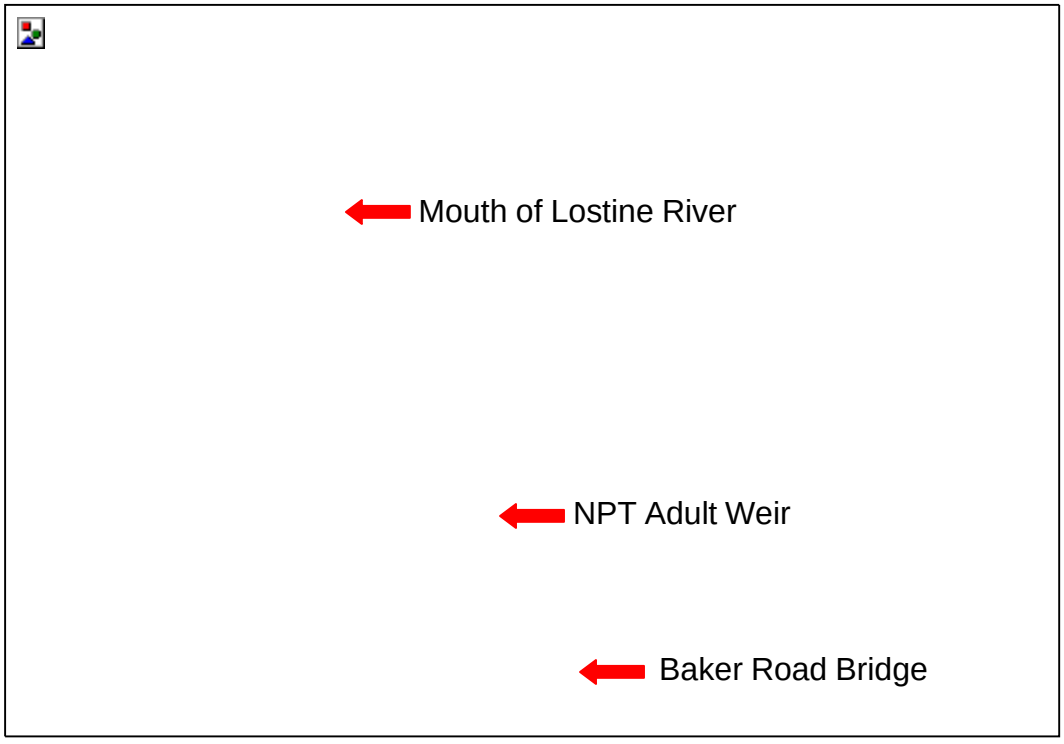
Appendix Figure F-31. Lostine River, Lostine River Ranch bridge and Westside Ditch.



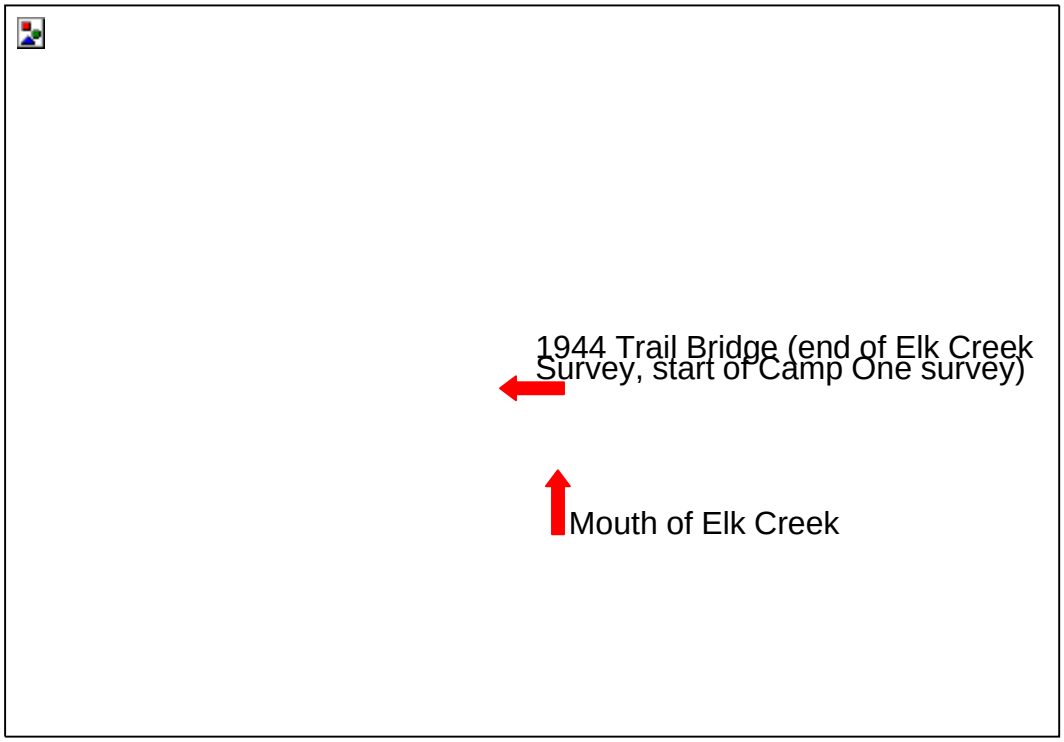
Appendix Figure F-32. Lostine River, Wallowa River Road (Highway 82) bridge.



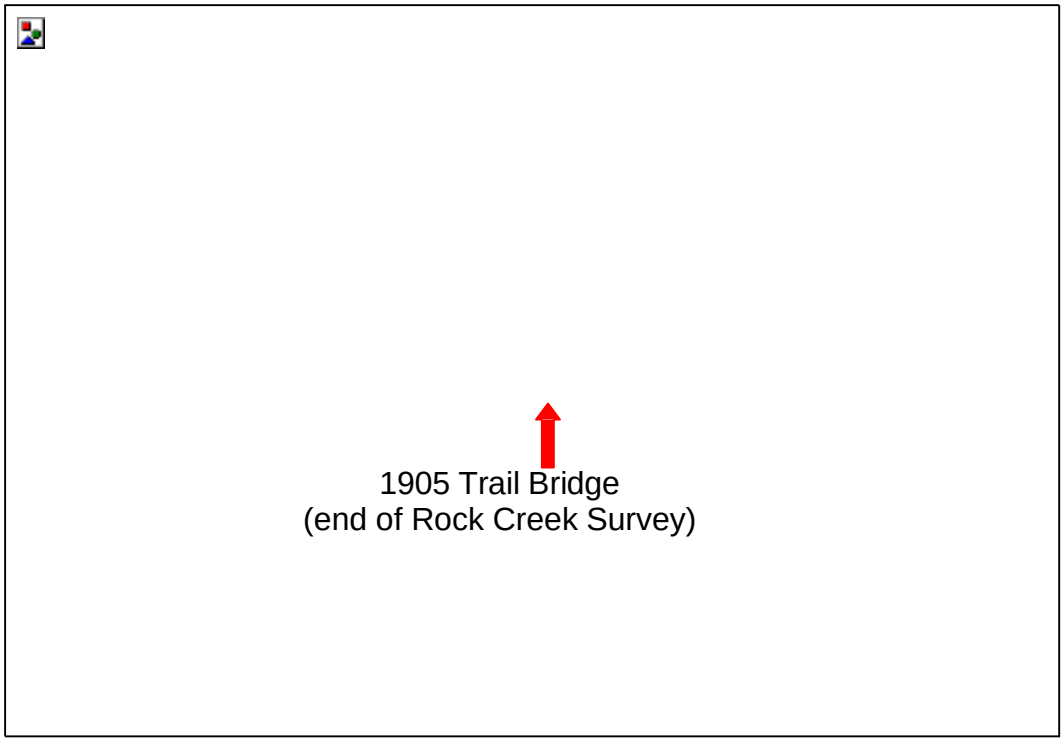
Appendix Figure F-33. Lostine River, McLain Ranch Red Barn.



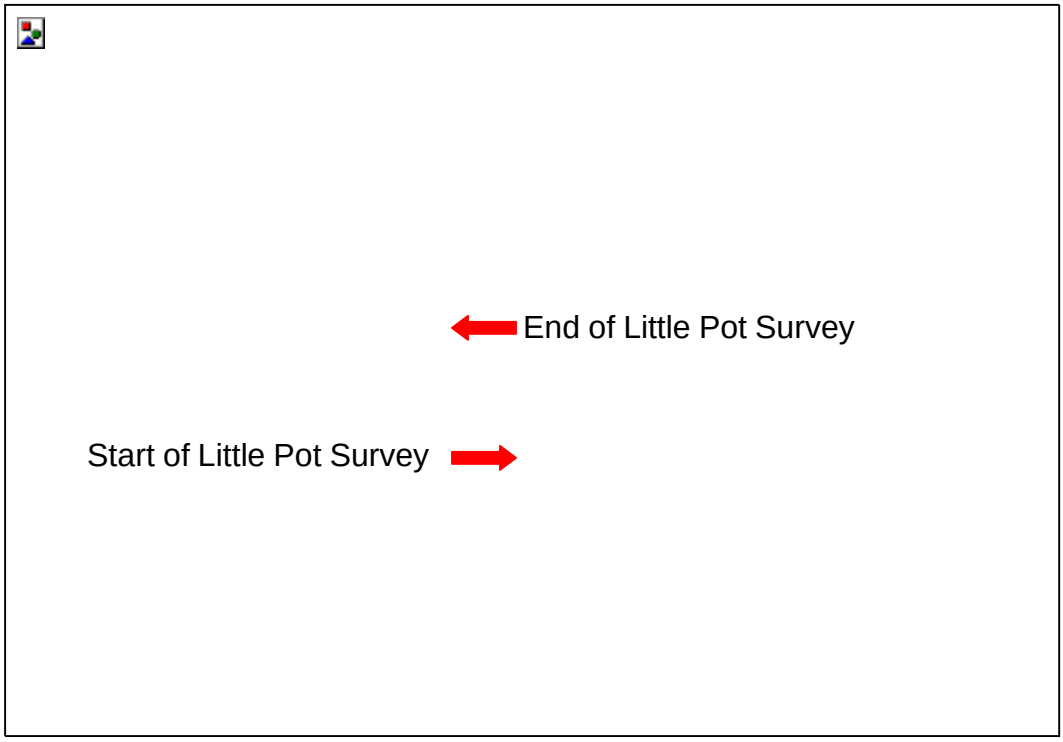
Appendix Figure F-34. Mouth of Lostine River.



