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PHASE II WATER RENTAL PILOT PROJECT:SNAKE RIVER RESIDENT FISH AND WILDLIFE RESOURCES AND MANAGEMENT RECOMMENDATIONS ANNUAL REPORT 1994

Annual Report 1994

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PHASE II WATER RENTAL PILOT PROJECT: SNAKE RIVER RESIDENT FISH AND WILDLIFE RESOURCES AND MANAGEMENT RECOMMENDATIONS

ANNUAL REPORT 1994

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Executive Summary

The Idaho Water Rental Pilot Project was implemented in 199 1 as part of the Non-Treaty Storage Fish and Wildlife Agreement between Bonneville Power Administration and the Columbia Basin Fish and Wildlife Authority. The goal of the project is to quantify resident fish and wildlife impacts resulting from salmon flow augmentation releases made from the upper Snake River Basin.

Phase I summarized existing resource information and provided management recommendations to protect and enhance resident fish and wildlife habitat resulting from storage releases for the improvement of anadromous fish migration.

Phase II includes the following: 1) a summary of recent biological, legal, and political developments within the basin as they relate to water management issues, 2) a biological appraisal of the Snake River between American Falls Reservoir and the city of Blackfoot to examine the effects of flow fluctuation on fish and wildlife habitat, and 3) a preliminary accounting of 1993-94 flow augmentation releases out of the upper Snake, Boise, and Payette river systems.

Phase III will include the development of a model in which annual flow requests and resident fish and wildlife suitability information are interfaced with habitat time series analysis to provide an estimate of resident fish and wildlife resources.

Introduction

The Idaho Water Rental Pilot Project (Project) began in 1991 as a three-year study to examine the feasibility of renting surplus water from Idaho rental pools as a means of improving anadromous fish migration in the lower Snake River. Under terms of the 1990 Non-Treaty Storage Fish and Wildlife Agreement (NTSFWA) between Bonneville Power Administration (BPA) and members of the Columbia Basin Fish and Wildlife Authority (CBFWA), the Project may be integrated into the Columbia Basin Fish and Wildlife Program pending a positive evaluation of the Project's success in improving fish migration.

The purpose of the Project is to identify expected changes in habitat conditions and estimate resident fish and wildlife impacts in the upper Snake, Boise and Payette River systems resulting from storage releases for salmon flow augmentation. The Project goal is to quantify resident fish and wildlife impacts associated with reservoir level and streamflow fluctuations. Impacts to resident fish and wildlife resulting from annual requests for salmon flow augmentation will be quantified through time using habitat time series analysis. Losses or gains in fish and wildlife habitat will be expressed in weighted useable area (WUA) and habitat units (HUs).

Phase I of the Project was completed in October 1992 and included the identification of existing resident fish and wildlife resources in the upper Snake River Basin, habitat conditions, management recommendations, and water release strategies designed to protect or enhance resident fish and wildlife and their resources.

Phase II began in February, 1993 and focuses on a biological appraisal of resident fish and wildlife habitat in the upper Snake River between American Falls Reservoir and the city of Blackfoot. The purpose of the biological appraisal was to gather fish and wildlife habitat information in a portion of the Snake River that had been dewatered in 1992 due to irrigation diversions. Additional fish and wildlife habitat data was needed in this reach to fill a data gap in resource information along the Snake River. Specific objectives of the biological appraisal were to map fish and wildlife habitat, develop habitat versus flow curves for several species of fish and wildlife, and validate the findings of an earlier Shoshone-Bannock flow study.

Water delivery requests for salmon flow augmentation from the upper Snake River Basin are made on an annual basis by the National Marine Fisheries Service (NMFS). In 1993, a total of 526,619 acre-feet (AF) of water was delivered from Water District 01 for salmon flow augmentation. The total contribution to salmon flow augmentation from the upper Snake River Basin, including Brownlee Reservoir, in 1994 was 786,720 AF. An estimated 428,120 AF of water was released from reservoirs in the upper Snake River Basin, and an additional 358,600 AF was released out of Brownlee Reservoir. A total of 330,287 AF was released past Milner Dam from April through August, 1994. The Boise River system contributed a total of 23,000 AF in 1993 for salmon recovery and 35,950 AF in 1994. A total of 130,000 AF was delivered to Brownlee Reservoir from the Payette River system in 1993. A total of 61,883 AF was released from the Payette system in 1994.

Background

Columbia Basin Fish and Wildlife Program

In 1980, the Northwest Electric Power Planning and Conservation Act (Act) was passed by Congress. The Act authorized the formation of the Northwest Power Planning Council (NPPC), a policy group made up of gubernatorial appointees from Montana, Idaho, Oregon and Washington. The Act directed the NPPC to develop a program to protect, mitigate and enhance fish and wildlife resources that have been adversely affected by the construction and operation of regional hydroelectric projects in the Columbia Basin.

The NPPC's Columbia Basin Fish and Wildlife Program (Program) was adopted in 1982 and stresses a comprehensive system-wide approach to rebuilding fish and wildlife resources in the Columbia River Basin. The focus of the Program is on anadromous fish "because of their social and economic importance to both the Northwest and the nation as a whole" (NPPC 1987). The Program has been amended in four phases to reflect changing ideas and developing knowledge about salmon and steelhead. The NPPC will integrate all the amendments into the existing fish and wildlife program.

Strategy for Salmon

The NPPC's Fish and Wildlife Program was amended in four phases, the first three of which comprise the Strategy for Salmon (NPPC 1992). The strategy is a "long-range plan to amend river operations, increase salmon productivity, repair salmon habitat and refine salmon harvests" (NPPC 1992). The fourth phase of the amendment process addresses resident fish and wildlife concerns. The Council's goal is to promote an ecosystem approach to protecting the resources of the Columbia River Basin. The Council (NPPC 1993) specifies its goals for resident fish and wildlife as the following:

> The program goal for resident fish is the recovery and preservation of the health of native resident fish injured by the hydropower system, where feasible, and mitigation for resident fish losses elsewhere in the system. [The wildlife program goal is] to achieve and sustain levels of habitat and species productivity in order to fully mitigate for the wildlife losses that have resulted from construction and operation of the federal and non-federal hydroelectric system.

Framework for Flow Augmentation

The Phase Two Amendments to the Program (NPPC 1991) set the framework for the concept of augmenting lower Snake River flows with storage water from the upper Snake River Basin to aid migrating Snake River spring chinook juveniles. For specific flow augmentation measures called for in phase two, refer to the Strategy for Salmon (NPPC 1992).

The state of Idaho developed a salmon recovery plan (Andrus 1990) in which flow augmentation was identified as a near-term recovery action for improving main stem passage of migrating juvenile salmon at the federal dams. The use of uncontracted storage space in U.S. Bureau of Reclamation (USBR) reservoirs in the upper Snake River Basin as well as the purchase or lease of contracted storage space in reservoirs above Brownlee Reservoir were interim flow augmentation measures identified in the recovery plan. These interim measures were to be implemented in combination with the drawdown of the four lower Snake River reservoirs. The state of Idaho believes that the most expedient way to recover threatened and endangered salmon stocks is to increase flow velocities in the lower Snake River through dam modification and **drawdown** of the lower Snake River reservoirs.

Idaho Water Rental Pilot Project

The Idaho Water Rental Pilot Project (Project) is part of and subject to the terms of the Non-Treaty Storage Fish and Wildlife Agreement **(NTSFWA)** between BPA and the Columbia Basin Fish and Wildlife Authority and is related to the Non-Treaty Storage Agreement between the United States and Canada. **The** Project encompasses three phases and is designed to examine the feasibility of renting surplus water from Idaho rental pools on a willing seller, willing buyer basis to improve anadromous fish migration in the lower Snake River below **Brownlee** Reservoir.

Phase I of the Project identified resident **fish** and wildlife resources in the upper Snake River Basin, estimated impacts, and provided management recommendations to protect and enhance those resources during the implementation of the Project. The Idaho Department of Water Resources **(IDWR)** Snake River hydrologic model (Robertson et al. 1991) was used in Phase I to generate an estimate of the future impacts of annual water rental releases on reservoir levels and **instream** flows.

Background information on pertinent Idaho water law, water rental pools, and 1991-92 water rental releases for salmon flow augmentation are included in Phase I Water Rental Pilot Project: Snake River Resident Fish and Wildlife Resources and Management Recommendations **(Riggin** and Hansen 1992).

The primary goal of Phase II of the Project was to fill data gaps in resident fish and wildlife habitat information on the Snake River above **Brownlee** Reservoir. The area between American Falls Reservoir and the city of Blackfoot was **dewatered** in 1992. General fish and wildlife habitat information in this area was lacking regarding the impacts of flow fluctuation upon habitat availability for various fish and wildlife species. A biological appraisal was conducted in 1993-94 to describe fish and wildlife habitat utilization and determine the relationship between flow fluctuation and habitat availability.

Phase III of the Project will focus on the development of a model in which annual flow requests and resident fish and wildlife habitat suitability information are interfaced to produce quantifiable impacts to resident fish and wildlife resources. The development of monitoring and evaluation criteria to determine the effectiveness of the Project in delivering water to **Brownlee** Reservoir for the improvement of anadromous fish migration will be included in Phase III.

Chapter 1: Recent Developments

The following is a brief synopsis of Columbia River policy issues that have developed since the completion of Phase I of the Water Rental Pilot Project.

Biological Opinion on 1993 Operation of the Federal Columbia River Power System

Improved salmon survival is central to the region-wide effort toward rebuilding salmon stocks. The operation of the Federal Columbia River Power System (FCRPS) by BPA, the Corps of Engineers (COE), and the USBR is assessed annually in consultation with NMFS. The 1993 Biological Opinion rendered a "no jeopardy" decision. "NMFS estimated the percentage of salmon killed during passage through the FCRPS in 1993 was 55 to 77 percent of the juvenile spring/summer chinook and sockeye; 81 to 92 percent of juvenile fall chinook; 33 to 41 percent of adult spring/summer chinook; 8 percent of adult sockeye; and 41 percent of adult fall chinook" (Bowler 1993).

Idaho Litigation

The Idaho Department of Fish and Game (IDFG) filed a lawsuit against NMFS in 1993 alleging its 1993 Biological Opinion failed to sufficiently protect the Snake River salmon runs. Judge Malcolm F. Marsh ordered the federal agencies to prepare a new plan for operating the federal hydroelectric system. Judge Marsh found that NMFS' use of the 1986-1990 baseline was arbitrary and capricious "because the agency failed to consider relevant facts such as the drought and low salmon run numbers during the base period". He also found the process to save salmon to be flawed because it is too heavily dependent on the status quo. The FCRPS has relied on minor adjustments when "the situation literally cries out for a major overhaul".

Columbia River System Operation Review

A comprehensive review of the Columbia River system began in 1990 prompted by the need to develop operating strategies that would better meet the needs of all river users. The System Operation Review (SOR) encompasses 14 Federal projects on the Columbia and lower Snake rivers. The intent of the review process is to coordinate future operations of the hydropower facilities in the Columbia River system and competing resource issues to provide the greatest benefit to the Northwest region.

The SOR includes the environmental analysis required by the National Environmental Policy Act (NEPA). Several Federal, state and local agencies and tribes are involved in the SOR. Ten work groups were organized based on river use and seven system operating strategies, each containing multiple options, were analyzed for the Environmental Impact Statement (EIS).