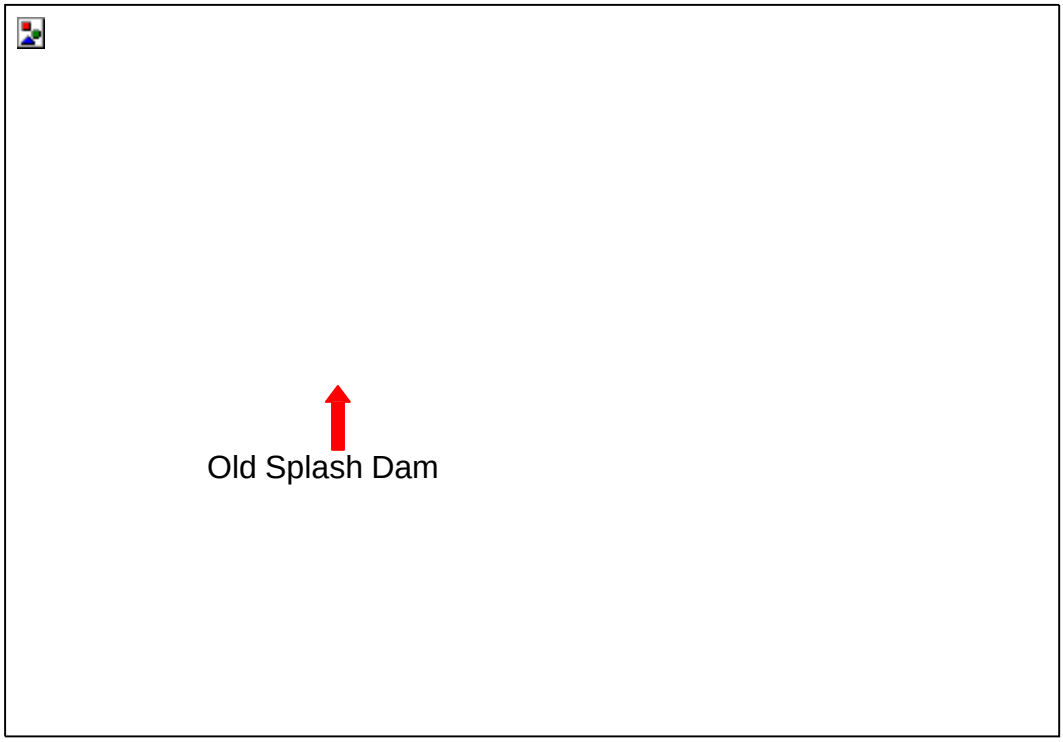
Appendix Figure F-35. Upper Minam River, Elk Creek and Camp One surveys.



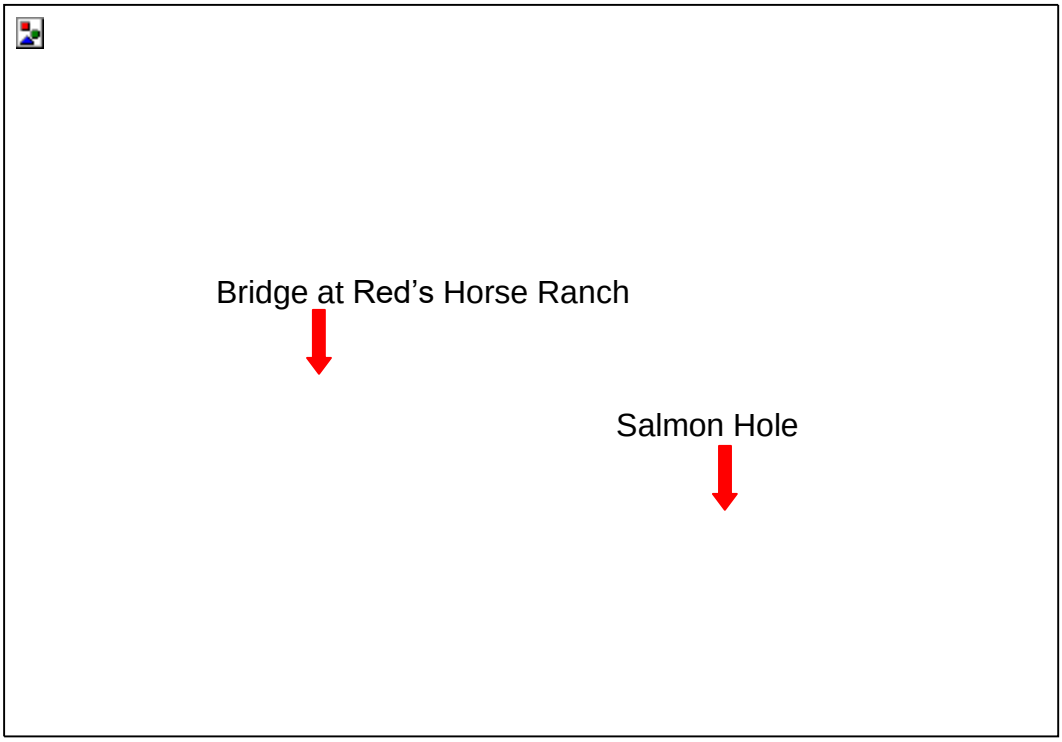
Appendix Figure F-36. Upper Minam River, Rock Creek survey.



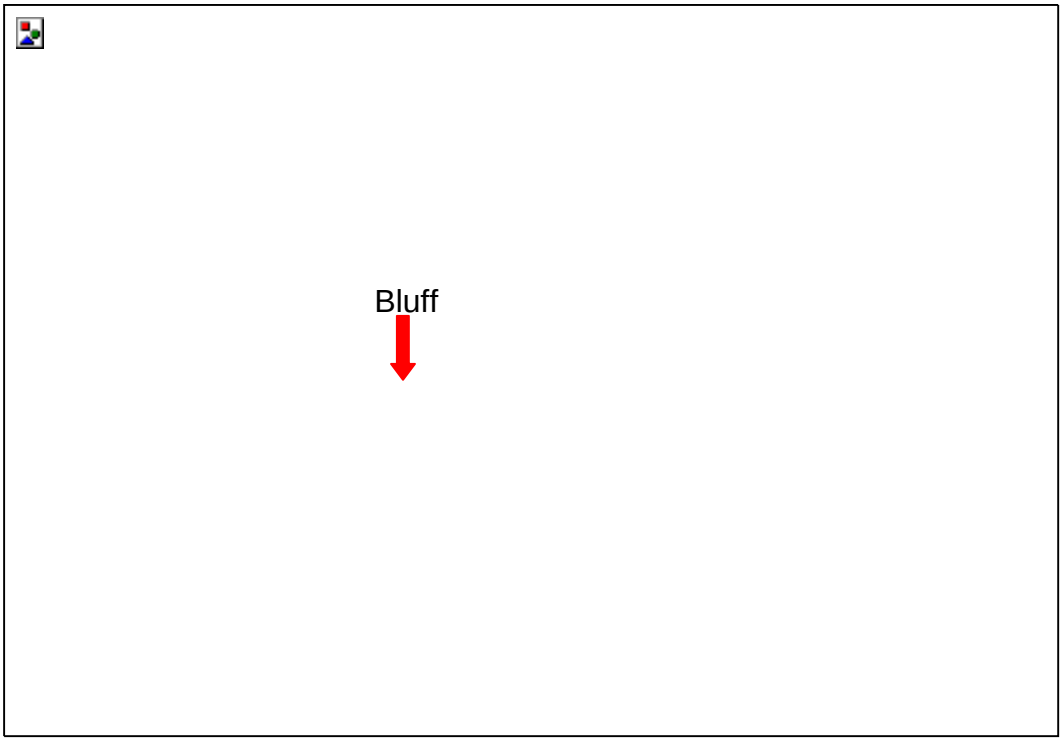
Appendix Figure F-37. Upper Minam River, Little Pot survey.



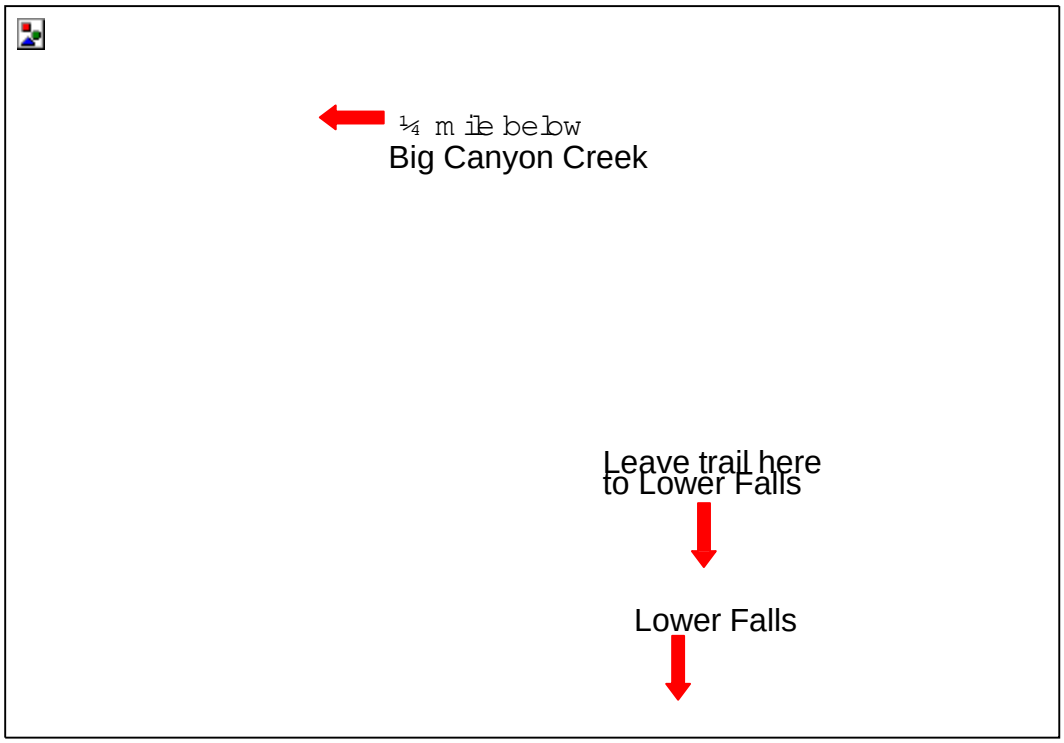
Appendix Figure F-38. Upper Minam River, Splash Dam.