Detailed Fishery Operating Plan (DFOP)

The Detailed Fishery Operating Plan @FOP) was developed by the Columbia Basin Fish and Wildlife Authority (CBFWA) to address the impacts of the hydropower system upon remaining salmonid stocks and other wildlife in the Columbia River Basin. The DFOP supports the drawdown of the four lower Snake River and John Day reservoirs as a way to achieve the additional water velocities needed to move Snake River smolts downstream rapidly. The plan also discourages the removal of fish from the migration corridor and considers the transportation of juvenile migrants "a last resort alternative". The 1994-1998 operations plan presented in the DFOP includes provisions for upper Snake flow augmentation. Upper Snake River flow augmentation objectives for 1994 totaled 927,000 AF, with Brownlee Reservoir contributing an additional 347,000 AF. The plan for 1995-1998 increases the use of Brownlee

Reservoir to meet migration needs, particularly in low and below average water years. By 1998, the flow augmentation objective for the upper Snake River and Brownlee Reservoir totals 2,414,000 AF. The DFOP also calls for an accelerated schedule for drawing down the four lower Snake and John Day reservoirs to enhance smolt travel time.

Reservoir Biological Rule Curves

In its ecosystem approach to mitigation of resident fish and wildlife impacts resulting from the construction and operation of the hydroelectric system, the NPPC called for the development of reservoir biological rule curves in its Phase Four Amendments to the Fish and Wildlife Program (NPPC 1993). The identification of reservoir levels necessary to maintain or enhance fish and wildlife should be completed by December 1996.

Idaho Irrigation Water Conservation

The Idaho Irrigation Water Conservation Task Force (IIWCTF) was established in 1993 by Governor Cecil D. Andrus. The purpose of the task force was identified as the following:

> Review Idaho water law and current practices regarding irrigation water use efficiency and to recommend actions needed for economic growth, environmental protection, and social equity. (IIWCTF 1994).

Several issues were discussed by the task force and consolidated into four "issue papers":

1) What are the key incentives and practices for agricultural water conservation in Idaho?
2) What does Idaho water law provide concerning water conservation and what changes are needed?
3) What are the impacts and benefits that would result from water gained through irrigation water conservation efforts?
4) To what extent can a variety of water storage options and flexibility in the timing of water releases better satisfy the broad range of beneficial uses of Idaho's water?

Middle Snake Nutrient Management Plan

In 1990, the Idaho Division of Environmental Quality (IDEQ) designated the middle Snake River from Shoshone Falls to Ring Hill as water quality limited. The Clean Water Act requires states to prepare water quality management plans to mitigate water quality problems and establish Total Maximum Daily Loads (TMDLs) for segments of rivers identified as "water quality limited." The Draft Middle Snake Nutrient Management Plan is intended to meet the criteria of the Clean Water Act and serve in place of a TMDL. Further, "the Nutrient Management Plan includes compliance and monitoring strategies to determine the effectiveness of management actions and the achievement of water quality improvement objectives and targets" (IDEQ 1994).

Middle Snake Snail Recovery Plan

Five Snake River snails listed as either threatened or endangered are found in free-flowing reaches of the Snake River between American Falls Dam and C.J. Strike Reservoir or are associated with spring or spring-like riverine habitats (USFWS 1994). The listed snail species include the threatened Bliss Rapids Snail (family Hydrobiidae), the endangered Snake River Physa (*Physa natricina*), the endangered Banbury Spring lanx (*Lanx* sp.), the endangered Utah valvata snail (*Valvata utahensis*) and the endangered Idaho Springsnail (*Pyrgulopsis idahoensis*). In its 1994 Draft Snake River Aquatic

Species Recovery Plan, the U.S. Fish and Wildlife Service (USFWS) reports that hydroelectric development throughout the Snake River has directly affected the species through inundation of lotic habitats, isolation and segmentation of populations, and by affecting suitable shallow-water shoreline habitat from project-caused flow fluctuation. Recovery objectives include 1) preventing the extinction and/or further decline of extant colonies and habitat of the federally listed snails by eliminating or reducing known threats; and 2) collecting the basic information necessary to establish recovery criteria so that the listed species can be reclassified or delisted (USFWS 1994).

The USBR and Idaho Power Company furnished data on the effects of upper Snake River storage releases on the listed snails. Documentation includes 1) the Snake River stage/discharge before, during, and after the fall/winter upper Snake River water releases for salmon, 2) the results from collection and analysis of Snake River water quality samples taken from mid-October 1993 to mid-April 1994, and 3) the results from snail shell surveys in three known habitat areas immediately following completion of the water releases for salmon (USBR 1994a).

Snake River Adjudication and 1994 Water Legislation

The Swan Falls dispute and subsequent agreement have been described in numerous reports (see Riggin and Hansen 1992). The Snake River Basin water rights adjudication process resulted from the Swan Falls Agreement. Many prior decrees issued in general stream adjudications for tributaries in the basin failed to state the requisite elements of the water rights such as the place of use or the duty of water. The Snake River Basin Adjudication should establish these water rights and all previously unadjudicated claims with more certainty (Fereday and Creamer 1992).

House Bills 969 and 990 make several changes in the way the adjudication will proceed, including 1) removing the director of the IDWR as a party and redesignating him as a fact-finder for the court, and 2) rewriting the "presumption" and "accomplished transfer" statutes which protected water users who had expanded on their original permits and/or licenses without authorization. Such expansion and transfers are now considered to be in the local public interest, so long as no other valid water rights are impaired.

Prior Appropriation Doctrine

The "prior appropriation" doctrine was upheld by the Idaho Supreme Court in March 1994. Hagerman irrigators sued the IDWR in 1993 after an 1892 spring-fed water right failed to provide its decreed allotment due, in part, to groundwater pumping further up the aquifer. The recent drought and conversion to sprinkler irrigation have also contributed to recharge decline. Many of the permits for groundwater pumping have been issued since the 1950's and are junior to many of the earlier surface flow rights. The Supreme Court ruling held that the IDWR must administer groundwater and surface water conjunctively. The court ruling required the director of the IDWR to write a set of conjunctive management rules for surface and groundwater.

The director of the IDWR first imposed a moratorium on new groundwater development in 1993. The Idaho Legislature extended the moratorium 32 months until the end of 1997.

Aquifer Recharge

Understanding of the relationship between surface and groundwater is evolving as more studies are undertaken and as knowledge about the Snake River Plain aquifer increases. The Idaho Supreme Court ruling requiring conjunctive management of surface and groundwater and allocation of water strictly by the "prior appropriation" doctrine resulted in the Idaho Legislature passing several bills aimed at efforts to recharge the aquifer. Governor Andrus and the Idaho Legislature approved a plan in which 45,000 AF of water was diverted from the North Side Canal into an area northeast of Jerome, Idaho, Water for the recharge project was supplied by Idaho Power Company. The USBR purchased storage space held by the city of Pocatello and released the water not only to compensate the utility for the loss in revenues, but also to augment flow releases for salmon.

1994 Snake River Basin Storage Appraisal Study

The USBR initiated the Snake River Basin Storage Appraisal Study pursuant to the **NPPC's** Fish and Wildlife Program. The purpose of the study was to explore the potential for additional Snake River Basin storage dedicated to increasing the volume of regulated water supplies available to enhance lower Snake River flows for salmon migration. The USBR identified 414 potential storage sites in the Snake River Basin above Lower Granite Reservoir (**USBR** 1994b). The USBR also identified 11 dam sites that could provide water supplies for lower Snake River salmon flow augmentation.

Water Management Opportunities Within the Snake River Basin: Oregon and Idaho

The Snake River Basin Water Committee was formed in 1993 to evaluate the opportunities for providing at least one million AF of water per year through improved water management measures from the Snake River Basin in Oregon and Idaho. Opportunities to "remanage" surface and groundwater resources were identified to increase flows for the Salmon Recovery Program. The analysis was an appraisal-grade screening of opportunities designed to identify water management strategies that 1) result in additional water being made available, and 2) reroute existing flows through the hydrologic system. The analysis did not include an **in-depth** analysis of resident **fish** and wildlife impacts resulting from "remanagement" opportunities. Specific measures that result in additional water include vegetative removal, weather modification, and land fallowing strategies. Several opportunities that result from rerouting or changing the timing of existing flows include modified operation of Dworshak and **Brownlee** Reservoirs, changed operation of the Boise River system, **groundwater** management, and upper Snake River Basin changed operations (**Bookman-Edmonston** Engineering, Inc. 1994).

Water Rental Effectiveness

The Fish Passage Center (FPC) summarized the benefits of flow augmentation to salmon and steelhead. The FPC concluded that "flow augmentation in 1993 resulted in higher flows than occurred with flow augmentation in **1992"**, and "any flow augmentation will have a degree of benefit for the **fish** that are present at the time of flow augmentation. The same increment of flow augmentation will have a more dramatic effect at lower flows that at high flows" (**DeHart,** FPC, in memorandum of March 11, 1994). The FPC also reported that fish respond to total flow, so flow augmentation that results in higher flows for a longer period of time will result in the most successful downstream migration.

Chapter 2:
Biological Appraisal

Executive Summary

Phase II of the Water Rental Pilot Project (Project) began in 1993 as part of a continuing effort to examine the effects of salmon flow augmentation on resident fish and wildlife resources. The primary goal of Phase II was to conduct a biological appraisal of the Snake River between American Falls Reservoir and the city of Blackfoot. The objectives of the appraisal were to characterize fish and wildlife habitat availability at different flows on the Snake River and verify fisheries data collected in a previous study completed by **Bio/West,** Inc. for the Shoshone-Bannock Tribes.

The study area includes four miles of the Snake River located in southeastern Idaho. Natural flows are seasonally altered by upstream storage and flow management for irrigation and power production. Flow fluctuations can vary greatly during the irrigation season between April and October.

The study area supports a variety of wildlife species that depend on riparian forested habitat. One of the few remaining extensive cottonwood forests in Idaho is surrounded by agricultural and residential land use. The relationship between streamflow and fish and wildlife habitat availability was defined by aerial photo interpretation, habitat mapping, photo points, and water surface elevation and depth measurements at various transects.

The results of the biological appraisal indicate that fisheries habitat in the main channel of the Snake River is limited by high summer flows and increased flow velocities. Canada goose nesting habitat on islands and side channel mallard brood rearing habitat are limited by early summer decreases in flow.

Introduction

The Idaho Water Rental Pilot Project (Project) is a three-year study designed to identify resident fish and wildlife resources, issues, and concerns in the upper Snake River Basin associated with renting water to improve conditions for anadromous fish migration. As part of this study, resident fish and wildlife habitat data has been summarized and used to point out critical seasonal periods when changes in river flow or reservoir level are most likely to impact resident fish and wildlife resources (see Riggin and Hansen 1992). The overall goal of the Project is to predict resident fish and wildlife impacts and benefits under any flow regime. The development of a model in which annual requests for salmon flow augmentation are interfaced with habitat suitability curves is the most appropriate vehicle to quantify impacts to resident fish and wildlife resources. Habitat time series analysis may further guide resource managers in making recommendations to protect and enhance resident fish and wildlife resources.

The study area for Phase II of the Project is located on the Snake River in Bingham County, southeastern Idaho, between American Falls Reservoir and the city of Blackfoot. The Snake River drainage basin upstream of American Falls Reservoir includes portions of Idaho and northwest Wyoming. The terrain is relatively flat, and the elevation in the study area is approximately 4,425 feet mean sea level (msl). The river is highly braided, containing numerous islands and several side channels. Land use in the study area is typical of the southeast region of Idaho. Much of the land bordering the river in the study area is privately owned and agricultural. Access to the river for recreational use is limited by private ownership. The river is navigable by boat and access is located near Tilden bridge.

Between American Falls Reservoir and Blackfoot, flows in the Snake River gradually decline at the onset of the irrigation season. Average monthly flows at the Blackfoot gauge drop from approximately 12,400 cubic feet per second (cfs) May 31 to 2,200 cfs by October 15. The average base flow from August through February is approximately 3,000 cfs. Average monthly flows during the spring range from 5,000 to 12,000 cfs. Peak runoff usually occurs at the end of May.

Habitat types within the study area include forested riparian habitat, scrub-shrub/emergent wetlands, and upland habitat, including sagebrush/grassland, weedy/disturbed areas, and cropland.

The study area provides feeding, nesting, and rearing areas for waterfowl during the spring, summer, and fall. Canada goose, mallard, pintail, and mergansers are just a few of the waterfowl species observed in the study area. Herons, white pelicans, various nongame birds, bald eagles and other raptors use the riverine wetland habitat in the study area. Aquatic furbearers such as beaver and muskrat have bank den sites on the main channel, and extensive dam complexes on some of the side channels. Mule deer, raccoons and other mammals also frequent the area.

Specific objectives of Phase II included the following:

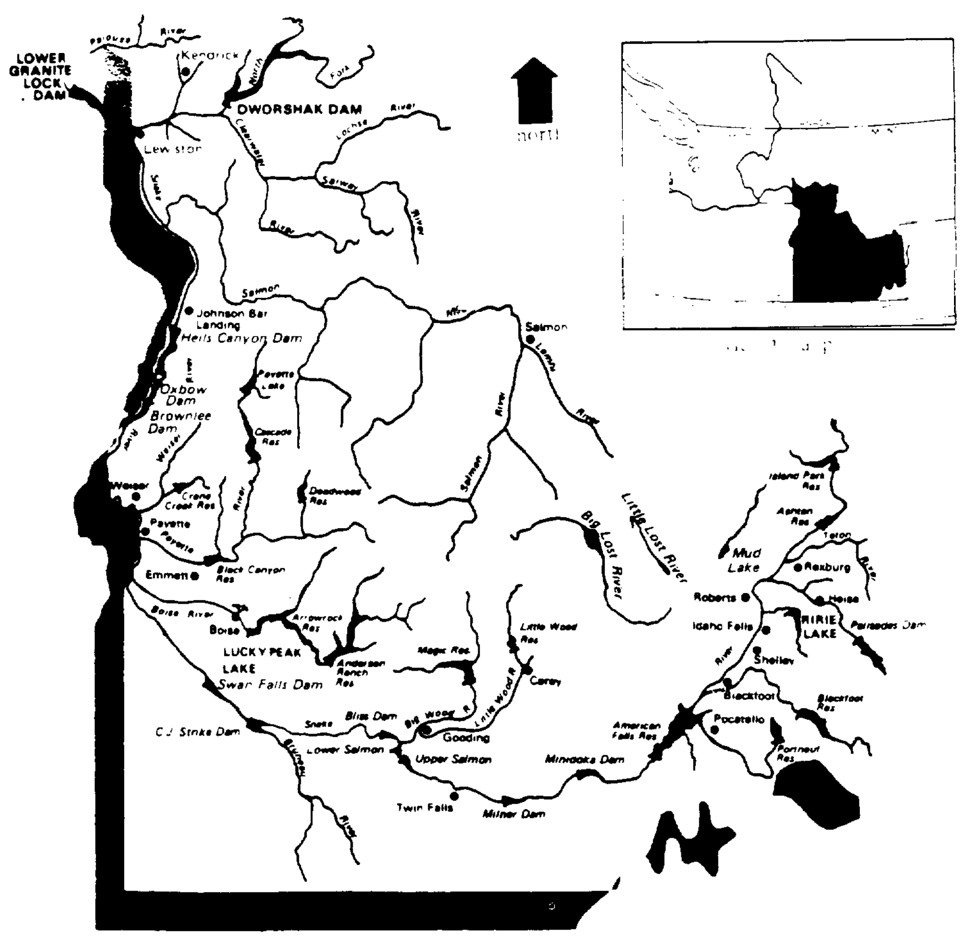
1) Compile hydrologic and physical information as well as life history, distribution and habitat requirements of species of interest.
2) Conduct habitat mapping and determine transect frequency and location for hydraulic data collection. Specific fish and wildlife species were predetermined.
3) Develop habitat suitability curves in which streamflow and wildlife habitat availability is characterized.
4) Verify the relationship between streamflow and fishery habitat identified by Bio/West, Inc. (Holden et al. 1987).

Study Area

A biological appraisal was conducted on the Snake River in the summer of 1993 for Phase II of the Water Rental Pilot Project. The following discussion briefly describes the resident fish and wildlife resources, and hydrologic and land use characteristics of the river and its corridor. A description is included of specific transect locations selected for a comparative analysis of the 1986 Shoshone-Bannock Instream Flow Study.

The Snake River is the principal tributary to the Columbia River and drains portions of Utah, Wyoming, Nevada, Oregon, and Washington (Figure 1). Twenty-five dams now block the main stem's flow. Basinwide, the river provides water to irrigate 3.8 million acres, accounting for much of Idaho's agriculture (Palmer 1991).

Figure 1. Snake River Main Stem

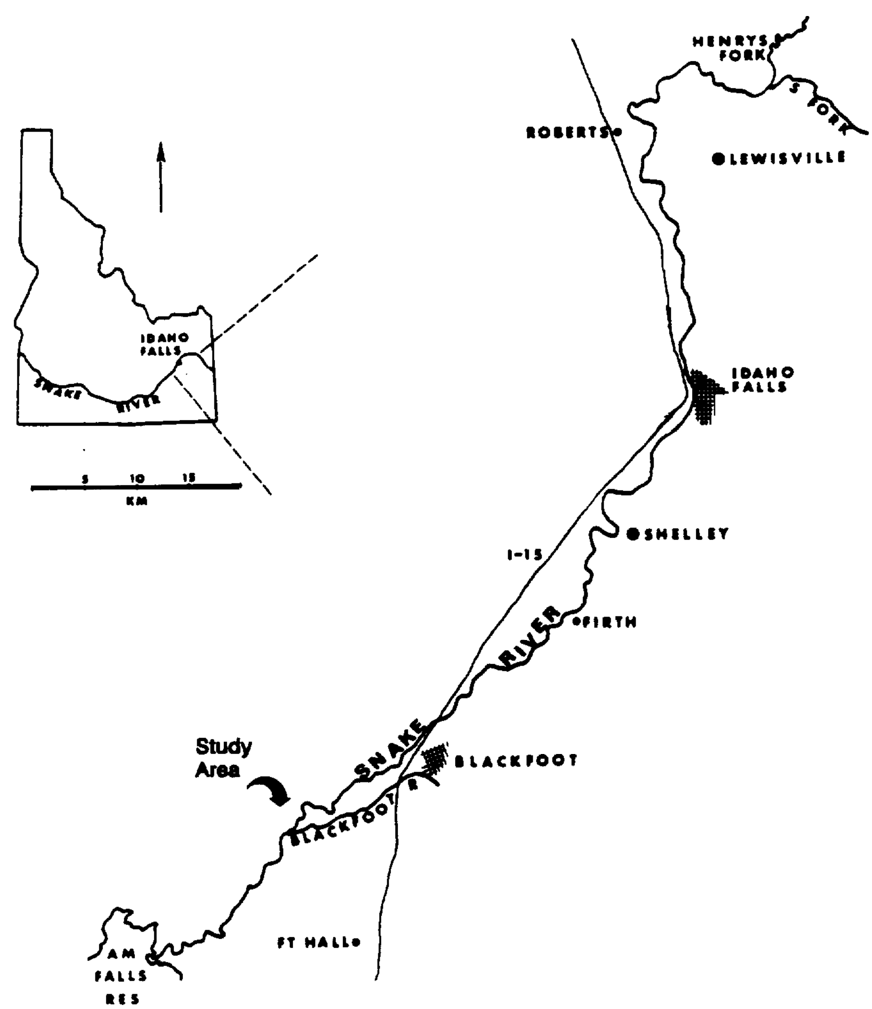


The Phase II study area is located in the southeastern part of Idaho and encompasses a heavily braided, **forested section** of the Snake **River from** river mile **(RM)** 755 downstream to **RM** 751, one-half mile from the confluence of the Blackfoot River (Figure 2). Elevation in the area drops from 4,425 feet msl to 4,410 feet msl. This section of the Snake River flows through the eastern Snake River Plain. The basalt flows that underlie the Snake River Plain comprise the Snake **River** Plain regional aquifer, one of the most productive aquifers in the United States **(FERC 1994).** Wii the study area, the river meanders in a southwesterly direction.

Hydrology

No tributaries flow into the Snake River withinthe study area. The Blackfoot River flows into the study area near **RM** 750. Several springs enter the river between Blackfoot and American Falls Reservoir, a few of which occur **within** the study area. The Watson Slough discharges into the river on the northwest bank near RM 752.

Figure 2. Snake River Study Area



American Falls Reservoir is located approximately fifteen miles downstream of the study area. American Falls Dam was built in 1927 and was replaced in 1977 by the American Falls Reservoir District. The reservoir is operated by the USBR as part of the Minidoka Project, which provides water for irrigation of land in the upper Snake River Basin (USBR 1993). Reservoir refill begins in October and continues through early spring.

The **Snake** River below Blackfoot was dewatered in 1992 as a result of mismanaged irrigation diversions. The minimum daily flow recorded at the **Blackfoot** gage from 1979 through 1993 was 35 cfs **on** April 28, 1992. The maximum daily flow was 28,300 cfs on May 18, 1984 (Table 1). Summary hydrograph data for the Blackfoot gage is included in Appendix A.

Table 1. Summary Hydrograph Data: Snake River at Blackfoot (1979-1933)

IDAHO DEPARTMENT OF WATER RESOURCES — SUMMARY HYDROGRAPH DATA

SNAKE RIVER AT BLACKFOOT (1979-93) — 13062500

***** MEAN DAILY FLOW BY MONTH *****

MONTH	MAXIMUM	YEAR	DAY	MINIMUM	YEAR	DAY	AVERAGE	COUNT
OCT	9510.	1983	27	95.	1980	2	2593.	465
NOV	8890.	1983	26	1240.	1987	1	3436.	450
DEC	9210.	1983	12	830.	1990	22	3555.	465
JAN	8870.	1984	28	1100.	1982	6	3637.	465
FEB	8580.	1984	1	980.	1982	7	3272.	424
MAR	19000.	1986	27	1060.	1988	20	4325.	465
APR	25100.	1986	26	35.	1992	28	6774.	450
MAY	28300.	1984	18	316.	1988	7	10164.	465
JUN	27200.	1984	11	618.	1989	29	9788.	450
JUL	20800.	1983	13	672.	1985	4	4972.	465
AUG	11000.	1984	1	342.	1980	29	2740.	465
SEP	9120.	1984	27	180.	1979	9	2459.	450

***** YEARLY FLOW DATA *****

MAXIMUM	YEAR	MINIMUM	YEAR	AVERAGE	COUNT
28300.	1984	35.	1992	4812.	5479

• [illegible] MONTHLY FLOW DATA • [illegible]

MONTH	MAXIMUM	[illegible]	MINIMUM	[illegible]
OCT	6093.	1983	871.	1981
NOV	7926.	1983	1810.	1981
DEC	8271.	1983	1535.	1988
JAN	7995.	1984	1398.	1989
FEB	5701.	1985	1553.	1989
MAR	13080.	1986	1489.	1988
APR	19447.	1986	1637.	1991
MAY	22077.	1986	1535.	1988
JUN	22813.	1984	2050.	1988
JUL	13145.	1983	1726.	1985
AUG	6544.	1984	1156.	1981
SEP	6099.	1984	726.	1981