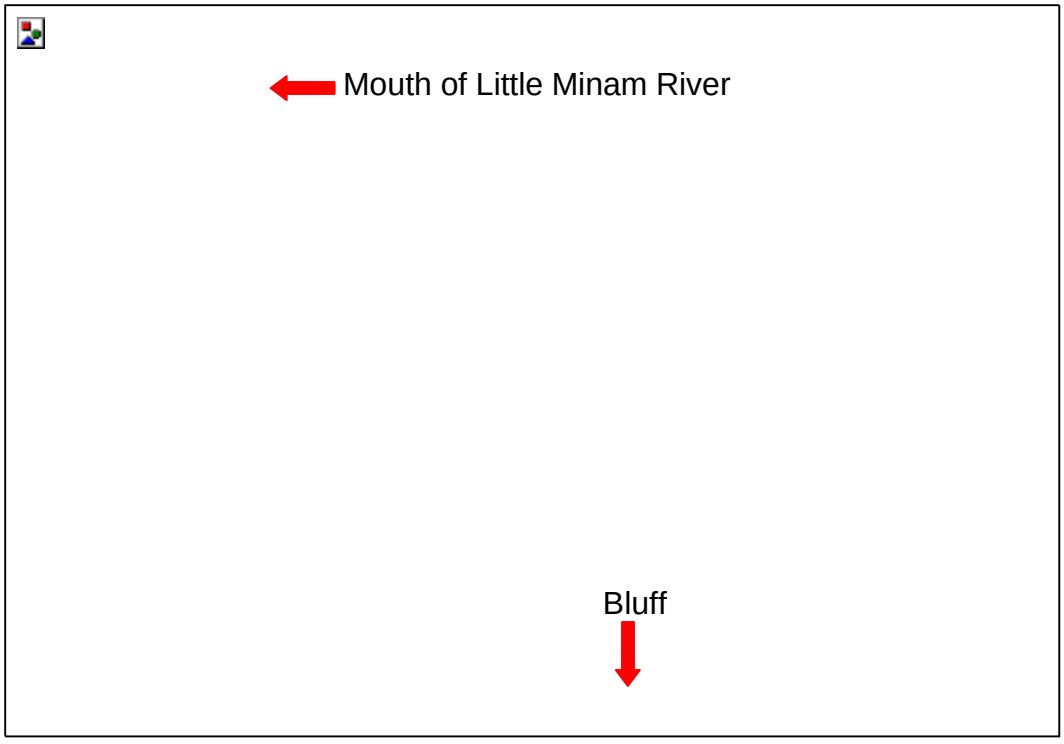
Appendix Figure F-39. Lower Minam River, Salmon Hole to Bridge at Red's Horse Ranch.



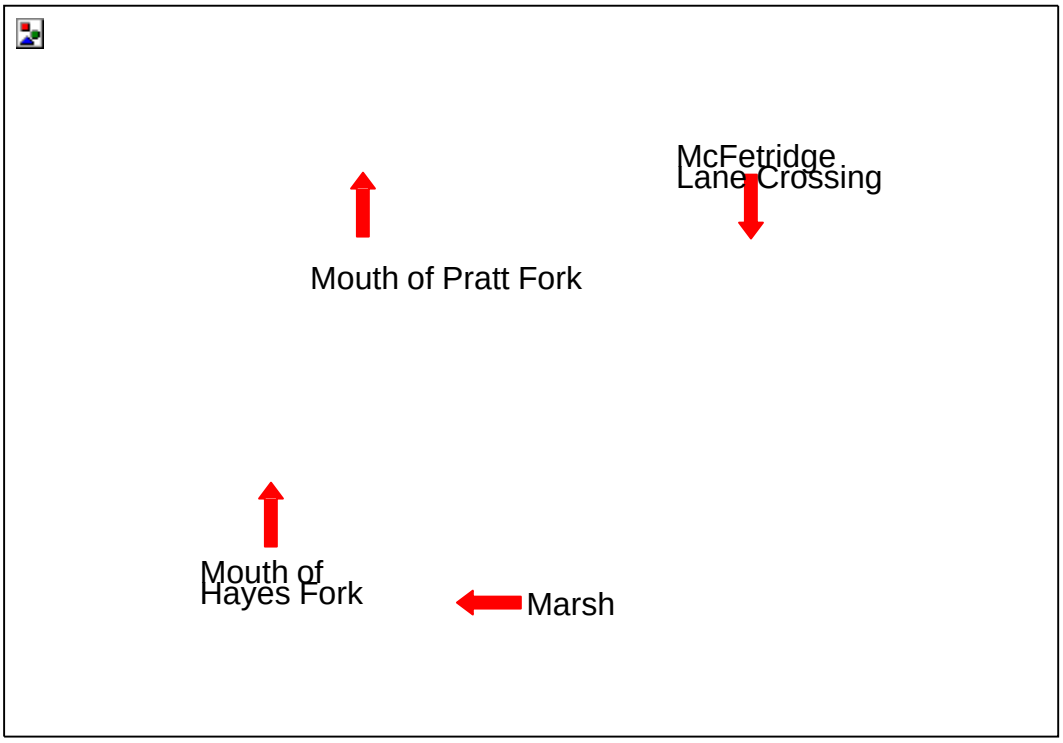
Appendix Figure F-40. Lower Minam River, Bluff.



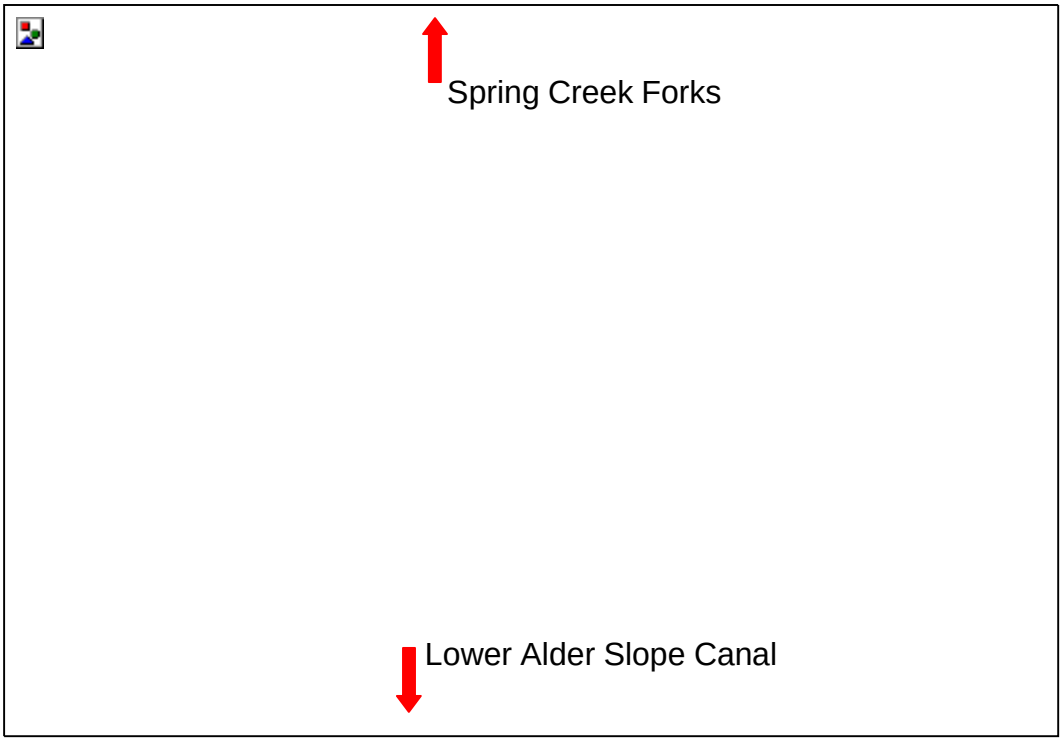
Appendix Figure F-41. Little Minam River, Lower Falls to ¼ mile below Big Canyon Creek.



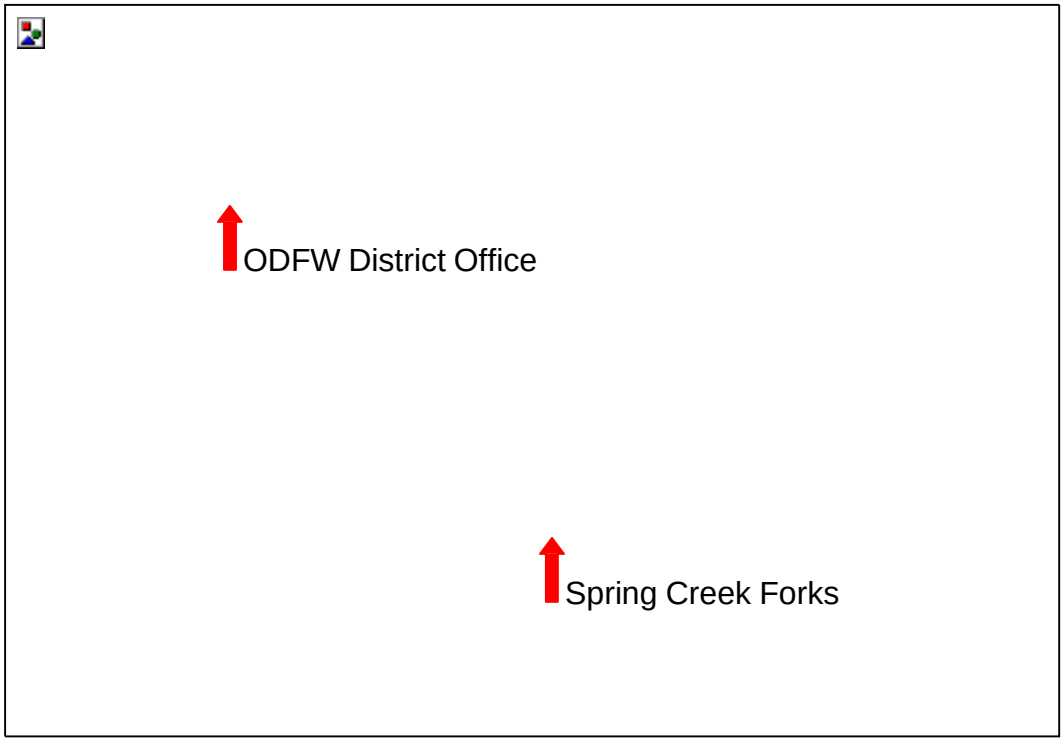
Appendix Figure F-42. Mouth of Little Minam River.



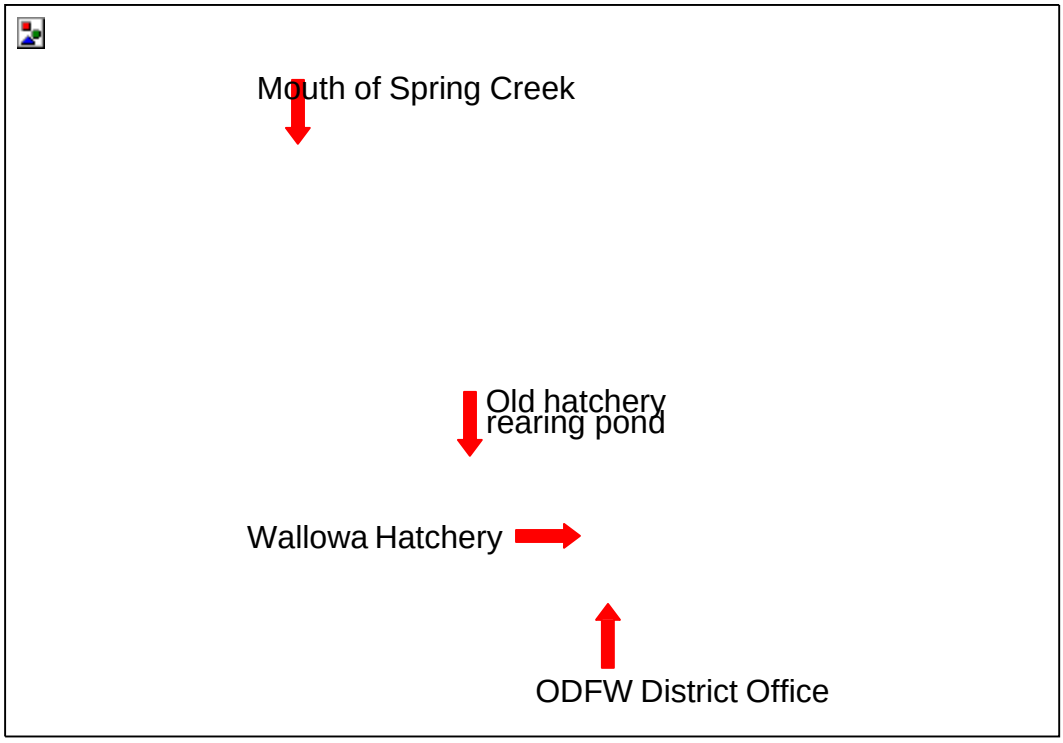
Appendix Figure F-43. Prairie Creek, Hayes Fork and Pratt Fork.



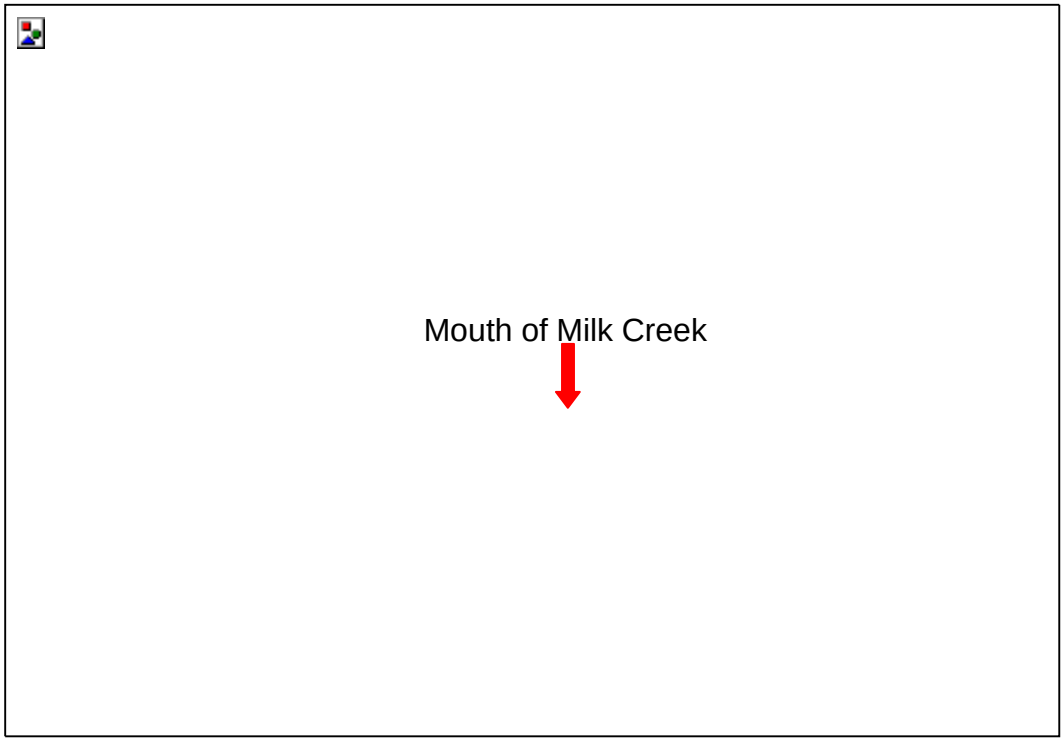
Appendix Figure F-44. Spring Creek, Lower Alder Slope Canal and Spring Creek Forks.



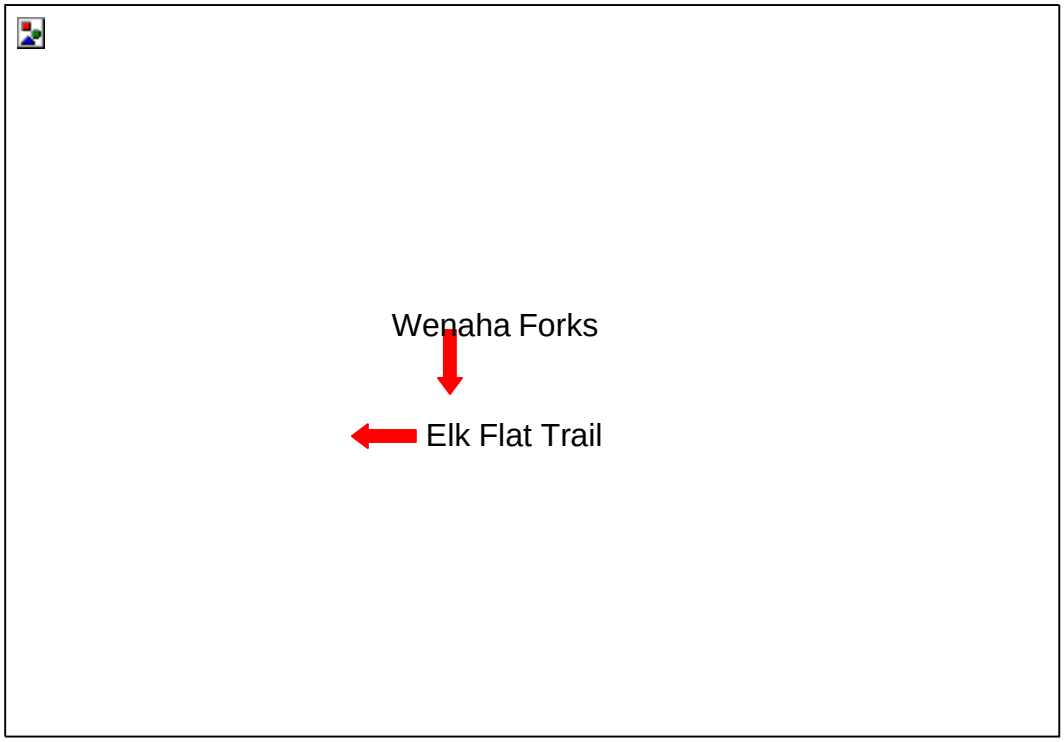
Appendix Figure F-45. Spring Creek Forks.



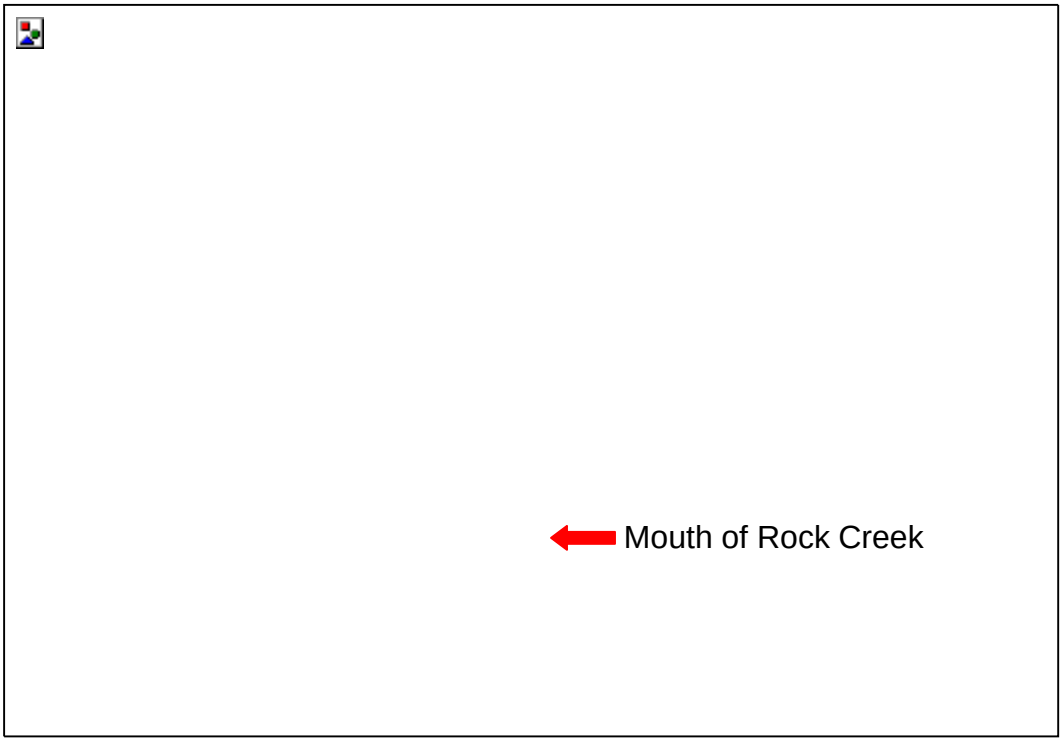
Appendix Figure F-46. Spring Creek, old hatchery rearing pond to mouth.



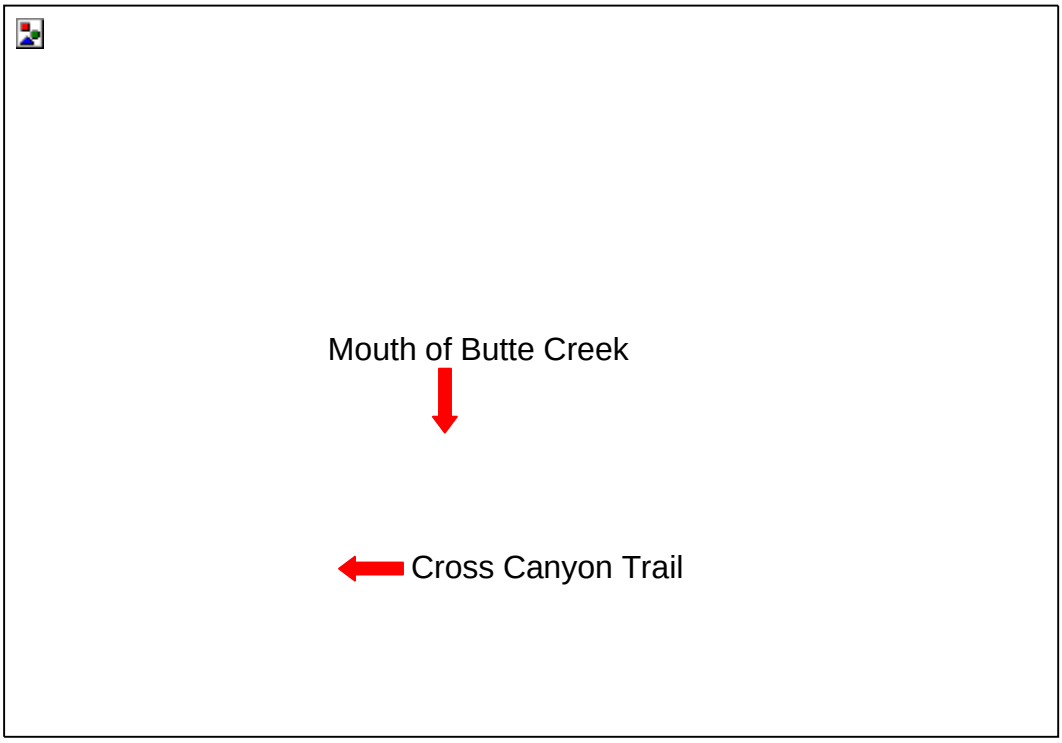
Appendix Figure F-47. South Fork Wenaha River, mouth of Milk Creek.