***** MEAN ANNUAL FLOW DATA • [illegible]

MAXIMUM	YEAR	MINIMUM	YEAR
10265.	1984	2019.	1988

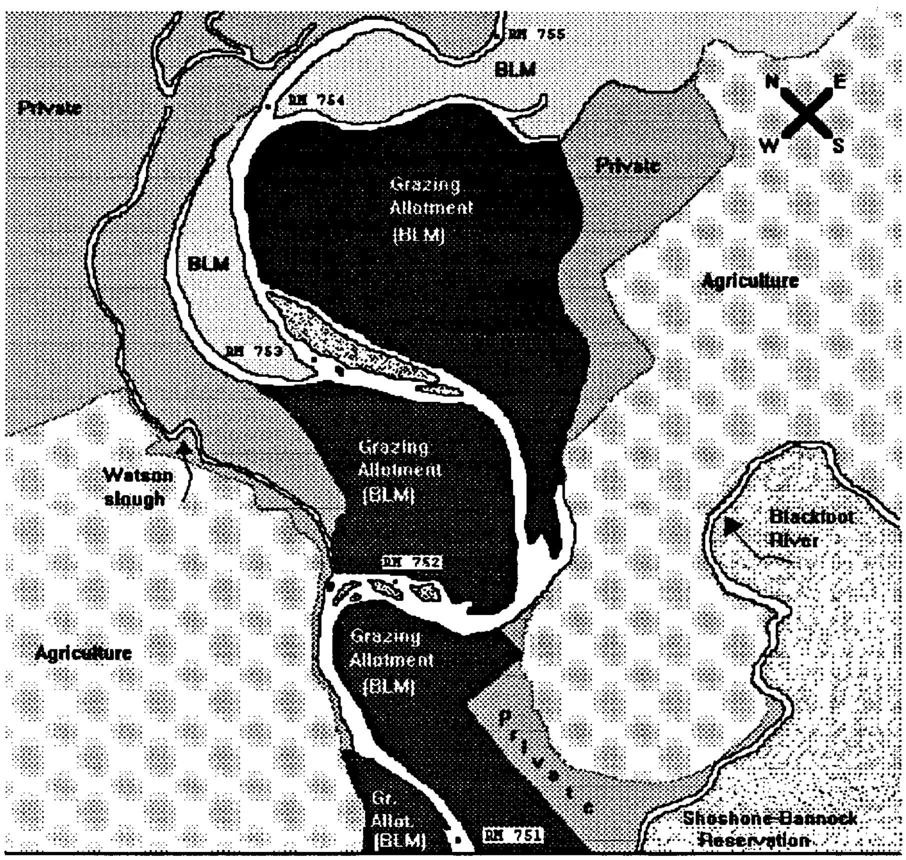
Land Use

The study area is located in Bingham County, a rural county where agriculture is the main industry. Bingham County is the leading producer of potatoes in the United States. The farms along the Snake River are well suited for potatoes and other crops, such as alfalfa, because of their rich, **well-**drained soils **(FERC** 1994). Both sides of the river are influenced by agriculture and grazing. Residential development borders the northwest side of the river, particularly toward the upper end of the study area. Much of the land along the Snake River is privately owned and farmed. Land bordering the southwest side of the Blackfoot River and extending to American Falls Reservoir is within the Shoshone-Batmock Tribes' **524,000-acre** Fort Hall Indian Reservation.

Public land within the study area is omitted land managed by the Bureau of Land Management **(BLM)** and comprises the Big Butte Resource Area. A total of 7,893 acres of omitted land lies in the Big Desert Planning Unit between Idaho Falls and American Falls Reservoir. Omitted lands are those lands **which** lie along the course of the Snake River that were excluded, or omitted from survey because of a major error in the location of the actual banks of the river when first surveyed in 1879-80 (McCarty 1982).

The BLM administers **grazing** allotments on most of the omitted lands **(Figure 3).**

igure 3. Snake River: River Mile 751 **to** 755



Mapped from 1:12,000 aerial photo at 662 cfs (9-22-88)

BLM records 'indicate approximately 233 head of cattle graze 729 acres either within or around the study area. All of the permits in this area specify spring or fall grazing; however, photo documentation indicates that grazing also takes place during the summer.

Vegetation

The BLM has completed some vegetation mapping of the Big Butte Resource Area, and predominant vegetation communities have been identified.

The dominant vegetation types in the study area are riparian and wetland types including forested wetlands and scrub-shrub/emergent wetlands, upland types including sagebrush/grassland communities, and cropland.

Much of the forested riparian habitat along the Snake River has been eliminated due to residential and agricultural development. Overstory varies from dense stands of mature cottonwoods (***Populus*** spp.) with lesser amounts of willows (***Salix*** spp.), boxelder (***Acer negundo***), alder (***Alnus*** spp.), and red-osier dogwood (***Cornus stolonifera***) in the upper half of the study area to a widely scattered overstory comprised of Rocky Mountain juniper (***Juniperus scopulorum***) in the middle to lower portion of the reach.

The understory and groundcover of the forested communities include younger overstory saplings as well as Wood's rose (Rosa ***woodsii***), golden currant (***Ribes aureum***), honeysuckle (***Lonicera*** spp.), serviceberry (***Amelanchier*** spp.), chokecherry (***Prunus virginiana***), stinging nettle (***Urtica dioicu***), black hawthorn (***Crataegus douglassii***), skunkbush sumac (***Rhus trilobata***), buckwheat (***Eriogonum*** spp.), vetch (***Astragalus*** spp.), and various grasses.

Scrub-shrub/emergent wetlands occur along the river on islands and gravel bars in the main channel and along the side channels. These wetland areas are primarily below the high water mark and are flooded during higher spring flows. Cottonwood saplings, willow, and other shrubs comprise the woody species found in scrub-shrub/emergent wetlands. Grasses such as reed canary grass (***Calamagrostis*** spp.), bluegrass (***Poa*** spp.) and other perennial and annual herbaceous vegetation are present.

At flows less than 5,000 cfs, cattle can access most of the islands in the study area. Cattle grazing has impacted many of the scrub-shrub/emergent wetland areas, particularly on the northwest bank near RM 751 and on the island near RM 753 (Figure 3). These wetland areas are important not only because they provide bank stabilization and protection for fish and wildlife, but also because they are becoming increasingly uncommon in Idaho.

The sagebrush/grassland community is in a relatively isolated portion of the study area between cropland and a dense stand of riparian forest near a side channel toward the upper end of the reach. Plant species occurring in this area include big sagebrush (***Artemesiu tridentutu***), threetip sagebrush (***Artemesiu tripurtitu***), gray rabbitbrush (***Chrysothamnus nauseosus***), giant wildrye (***Elymus cinereus***), squirreltail (***Situnion hystrix***), and needle-and-thread grass (***Stipa comutu***).

Croplands have replaced sagebrush/grassland communities throughout the region. Ditch-irrigated fields provided some cover strips for wildlife in the past, but the modern irrigation systems in the area produce cropland monocultures which do not contribute to natural diversity. Agricultural lands can, however, supply considerable amounts of forage for waterfowl. Wintering ducks utilize grain and residue; geese use both wheat and potato fields (USBR 1993).

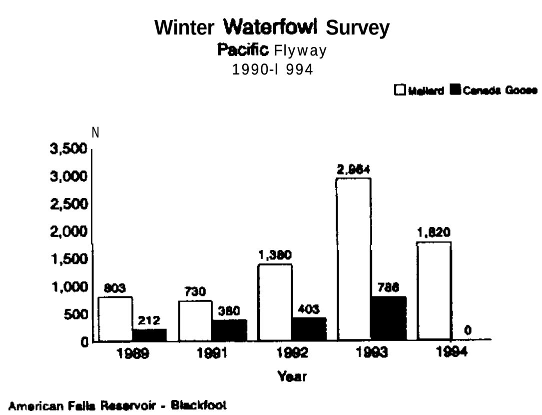
Wildlife Resources

Much of the terrestrial habitat surrounding the study area has been converted to agricultural use. The remaining riparian and wetland habitats along the Snake River provide critical protection for a variety of wildlife species. These species depend on wetland and riparian habitats along the Snake River for food, cover, and reproduction.

The study area is particularly important to waterfowl and upland game birds. The islands and side channels provide significant habitat for waterfowl using the Pacific Flyway.

Mallards and Canada geese comprise the majority of birds **censused** during the annual Winter Waterfowl Survey. Between American Falls Reservoir and Blackfoot, mallards have consistently outnumbered Canada geese over the last five years (Figure 4).

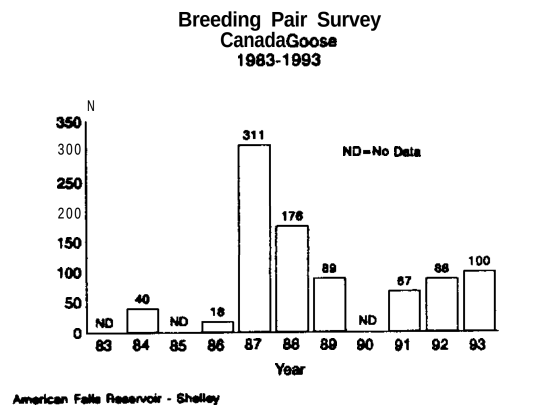
'igure 4. Winter Waterfowl Survey



However, mallards have declined steadily for at least the last 15 years. The population is now well below the USFWS' desired level nationwide. This decline is thought to be the result of recurring drought conditions in important nesting areas in southcentral Canada **(IDFG** 1990).

The nesting population of Canada geese between American Falls Reservoir and Shelley, 25 miles upstream of the study area, has ranged **from** 18-3 11 pairs since 1983 (Figure 5). The IDFG and the Blackfoot Chapter of Ducks Unlimited have installed 20 goose platforms in or near the study area. Five platforms are located on a side channel near RM 755 and have not been utilized in recent years. Goose nesting success requires a secure nest site away from predators and human disturbance. Studies (Parker 1973 and Kjelstrom 1992) indicate that lower water surface elevation causes slack or shallow water and possible formation of land bridges between many of the islands and riverbanks. These conditions provide predators

Figure 5. Breeding Pair Survey



easy access to the islands, endangering birds nesting there. Winter conditions in the study area discourage any use by waterfowl because the river is iced over. Most of the waterfowl are found near the head of American Falls Reservoir where numerous natural springs and several creeks converge to create open water areas (Meints, IDFG, pers. **comm.** March 25, 1994). The northern arc of American Falls Reservoir has bee n nominated as part of the Western Hemisphere Shorebird Reserve Network (Melquist **in** USBR **1993).** The American Falls Reservoir complex also provides habitat for colonial nesting water birds. Nesting colonies are found near the **mudflats** at the upper end of the reservoir **(Trost in** USBR 1993). Small and moderate-sided **mudflats** associated with reservoir **drawdown** may attract some shorebirds, especially those that often feed in water (Taylor and Trost 1992). Game birds such as ring-necked pheasant and wild turkey are present within the study area.

Wild turkeys are not native to Idaho but were first transplanted here in 1961. Since then, more than 100 transplant efforts have been conducted statewide. The IDFG hopes to establish turkey populations in all suitable habitat, and produce a harvest of 1,000 birds by 1997 (IDFG 1994). Turkeys were first introduced by the IDFG along the Snake River below Blackfoot in 1982. This initial release numbered 36 turkeys of the Rio Grande strain *(Meleagris gallopavo inter-media)* (USBR 1993). Fourteen Merriam turkeys *(Meleagris gallopavo merriami)* were released between Tilden Bridge and Blackfoot in 1990 (Meints, IDFG, pers. comm. August 9, 1994). A total of 64 Merriam turkeys were released between Tilden Bridge and Blackfoot in January 1994. Of this amount, 10 birds were equipped with radio transmitters to determine area of use and habitat preferences (Meints, IDFG, pers. comm. March 14, 1994). The current population is estimated to be between 100 and 150 birds. (Hemker, IDFG, pers. comm. March 11, 1994). The IDFG estimates that 5 birds per year are taken between Blackfoot and American Falls Reservoir, and 2-3 birds per year are taken within the study area (Hemker, IDFG, pers. comm. March 11, 1994).