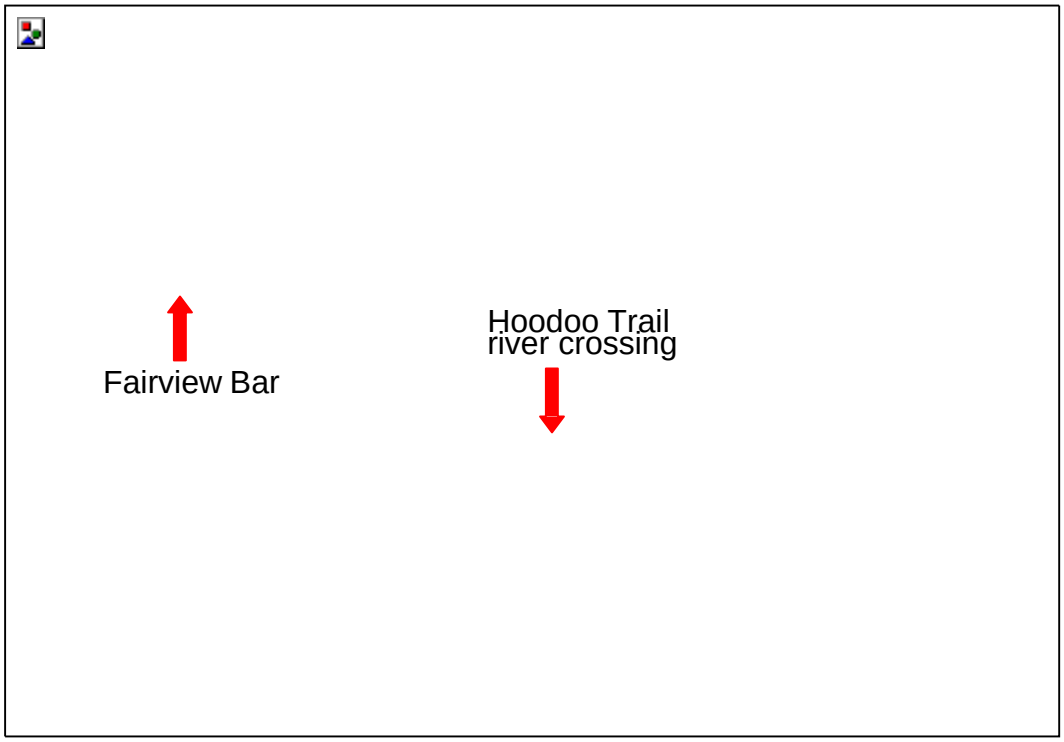
Appendix Figure F-48. Wenaha River Forks and Elk Flat Trail river crossing.



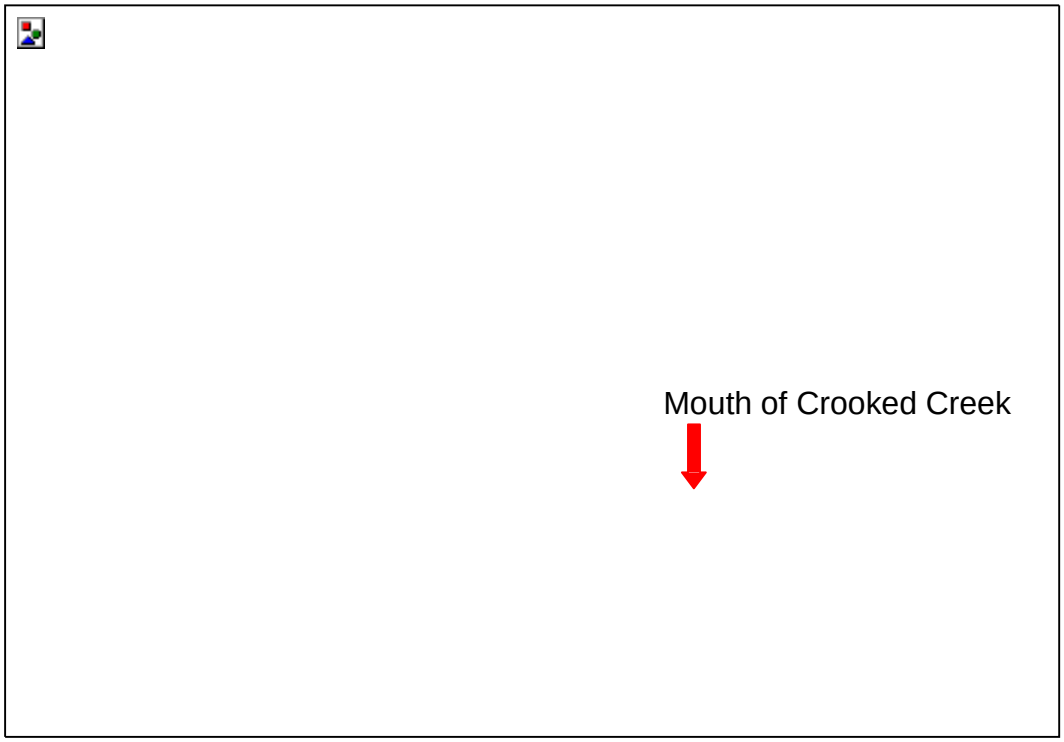
Appendix Figure F-49. Wenaha River, mouth of Rock Creek.



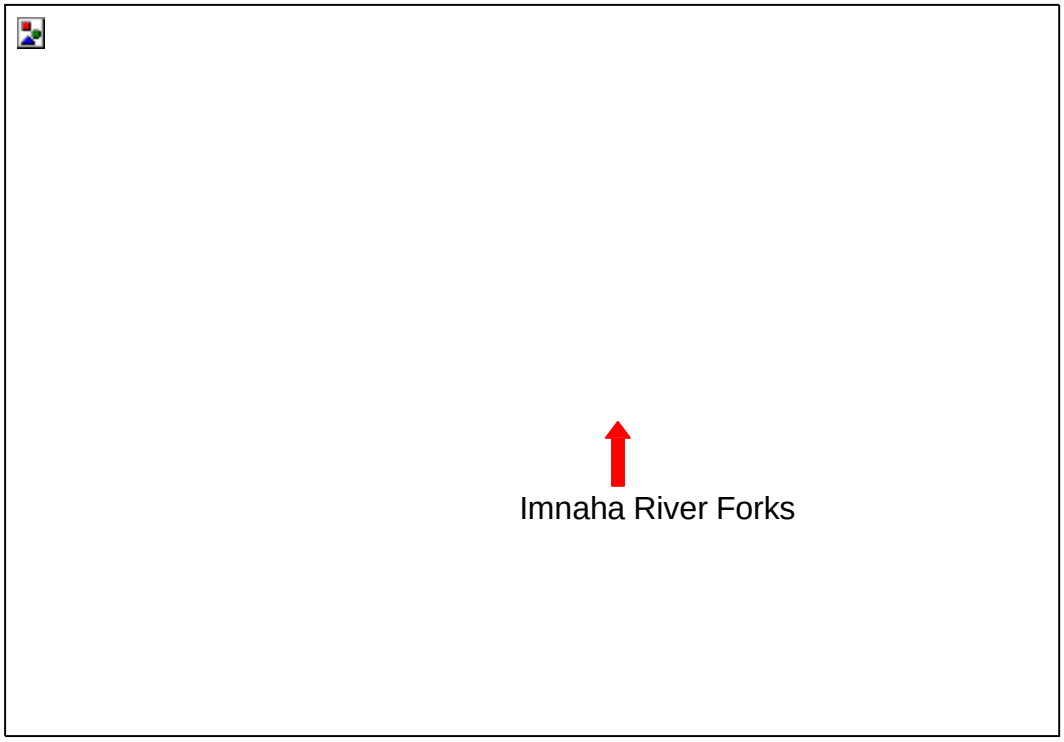
Appendix Figure F-50. Wenaha River, mouth of Butte Creek and Cross Canyon Trail river crossing.



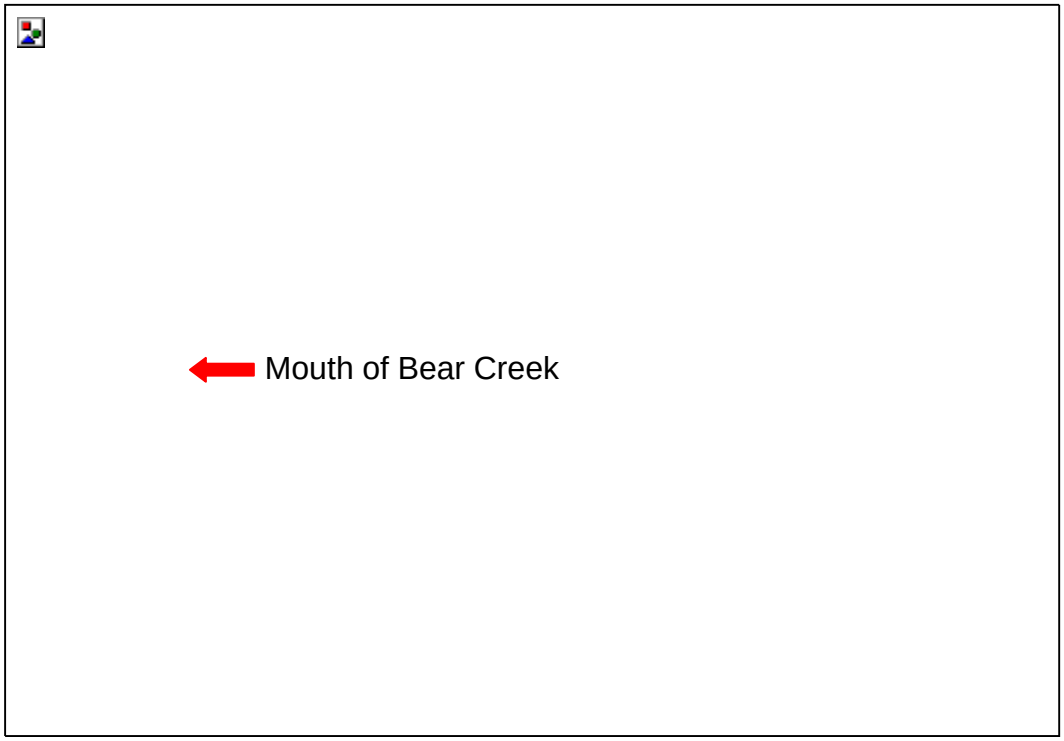
Appendix Figure F-51. Wenaha River, Fairview Bar and Hoodoo Trail river crossing.



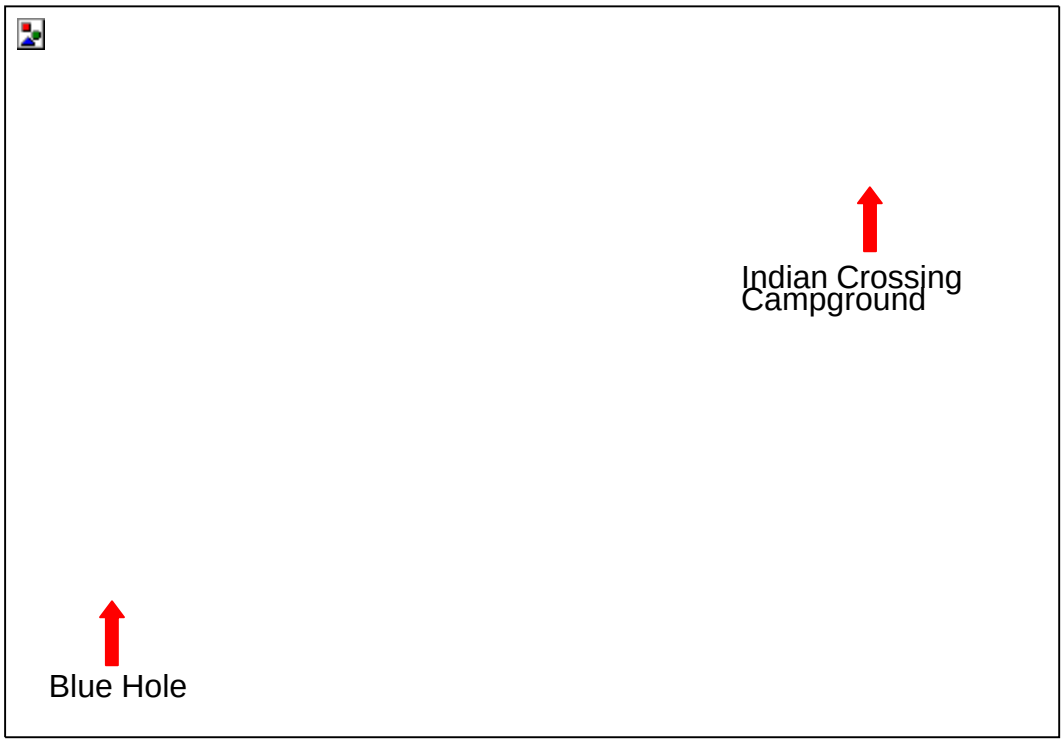
Appendix Figure F-52. Wenaha River, mouth of Crooked Creek.



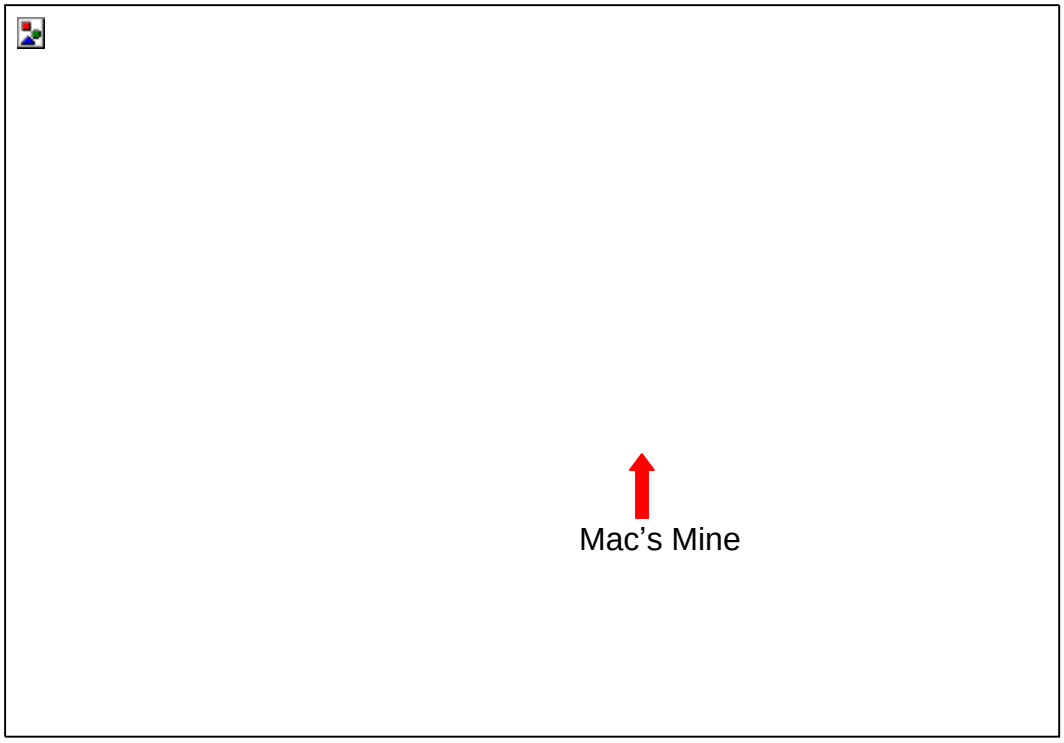
Appendix Figure F-53. Imnaha River Forks.



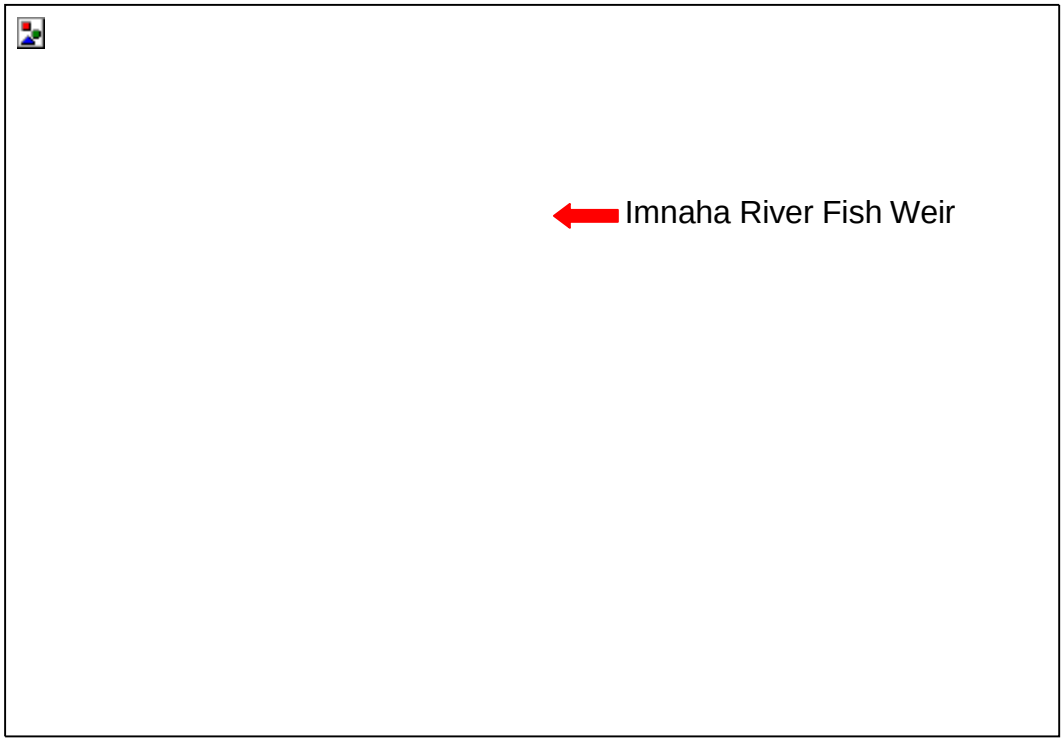
Appendix Figure F-54. South Fork Imnaha River, mouth of Bear Creek.



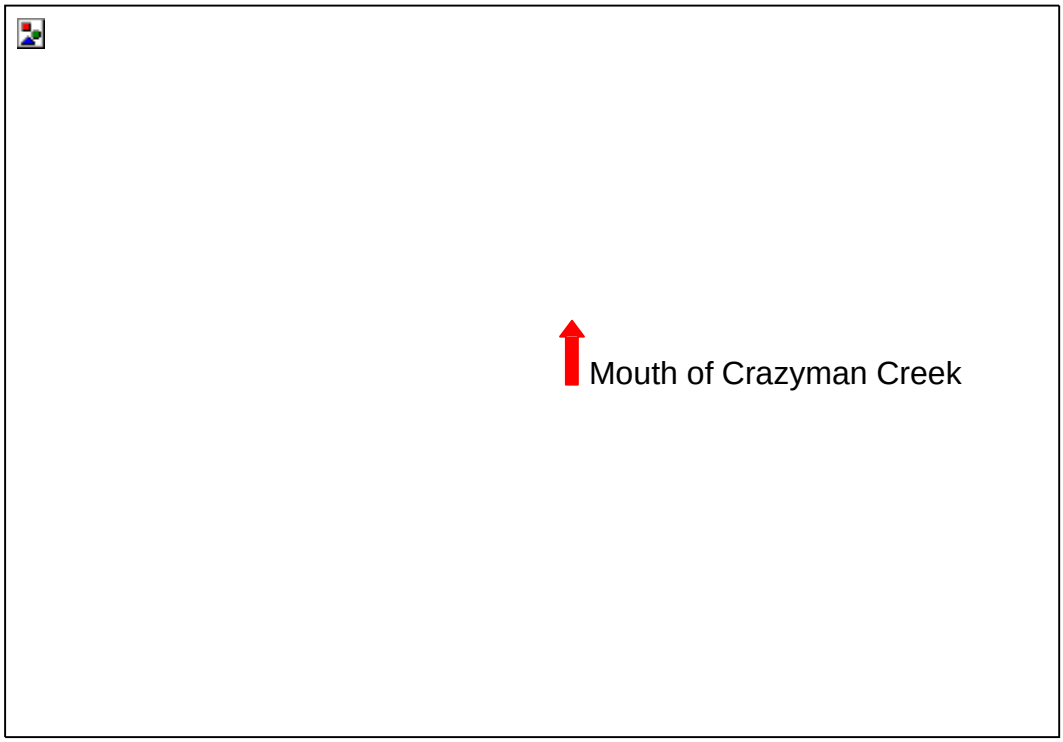
Appendix Figure F-55. Imnaha River, Blue Hole to Indian Crossing Campground.