Forested and scrub-shrub/emergent wetlands along the Snake River provide critical habitat to a variety of nongame bird species. Some of the nongame birds observed in the study area include bank swallow *(Riparia riparia)*, American robin *(Turdus migratorius)*, yellow warbler *(Dendroica* petechia), and black-billed magpie *(Pica pica)*.

Several nongame bird species that depend on riverine habitat have been observed in the study area. These include great blue heron *(Ardea herodias)*, belted kingfisher *(Ceryle alcyon)*, killdeer *(Charadrius vociferus)*, double-crested cormorant *(Phalacrocorax auritus)*, and herring gull *(Larus argentatus)*.

White-tailed deer *(Odocoileus virginianus)* and mule deer *(Odocoileus hemionus)* have been observed in the riparian corridor within the study area. The 1993 Unit 68A Deer Survey Summary (Table 2) indicates that mule deer comprise the majority of the deer in this area.

Table 2. 1993 Unit 68A Deer Survey Summary

Mule Deer	Count
Antlered	20
Antlerless	171
Subtotal	**191**
White-Tail Deer	
Antlered	0
Antlerless	11
Subtotal	**11**
Total	202

Source: Daryl Meints, IDFG, personal communication, 6-10-94.

Approximately 400-500 deer are found in Unit 68A with an unknown number moving off the desert and into the river corridor during the winter (Meints, IDFG, pers. comm. July 12, 1994). The forested and scrub-shrub/emergent wetlands supports a variety of mammals such as raccoon *(Procyon lotor)*, striped skunk *(Mephitis mephitis)*, coyote *(Canis latrans)*, red fox *(Vulpes vulpes)*, and short-tailed weasel *(Mustela erminea)*.

Aquatic furbearers are numerous in the study area. Species include muskrat *(Ondatra zibethicus)*, mink *(Mustela vison)* , and beaver *(Castor canadensis)* . The majority of beaver observations have occurred in the upper portion of the study area near RM 755. The riparian forest provides an ample food supply as beavers select cottonwood, willow and alder as their preferred food (Allen 1982). Several bank dens and food caches have been observed on the main channel as well as on the side channel near RM 755. An extensive dam/pond complex can be found in an isolated section of the side channel. Beavers are better able to control water depth and stability in this area because it is less **influenced** by flow fluctuation and higher velocities in the main river channel.

Threatened and Endangered Species

There are several endangered, threatened, or candidate species that occur along the Snake River from the mouth of American Falls Reservoir to Blackfoot (Table 3) (Kaltenecker, ICDC, pers. comm. January 23, 1993).

Table 3. Threatened, Endangered, and Candidate Species Between American Falls Reservoir and Blackfoot

Species	Category
Bald eagle	Endangered
Bliss Rapids snail	Threatened
Pygmy rabbit	Candidate
Black tern	Candidate
Wolverine	Candidate
Trumpeter swan	Candidate
Eared grebe	Protected Nongame
Western grebe	Protected Nongame
Clark's grebe	Protected Nongame
Forster's tern	Protected Nongame
Yellow-billed cuckoo	Peripheral Species
American white pelican	Priority Species

Source: Moseley, R. and C. Groves, 1992.

The bald eagle (*Haliaeetus leucocephalus*) is listed as an endangered species. However, it is currently being considered by the USFWS for downlisting to threatened status. The Bliss Rapids snail (undescribed species) is listed as a threatened species. Candidate species for possible listing as threatened or endangered include the pygmy rabbit (*Brachylagus idahoensis*), black tern (*Chlidonias tiger*), wolverine (*Gulo gulo*), and trumpeter swan (*Cygnus buccinator*). *The Idaho* Conservation Data Center (ICDC) does not track site-specific occurrences of pygmy rabbit. Because pygmy rabbits can occur in any big sagebrush habitat, they are thought of as "possibly" occurring in the study area. In addition, it is questionable that wolverine **"occurs" in this area because there has only been a** single probable sighting (Stephens, IDFG, pers. comm. July 11, 1994). State protected species include *the eared grebe (Podiceps nigricollis)*, western grebe *(Aechmophorus occidentalis)*, Clark's grebe (*Aechmophorus clarkii*), forster's tern (*Sterna forsteri*), and yellow-billed cuckoo (*Coccyzus americanus*). A flock of approximately 20 white pelicans (*Pelicanus erythrorhynchos*) have been observed feeding in the study area but it is **unknown** if they use the area for nesting.

The bald eagle has m-inhabited most of its historic range in the northwest United States (FERC 1994). Bald eagles occur in the American Falls area primarily as winter migrants (USFWS 1992 <u>in</u> USBR 1993). Bald eagles use the South Fork Snake River below Palisades Dam on a year-round basis. Several forested wetland areas provided good bald eagle nesting and perch sites in the South Fork prior to the construction of the dam (Sather-Blair and Preston 1984). Several factors have threatened bald eagle populations including logging, overgrazing of cottonwood saplings, agricultural development, reduced food supply, pesticide contamination, proposed dams, illegal hunting, recreational disturbance, strychnine use, and lead poisoning (FERC 1994). Maintaining wintering populations and winter food supply, protecting roosting areas from logging and human disturbance, and establishing a nesting population are key management objectives within the Snake River Floodplain Management Zone (USFWS 1992 <u>in</u> FERC 1994).

Bald eagle observations from 1989-1994 on the Snake River between American Falls Reservoir and Shelley, approximately 25 miles northeast of the

Table 4. Summary of Mid-Winter Bald Eagle Surveys Conducted from 1990-1994 between American Falls Reservoir and Blackfoot

Year	Adults	Immatures	Unknown	Totals
1990	26	16	0	42
1991	26	12	0	38
1992	42	15	0	57
1993	34	13	1	48
1994	48	25	0	73

Source: IDFG midwinter bald eagle field observations completed in coordination with the BLM. Provided by Daryl Meints, IDFG, Pocatello, ID.

study area, are summarized in (Table 4).

The study area contains one nesting pair of bald eagles near Ferry Butte between RM 751 and 752 (Figure 6). Nesting activity in this area is monitored by the IDFG. Since 1989, the Ferry Butte bald eagle nest has produced 5 fledglings (Meints, IDFG, pers. comm. June 11, 1994). Between 1989 and 1991 the pair was unsuccessful in producing any young. One fledgling was produced in 1992 and 1993. The pair using this territory built a new nest in the fall of 1993, approximately 100 feet from the southeast side of the river. The pair produced two fledglings in 1994.

Fisheries Resources

The IDFG manages the Snake River below Blackfoot for cutthroat trout *(Oncorhyncus clarki)*, rainbow trout *(Oncorhyncus mykiss)*, brown trout (Salmo *trutta), and* mountain whitefish *(Prosopium williamsoni)* (IDFG 1991). A 1986 fisheries survey on the Snake River completed by Bio/West, Inc. (Christ and Holden) for the Shoshone-Bannock Tribes indicates that other fish species include yellow perch *(Perca flavescens)*, black bullhead *(Ictalurus melas)*, various suckers, carp *(Cyprinus carpio)*, Utah chub *(Gila atraria)*, redside shiner *(Richardsonius balteatus)*, longnose dace *(Rhinichthys catactae)*, speckled dace *(Rhinichthys* osculus), and fathead minnow *(Pimephales prom&as)*.

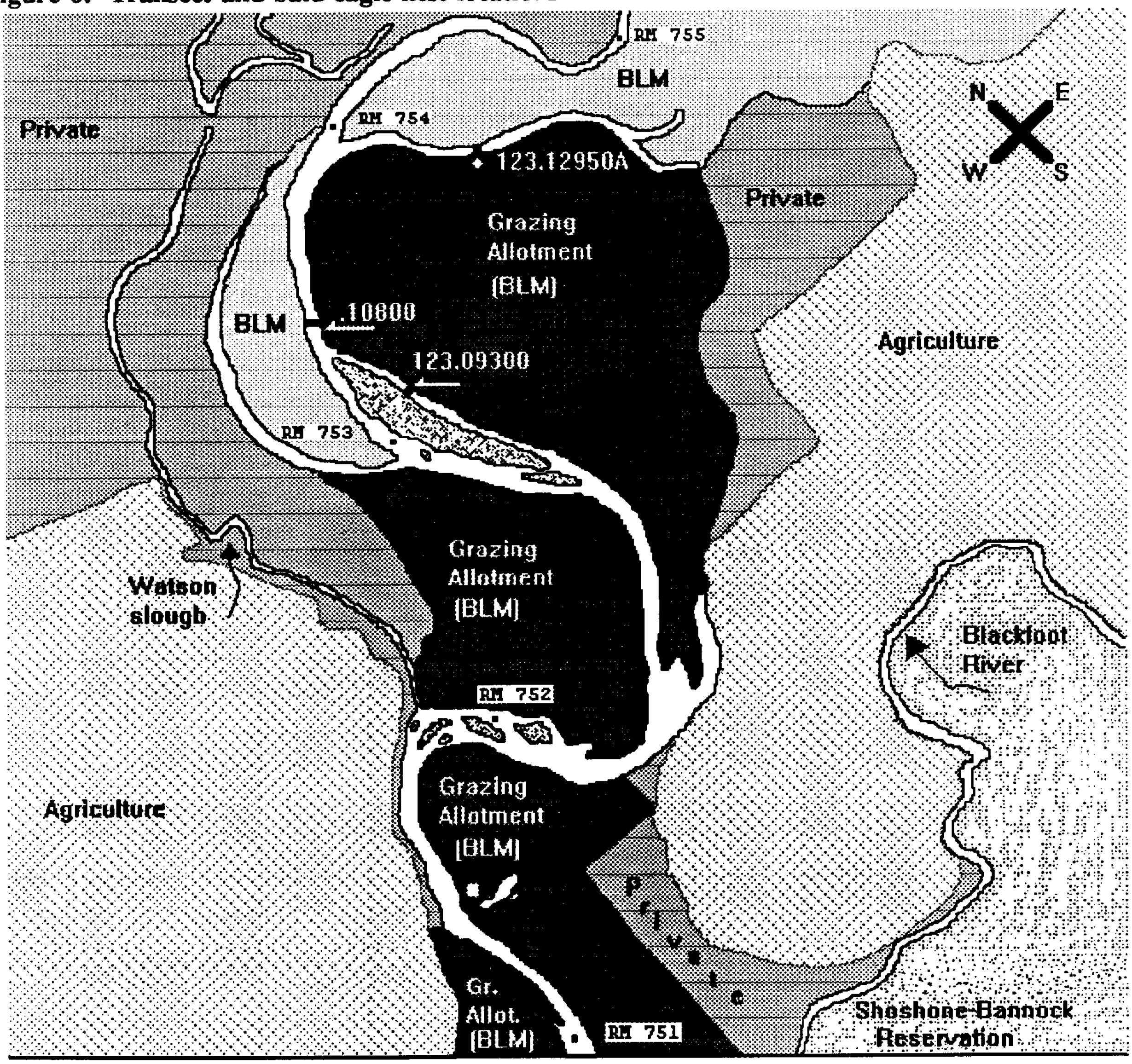
Electrofishing and creel surveys conducted in 1986 and 1987 throughout the Snake River between American Falls and the confluence of the Henrys Fork and South Fork Snake indicated that whitefish was the predominate game species, and hatchery trout comprised the majority of trout caught (Lukens 1988b). Relative species composition was 70% rainbow, 19% brown, 8% hybrid rainbow/cutthroat, and 2.4% cutthroat. Thirty percent of the rainbow trout were classified as wild. A creel survey conducted between June and November 1987 showed that the catch rate below Tilden bridge was twice that above the bridge. Anglers caught 0.16 trout per hour from Tilden bridge downstream to American Falls Reservoir and 0.08 trout per hour above the bridge to Blackfoot (Lukens 1988b).

Lukens (1988b) concluded that recruitment was limiting in the Snake River between American Falls Reservoir and Blackfoot. Several irrigation diversion dams upstream have slowed water velocities, presumably increased water temperatures, blocked gravel recruitment, inundated spawning gravels and caused accumulation of fine sediment. After an intense stocking program was completed in 1991 and 1992, the IDFG conducted similar surveys in 1992 to determine whether a marked improvement in the fishery had occurred. Relative species composition of the catch was 92% hatchery rainbow, 4% wild rainbow, 1.4% brown, 1.1% hybrid rainbow/cutthroat, and 0.7% cutthroat trout. The catch rate above American Falls Reservoir increased from 0.16 to 0.35 trout per hour.

Site Descriptions

Three transects were selected to represent the main channel, a medium side channel, and a small side channel of the Snake River (Figure 6).

Figure 6. Transect and bald eagle nest locations



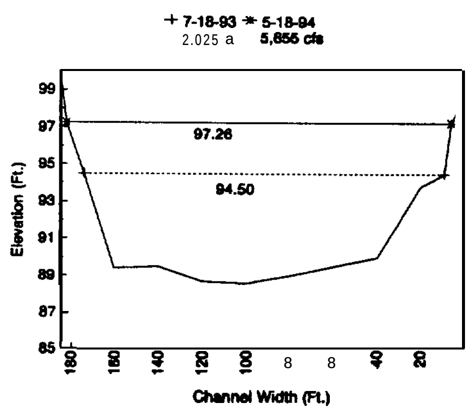
Mapped from 1:12,000 aerial photo at 662 cfs (9-22-88)

Station .10800

Station .10800 was selected as representative of the main channel on the Snake River (Figure 7). The northwest bank is steep, vegetated and unstable. The southeast bank is well vegetated and stable.

Vegetation is comprised of 75 % overhanging shrubs and 25% grass. The habitat is described as a deep run with a substrate composed of pebbles, cobble, and gravel covered with fine sediment.

igure 7. Main Channel: .10800

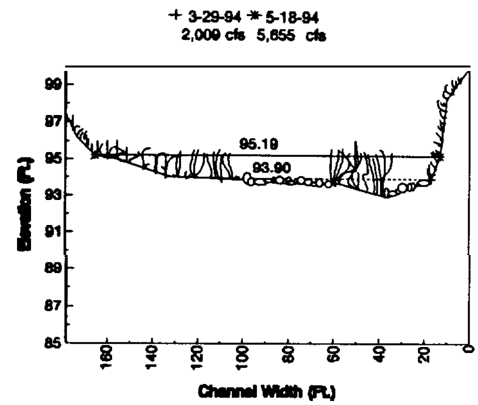


Station 123.12950A

Station 123.12950A represents a medium side channel on the Snake River (Figure 8). This side channel is located in the upper section of the study area and is relatively undisturbed. The northwest bank is gently sloped, stable, and well vegetated with grasses. The southeast bank is also stable and well vegetated but is considerably steeper.

Habitat in this side channel is described as a deep, slow glide. The channel flow is constricted at this transect, forming either a small riffle or restricting passage further upstream depending on flow level. Substrate is composed of gravel with some areas embedded with fine sediment. Deeper areas contain primarily mud and silt.

igure 8. Medium Side Channel: 123.12950A

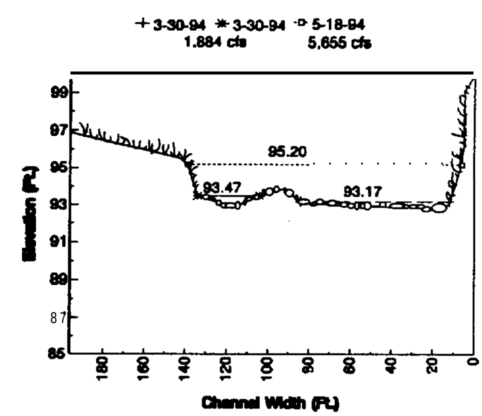


Station 123.09300

Station 123.09300 represents a small side channel (Figure 9). This transect was located on the southeast side of an island that splits the main channel of the Snake River. Both banks are gently sloped, stable and well vegetated. Vegetation consists of 90% grass and 10% overhanging trees.

This side channel consists of submerged grasses and cold water springs. The substrate is composed of gravel and cobble. The habitat at this station is described as a shallow, fast run and riffle.

'igure 9. Small Side Channel: 123.09300



Methods

The biological appraisal in this study was designed to 1) characterize fish and wildlife habitat on a section of the Snake River where such information was incomplete, and 2) verify the relationship between streamflow and fishery habitat identified by Bio/West, Inc. (Holden *et* al. 1987).

Bio/West, Inc. conducted an instream flow analysis of the Snake River above American Falls Reservoir for the Shoshone-Bannock Tribes. Bio/West, Inc. used the Instream Flow Incremental Methodology (IFIM) developed by the U.S. Fish and Wildlife Service National Ecology Center. IFIM attempts to quantify the amount of potential fish habitat available for each life history stage of a species as a function of streamflow. This method is intended to be used as a decision making tool and is specifically tailored to demonstrate the impact of incremental changes in streamflow on fishery habitat.

The river segment between American Falls Reservoir and Blackfoot was chosen based on several criteria, including importance to fish and wildlife, accessibility, and flow regime. Reconnaissance of the study area was conducted during March 1993 by IDFG personnel in order to adequately describe the scope and difficulty of the study. Boat ramps and access sites were evaluated. In June 1993, IDFG personnel toured the study area by boat to identify critical areas such as trout spawning and rearing areas, waterfowl nesting and brood rearing sites, and boating passage areas.

A complete set of 1:24,000 scale U.S. Geological Survey (USGS) topographic maps and 1:12,000 scale aerial photographs supplied by the U.S. Army Corps of Engineers (ACOE) were analyzed to determine gross macrohabitat delineations, total river mileage, major tributary inflow, and channel character. The river was classified into habitat types which were recorded on topographic maps.

Transects were established every 300 feet to describe the entire study area. After all the data were collected, three transects were selected to represent main, medium and small side channels similarly identified in the Bio/West, Inc. study.

In order to describe fish and wildlife microhabitat characteristics, water surface elevation, depth, velocity, cover, and substrate information was collected. Cover and substrate criteria were described but were not used in the quantitative analysis.

Water surface elevations were measured using a Leitz B2A 30-power transit mounted on a tripod perpendicular to the river flow. All transects were surveyed at least twice in order to compare habitat availability during various flow regimes. Dense vegetation, the presence of several islands, and the river's meandering quality required the establishment of relative benchmarks (elevation = 100 ft.) at each transect to facilitate efficient and timely data collection. Therefore, the transects are independent of one another and are not tied to a known elevation.

The depth and velocity suitability curves utilized by Bio/West, Inc. were used in this study (Appendix B). A tagline consisting of one 600-foot piece of parachute chord marked in lo-foot increments was used to mark each transect so that depth measurements could be taken. Channel depth information in wadeable portions of the river was collected using a 25-foot graduated stadia rod. To collect depth information in un-wadeable portions of the river, field personnel used a 14-foot inflatable Achilles equipped with an outboard jet unit, a SI-TEX AVS-107 video sounder, and transom mount transducer.

Discharge data presented in this report reflect the mean daily flow measured at the Blackfoot gage (Appendix A). Flows were not measured in the side channels, so those flows discussed refer to the main channel discharge. The percentage of total flow carried by the side channels was based on an analysis of photos taken over a range of flows.

Velocities, therefore, are estimates and were calculated using the formula:

$$V = Q/A,$$

where V = velocity (m/s), Q = discharge (m^3/s), and A = cross-sectional area of the water (m^2) (Gordon et *al.* 1992).

For flow information during the nesting season, March l-May 3 1, hourly flow fluctuations were compiled from quarter-hour gage data in order to create a 24-hour hydrograph for each month of the nesting season (Appendix C). A discharge of 2,000 cfs was common from June through August, 1993. Biologists returned to the study area in spring 1994 to collect high flow measurements. Observed flows ranged from 800 to 19,000 cfs. Flows of 5,655 cfs and approximately 2,000 cfs were used in the analysis.

Bank vegetation and cover were mapped and described from the bank and by boat. Macrohabitat was mapped and photographed by boat several times throughout the field season to describe the availability of habitat at various flow levels. Standardized photo points were set up on the tripod at each transect.

Where visibility was not limiting, substrate was determined by snorkeling upstream from one transect to the next. Low flow conditions facilitated the identification of substrate in most of the side channel areas. Substrate in deep areas of low visibility and high velocity were estimated based on channel characteristics. Substrate categories followed the modified Wentworth classification system and included cobble, gravel, pebble, silt, and clay.

The amount of wetted perimeter for each flow was calculated to determine the percent change in available habitat at different flows. Wetted perimeter was determined using a digitizing planimeter.

Goose nest searches were conducted on all islands within the study area regardless of size. Mainland searches were confined to the goose platforms on the medium side channel in the upper portion of the study area. The methodology described by Bruggink *et.* al. (1994) was used to search the islands for nests. Four people spaced approximately 50 meters apart systematically walked the islands in March 1994.

Assumptions

Assumptions made during the development of the biological appraisal include the following:

1) Most of the habitat needs for breeding waterfowl occur within 100 feet of water's edge.
2) Geese nest in close proximity to the shoreline with strong preference to nesting on islands.
3) Duck nesting habitat in upland areas is not affected by flow fluctuations.
4) Trout spawning and rearing occur in side channels and adjacent spring areas.
5) Juvenile trout migrate to the main channel for rearing as flows recede and dewater side channels.
6) Channels have similar characteristics and/or are similar in size to those in the Bio/West, Inc. study.

Target Species

The target species selected in the Bio/West, Inc. study (rainbow trout, cutthroat trout, and whitefish) were also used in this study. Canada goose, mallard, and beaver were selected as target species because they are common in the area and are believed to be impacted by changes in flow.

Results and Discussion

Considerable changes were noted in the availability of suitable habitat as flows changed in all three Snake River **channels.** The main **channel** exhibited a 1.8 ft. change in mean depth as flow increased **from** 2,025 **cfs (Figure 10A)** to 5,655 **cfs** (Figure **10B).** Velocities at both flows were limiting for rainbow, cutthroat and whitefish. **Downed** cottonwoods and root wads embedded in the northeast bank became submerged at higher **flows.**

Figure 10a.

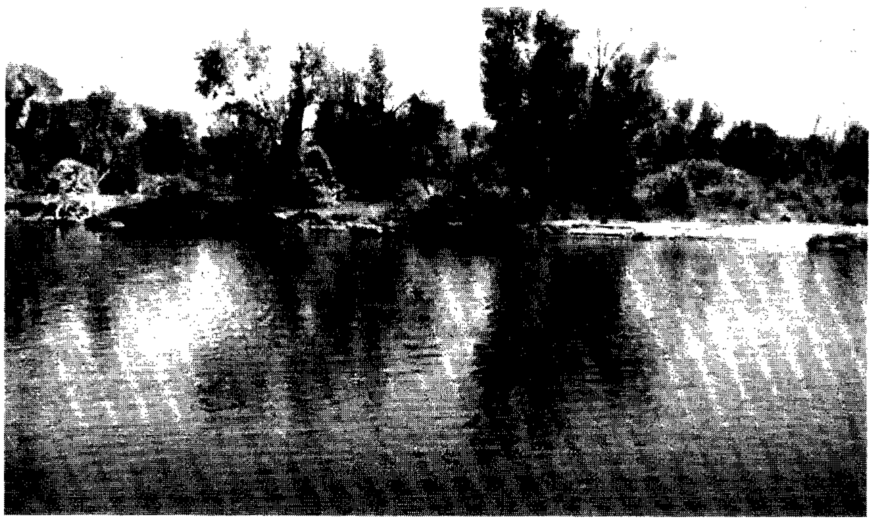


Figure 10b.