Appendix Figure F-56. Imnaha River, Mac's Mine.



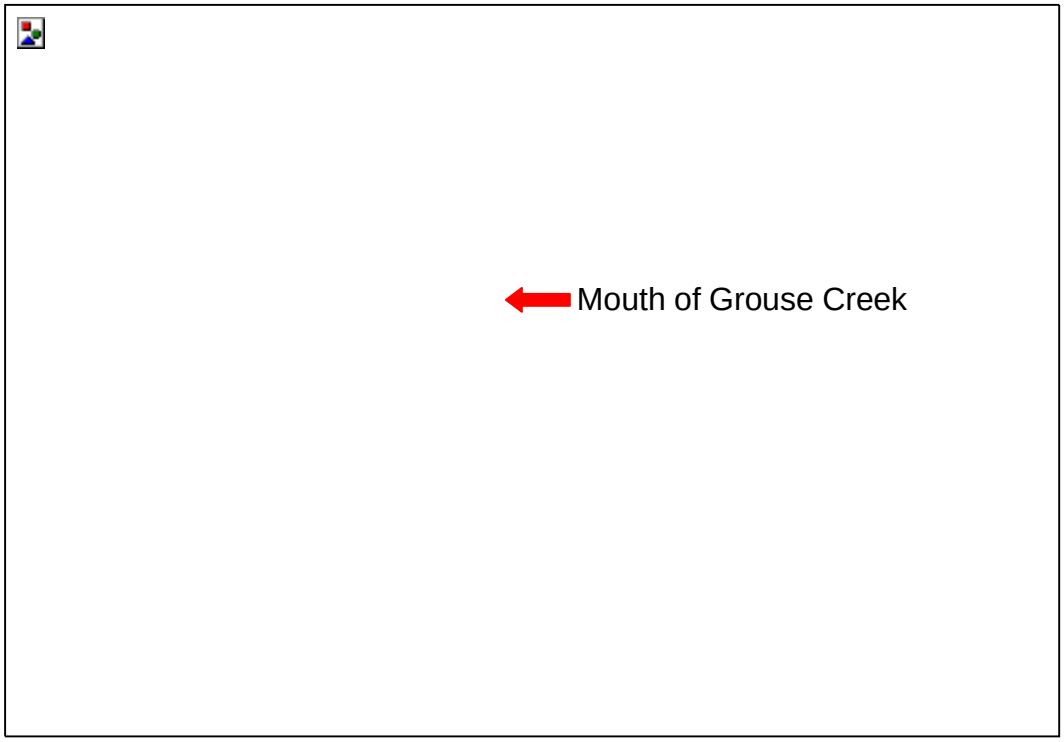
Appendix Figure F-57. Imnaha River, Fish Weir.



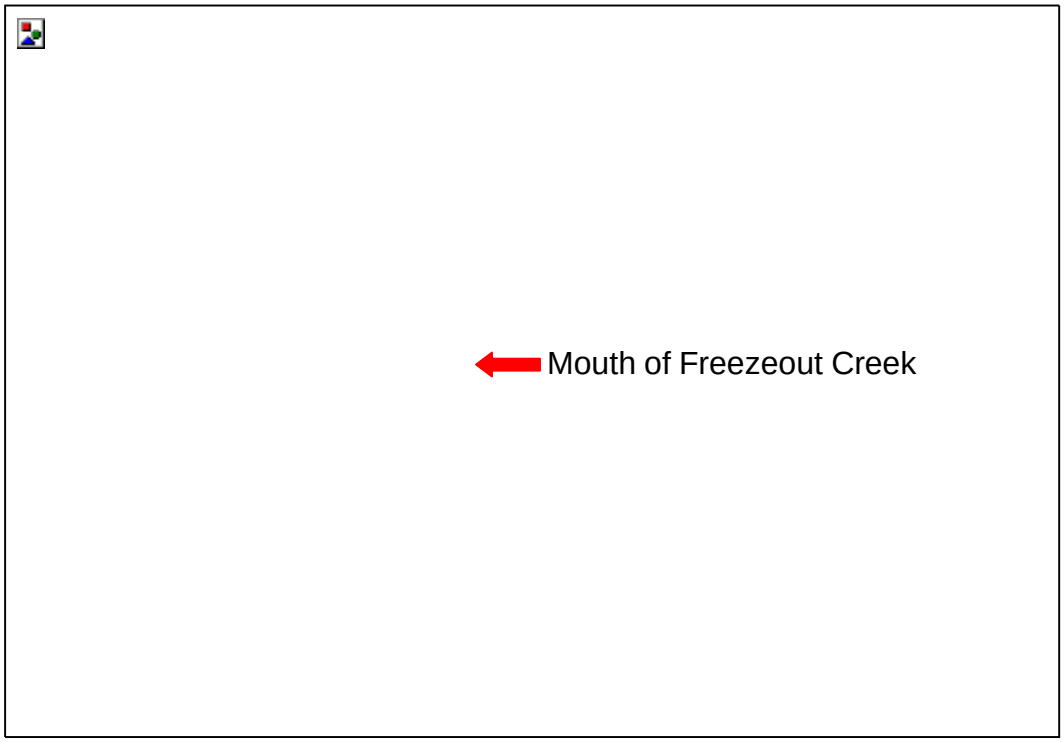
Appendix Figure F-58. Imnaha River, mouth of Crazyman Creek.

Appendix Figure F-59. Imnaha River, Garnett's upper property boundary.

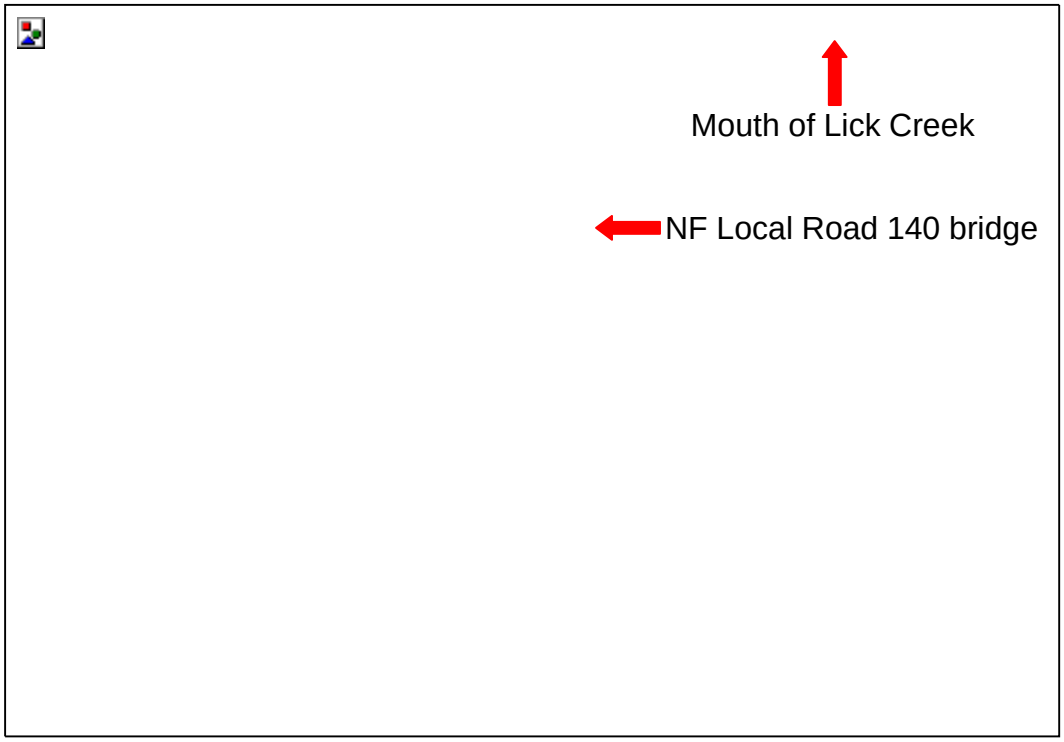
Appendix Figure F-60. Imnaha River, Garnett's lower property boundary.



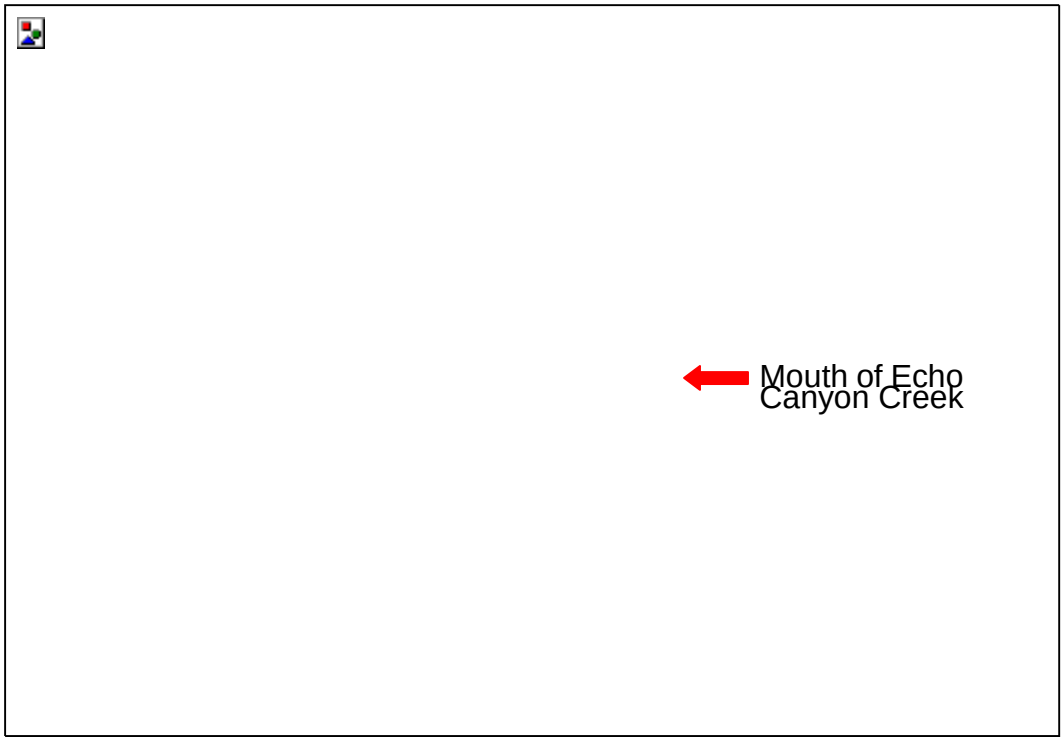
Appendix Figure F-61. Imnaha River, mouth of Grouse Creek.