The medium side channel shows considerable change in the availability of suitable habitat for fish and wildlife. At a flow of 2,009 cfs in the main channel, passage in the side channel is cut off, separating the side channel into an upper and lower section (Figure **11A).**

Water fills the side channel when the flow in the main channel is 5,655 cfs, allowing the young willows along the northwest bank to provide cover (Figure **11B).** As flow increases, vegetation becomes submerged providing feeding areas for mallards and other waterfowl.

Figure 11a.

Figure llb.

The majority of the small side channel is dewatered when the main channel flow rate is 1,844 cfs. Flow is restricted to a small channel near the island on the northwest bank (Figure 12A). Gravel beds are exposed and water is stagnant near the southeast bank. When the main channel flow is 5,655 cfs, the small side channel is bankfull and is still connected to the main channel (Figure 12B).

Figure 12a.

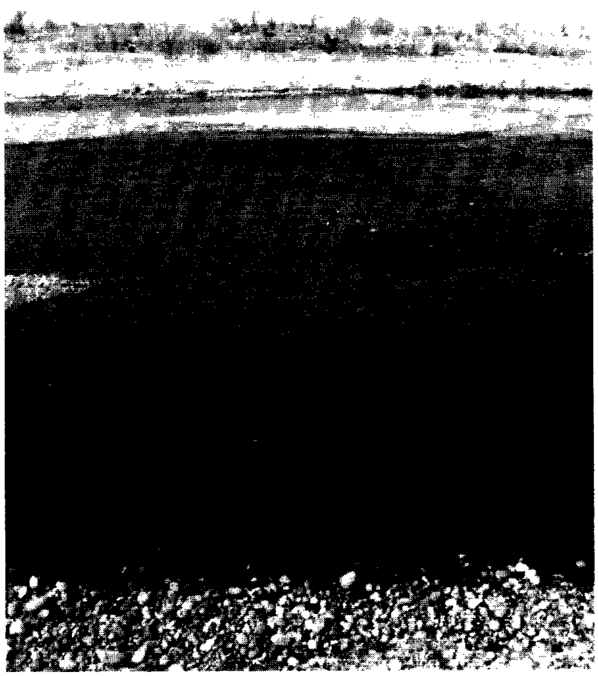
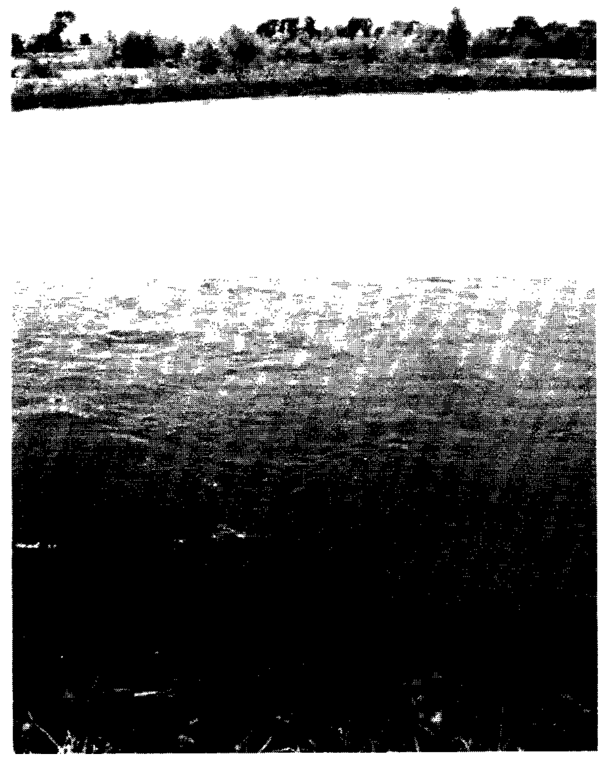


Figure 12b.



Detailed Analysis

To enable the comparison of habitat availability with the **Bio/West,** Inc. study, the relationship of flow in the side channels to flow in the main channel was developed. To determine this relationship, **field** observations and photo points were used over a range of flows throughout the study. These data suggest that at a flow of approximately 2,000 cfs in the main channel, the small side channel carries an estimated 2% of the flow. When flows in the main channel are 2,000 cfs the medium side channel is cut off from the main channel and only carries water backed up from the main channel. The medium side channel is defined as such due to its width. It is more isolated than the small channel and therefore receives less flow than the small side channel. At flows between 5,000 and 8,000 cfs it is estimated that approximately 10% of the main channel flow is carried through the small side channel, and 5% of the flow goes through the medium side channel.

Main Channel

Fisheries

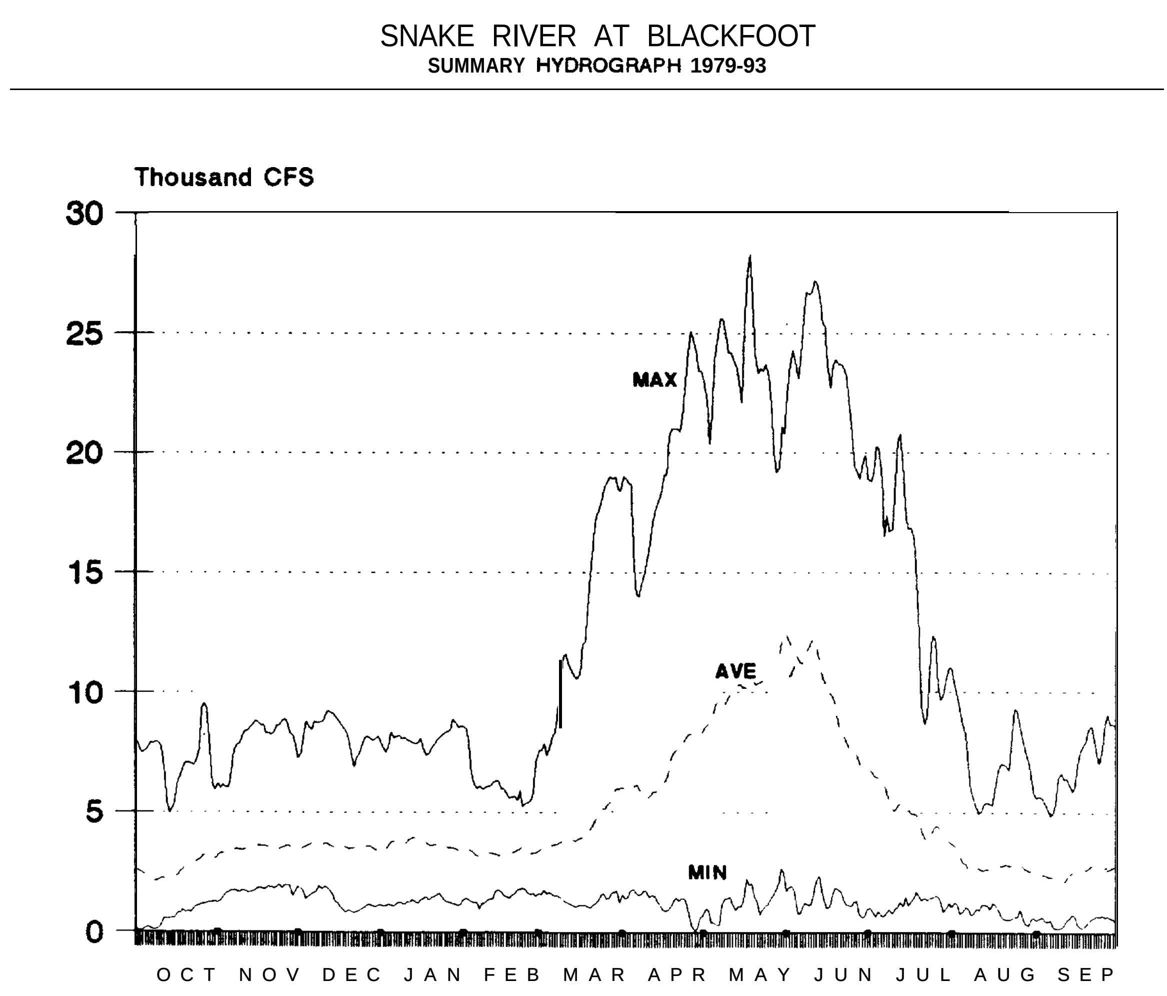
The Bio/West, Inc. study (**Holden** ***et al.*** 1987) demonstrated that a significant decrease in WUA occurred in the main channel as flows increased above 2,000 cfs (Appendix D). An increase in velocity with higher flows was found to be related to this loss of habitat. Rainbow trout were more affected than either cutthroat trout or mountain whitefish (**Holden** et ***al.*** 1987). **Holden** et ***al.*** (1987) further concluded that a reduction in habitat during late summer and fall would result in a decrease in population levels since habitat is more limiting at these times.

Wetted perimeter increased 2 1.67 **%** when flows increased **from** 2,025 cfs to 5,655 **cfs.** Mean depth at the main channel station increased 38.3% (1.8 ft.) when flows increased from 2,025 cfs (4.7 ft.) to 5,655 cfs (6.5 ft.). The depth suitability curves for all three species (Appendix A) indicate that depth greater than 1.1 ft. is optimal. Depth maintains pool quality, and provides wetted area for spawning. Estimated velocities increased 88.89% from 2.61 m/s (8.56 f/s) at a flow of 2,025 cfs to 4.93 m/s (16.17 f/s) at 5,655 cfs. These velocity estimates are unrealistic, particularly in the broad Snake River floodplain in this area. However, actual flow velocities at 5,655 **cfs** would likely preclude trout spawning activity in the main channel. Bio/west, Inc. concluded that rainbow trout were usually associated with areas in which velocities were under 2.0 f/s. Velocity is significant for maintaining desirable insect species composition, influencing stream carrying capacity, reducing effects of predation on young fish and determining spawning site preference. Trout generally select gravel substrate at the head of a riffle or downstream edge of a pool in which to build their redd (nest). However, as flows increase, velocities can become too high for spawning in the main channel. Side channels and near shore areas would likely be more suitable for spawning at higher flows (C. Robertson, IDFG, pers. **comm.** June 30, 1994). Water depth and velocity are important for successful spawning and maximum egg survival. Thus, an increase in habitat would be associated with a reduction in velocity and, therefore, flow. During the summer, low flows can be associated with higher water temperature. Christ and **Holden** (1986) reported summer water **temperatures** in the Snake River ranged from 18 to **20°** C. Water clarity at this flow was highly variable depending on irrigation return flow.

Based upon aerial photo interpretation, the study area has a 1: 1.75 pool to riffle ratio at 662 cfs. At a discharge of 3,017 cfs this ratio is 1: 1. Optimal rainbow trout riverine habitat is characterized by clear, cold water; a silt-free rocky substrate in riffle-run areas; an approximately **1:1** pool to riffle ratio, with areas of slow, deep water; **well-**vegetated stream banks; abundant **instream** cover; and relatively stable water flow, temperature regimes, and stream banks (Raleigh and Duff 1980 **in** Raleigh et ***al.*** 1984). In terms of physical habitat, the pool-riffle structure provides a great diversity of bedforms, substrate materials and local velocities (Gordon ***et al.*** 1992). Deep pools provide cooler water temperature and resting areas for trout. Pools can become sediment traps if periodic high flows do not scour out the accumulation of fines that result from irrigation return flows. Deep, low-velocity pools containing extensive cover are critical to **maintaining** stable trout populations. The river is highly regulated by upstream dams for **irrigation/hydropower** development.