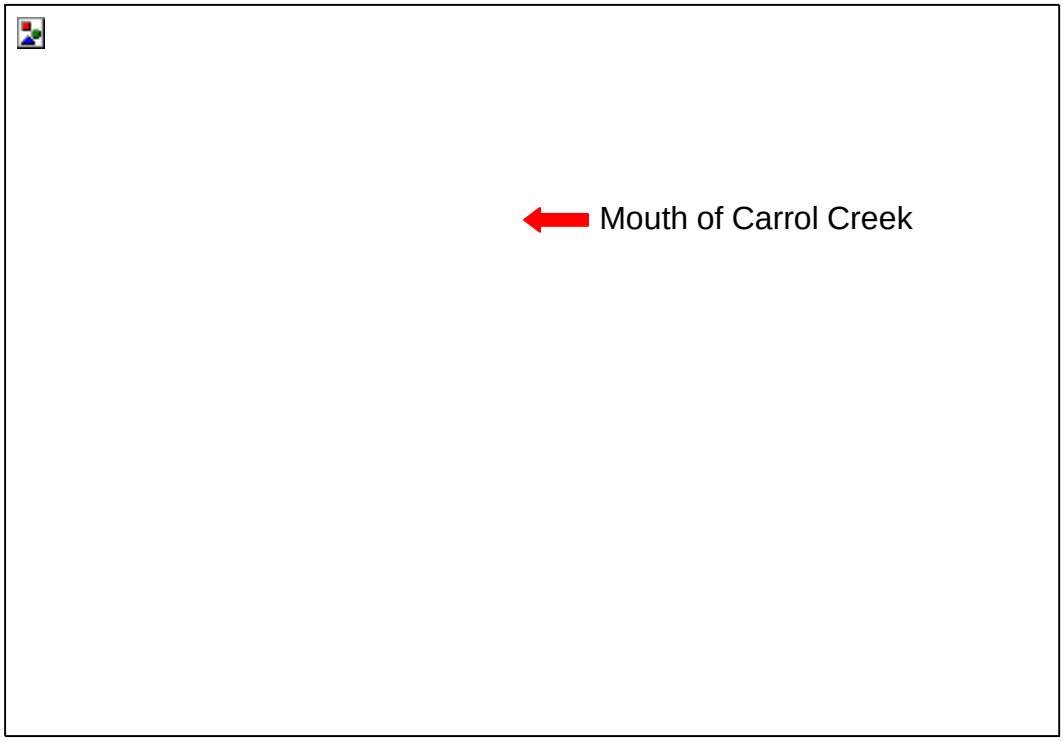
Appendix Figure F-62. Imnaha River, mouth of Freezeout Creek.



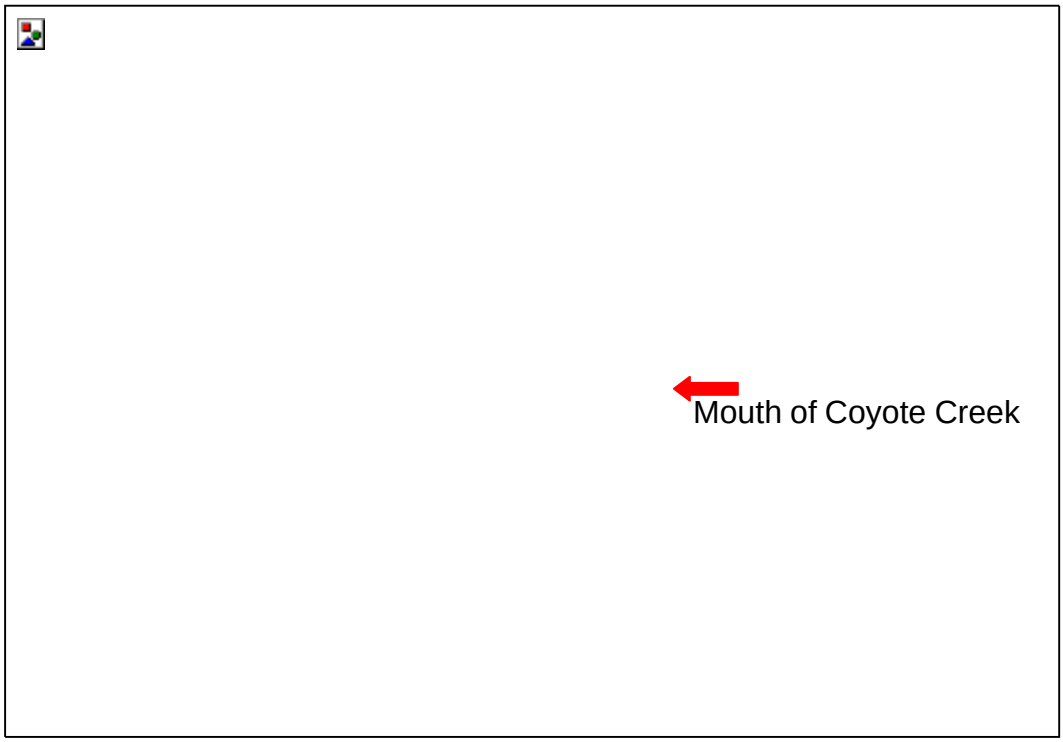
Appendix Figure F-63. Big Sheep Creek, NF local road 140 bridge.



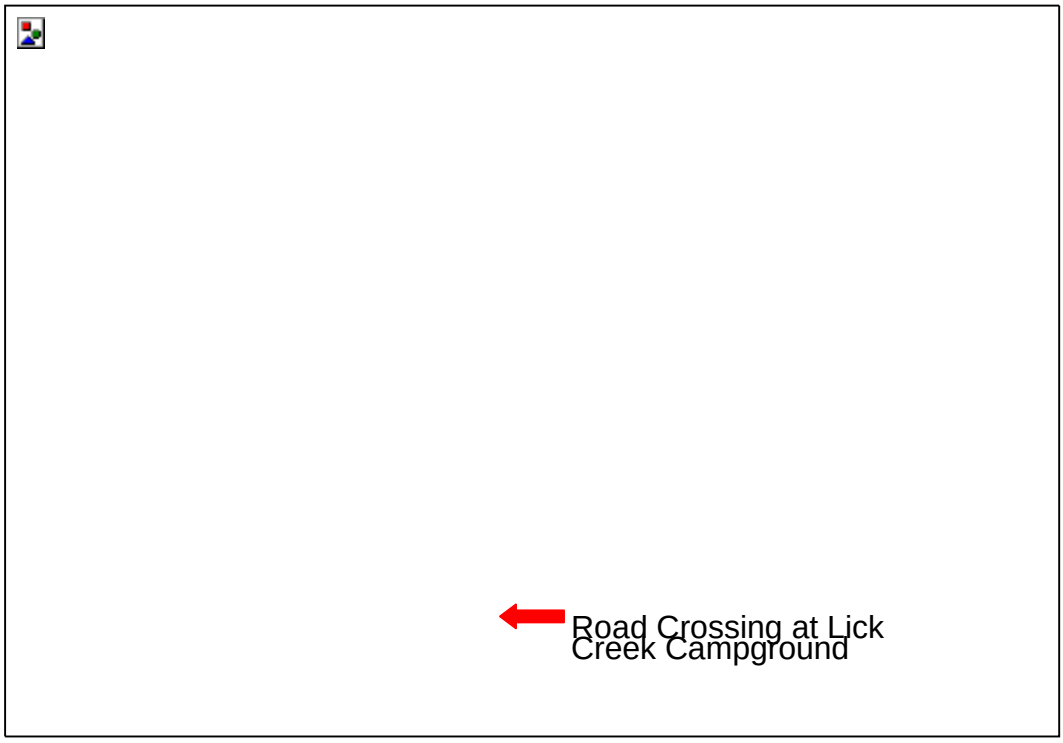
Appendix Figure F-64. Big Sheep Creek, mouth of Echo Canyon Creek.



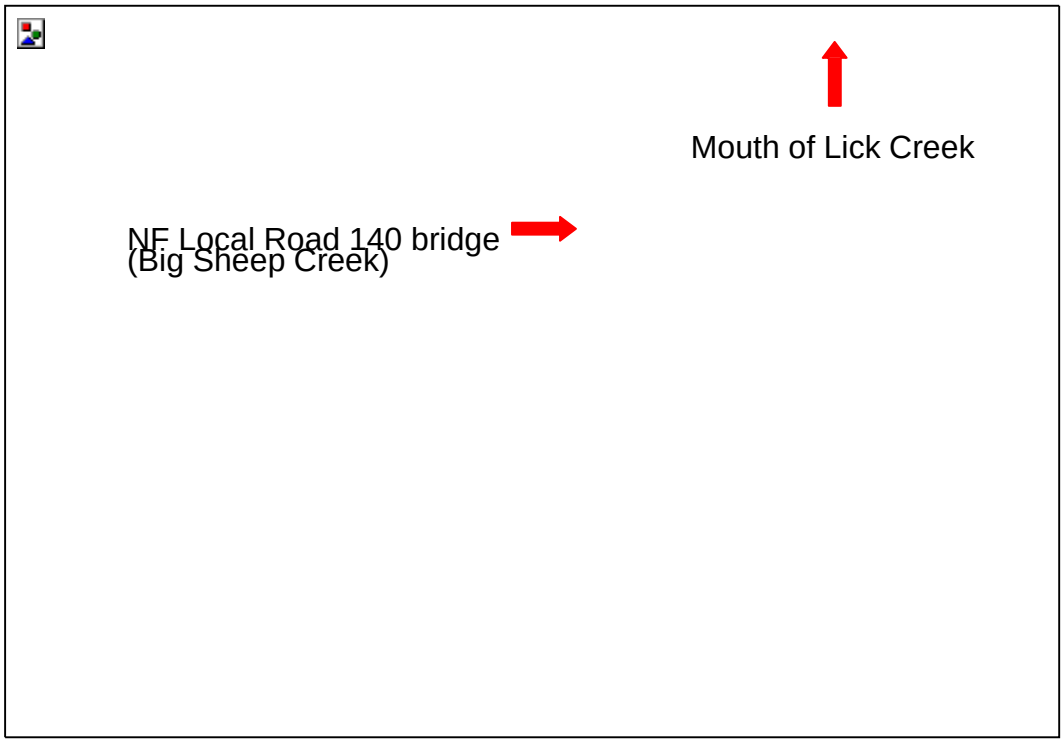
Appendix Figure F-65. Big Sheep Creek, mouth of Carrol Creek.



Appendix Figure F-66. Big Sheep Creek, mouth of Coyote Creek.



Appendix Figure F-67. Lick Creek, road crossing at Lick Creek Campground.



Appendix Figure F-68. Mouth of Lick Creek