The hydrograph has flattened out and the peak has **shifted** to later in the year **(Figure** 13). The amount of unconsolidated **bedload** movement is high and **banks** are unstable at the main channel station.

Figure 13. summary Hydrograph for Snake River at Blackfoot



Downed trees, root wads and overhanging vegetation occur in many areas along the banks of the main channel. Depending on flow, these areas provide good cover for fish. Christ and **Holden** (1986) found a higher catch per unit effort in the main channel primarily due to the presence of better cover along the shore and the presence of backwater habitats.

As flow increases during spring nmoff, spawning would likely occur in the side channels, adjacent springs, and other tributaries rather than in the main channel. Flows in excess of 2,000 cfs and associated higher velocities would likely preclude the availability of trout spawning or rearing habitat in the main channel. Spring flows in this reach peak at the end of May and average approximately 10,000 cfs (Figure 13). The average annual daily flow at the Blackfoot gauge from 1979-1993 is 4,812 cfs (Table 1).

Wildlife

A flow of approximately 2,000 cfs in the main channel creates foraging opportunities for bald eagles, pelicans, herons, and shorebirds. Exposed gravels near the water's edge contain aquatic organisms suitable for gulls and **grebes.** Beaver are active, swimming to and from bank den sites and gathering food. Main channel bank dens observed at a flow of 2,000 cfs were submerged at 5,655 cfs.

Canada geese are an important waterfowl species that nest along the Snake River. The goose nesting season occurs in the spring, from March through May. Forested and scrub-shrub wetlands along the river provide good nesting and brood rearing habitat for ducks. Islands in the study area provide important nesting habitat for Canada geese.

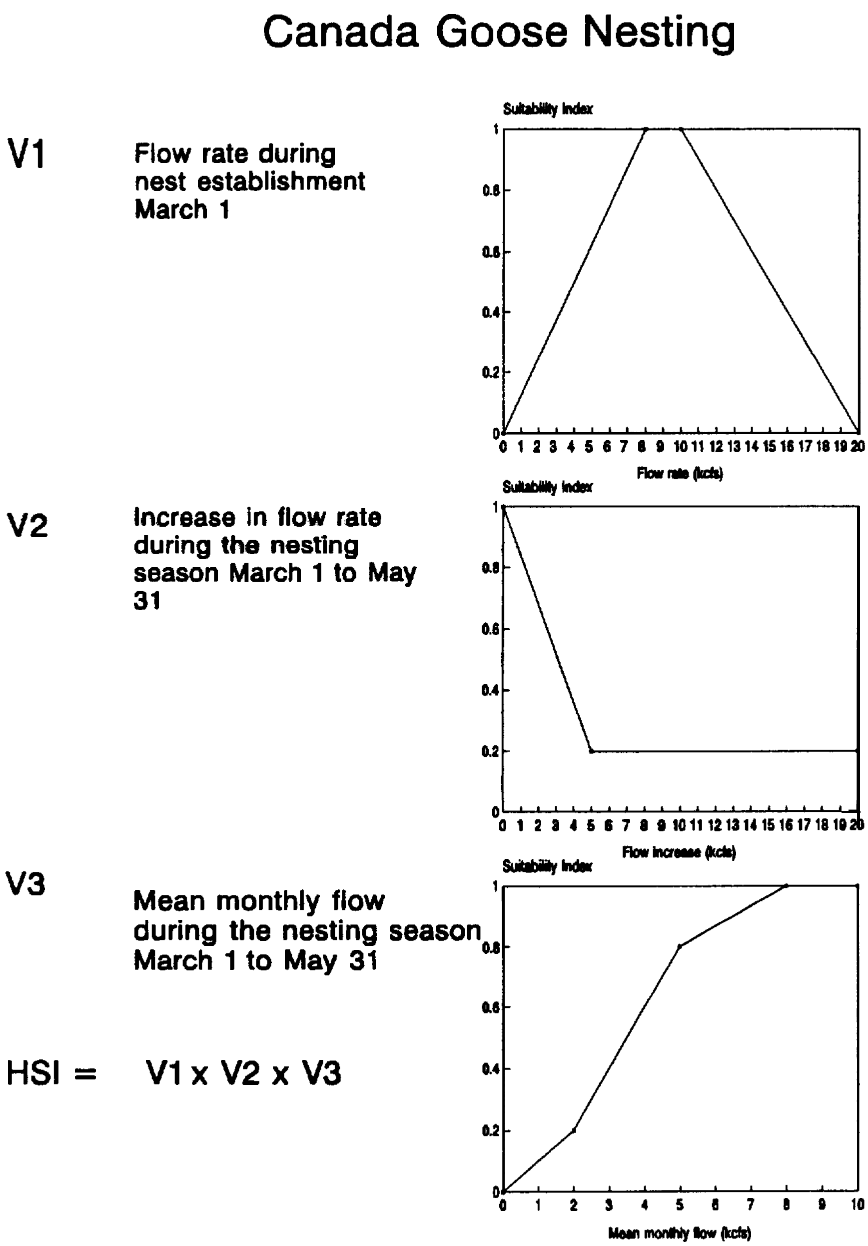
Streamflow fluctuations in the study area are the result of water releases from Palisades Reservoir and irrigation return flow from canals upstream. Fluctuation in flow during the nesting season can affect Canada goose nesting success in two important ways:

1) Low streamflows in the river at times are not adequate to maintain island integrity. Land bridges or shallow water between islands and the mainland provide easy access to the island nesting waterfowl by mammalian predators.
2) Streamflows increased after nests are established can cause significant loss of nests due to flooding. The degree of loss depends on the magnitude and timing of the water releases from Palisades Reservoir.

Data obtained from the Blackfoot gauge indicate that flow during the goose nesting season is not optimum for production due to large fluctuations in flow. The last three years of data suggest that the daily flow fluctuates most during the month of May (Appendix C), leaving nests particularly susceptible to inundation. A Canada goose nest containing 7 eggs was found in March 1994 on the gravel shoreline of a small island when flows were 2,085 cfs in the main channel. The location of the nest was photographed and marked. When biologists returned to the site in May 1994, the flow was approximately 9,000 cfs and the nest had been **inundated.**

The habitat suitability curve for Canada goose, developed specifically for this section of the Snake River, is based on three variables: 1) the flow rate at the beginning of the nesting season, 2) the amount of flow increase during the nesting season, and 3) the mean monthly flow during the nesting season (Figure 14). A flow of **8,000-10,000** cfs at the beginning of the nesting season would provide the largest amount of secure island area available for nest establishment. After the nests are established, flow levels may decrease to 8,000 cfs and still sufficiently maintain island integrity. Flows between 5,000 and 8,000 cfs provide adequate protection from mainland predators. Flows less than 5,000 cfs would leave geese vulnerable to predation. We assumed that any flow increase after nest establishment would cause the loss of some nests. Daily flow fluctuations in May 1994 demonstrate the range in which increases and decreases can occur (Appendix C). The mean monthly flow for the same **month** was 3,042 cfs (Appendix A). While a decrease in flow over the

Figure 14. Canada Goose Nesting Habitat Suitability



course of one or two days may not be detrimental to gosling survival as it relates to island accessibility by mainland predators, a low flow over a **sustained** period would adversely **affect** nest production.

Medium Side Channel

Fisheries

Holden et al. (1987) concluded that as flow increased in the medium side channel, there was relatively little change in habitat indicating that velocities and habitat remained acceptable to the three species.

Figure 8 illustrates the relationship between flow and habitat availability in the medium side channel. Vegetation is exposed and fish may be stranded as flows recede. As flows increased in the main channel, more water entered the side channel, wetting more area and creating more habitat. The wetted perimeter increased 71.45% when main channel flow increased from 2,009 cfs to 5,655 cfs. At a flow of 2,009 cfs in the main channel, water is stagnant forming a backwater, lacustrine-type environment. Water temperature at this flow is warm during the summer months.

The medium side channel provided considerably more habitat for all three species at a flow of 5,655 cfs than at 2,009 cfs. The average depth at a flow of 2,009 cfs is 0.5 ft, unsuitable for all target species. Habitat availability increases at 5,655 cfs as average depth increases to 1.3 ft. A depth suitability index of 0.3 for juvenile whitefish and 1.0 for juvenile cutthroat (Appendix B) represent the extremes of depth suitability for the target species.

The medium side channel is cut off from the main channel at 2,000 **cfs.** Velocities, therefore, are zero because the only water the channel receives is that which remains trapped in the upper section as flows recede or water backed up from the main channel. Fish that do not migrate into the main channel and are stranded in the upper section would be able to survive in some of the deeper pools. Velocity suitability curves for all target species indicate optimal suitability (Appendix B). It was estimated ***that 5%*** of the main channel flow is carried by the medium side channel at higher flows. Water appeared to move slowly and is not accurately represented by the calculated flow velocity of 5.38 f/s. This may be a reflection of the flow estimation and does not necessarily mean velocities at this flow are unsuitable for the target species.

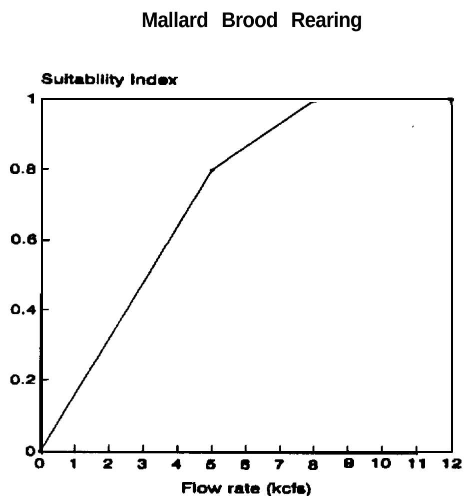
Wildlife

Numerous ducks were observed in the upper section of the medium side channel in March 1994 when flows were 2,009 cfs. While no feeding behavior was observed, most of the ducks appeared to be resting. The side channel is located near agricultural fields which may provide foraging areas for mallards and other waterfowl. Agricultural grains are often an important supplement to natural foods (e.g. invertebrates, seeds, **rootlets** and tubers of wetland plants) (Baldassarre ***et*** al. 1983 **in** Allen 1986). Higher flows advanced into the vegetation, providing ideal feeding areas for waterfowl. Studies (Nichols et al. 1983 &Allen 1986) indicate that minimal flooding of bottomlands in the Lower Mississippi Valley occurs in years of low precipitation, resulting in reduced availability of plant foods and reduced time for invertebrate production, which ultimately results in lower nutrient availability for mallards. These factors may contribute to poor physiological condition, later pair formation, and delayed spring migration. Although mallards will feed in dry sites, flooded areas are preferred (Allen 1986).

A habitat suitability curve for mallard brood rearing was developed for the study area (Figure 15). Brood rearing habitat is optimal in the medium side channel when flows reach 8,000 cfs in the main channel. Vegetation along both banks is submerged and young willow saplings provide cover for broods.

Five goose platforms are located on this side channel but none have been used in recent years. There is abundant habitat available for Canada geese in the form of islands and herbaceous

Figure 16. Mallard Brood Rearing Habitat Suitabiity



vegetation along the river banks.

A substantial beaver dam/pond complex is located on the side channel. Beavers have successfully stabilized water levels during low flow conditions. Bank dens and food caches are also present. Extensive beaver cuts, chewed-up willows, downed cottonwoods, and a series of beaver paths are present along both stream banks the length of the channel. The relationship between flow fluctuation and beaver habitat on large river systems is not entirely known. Established beaver dams are more vulnerable to increases in flow because they may be washed out. Similarly, high flood flows in the early spring may be detrimental to young as they become trapped under the ice (Melquist, IDFG, pers. comm. May 1994). Sigh spring flows, otherwise seasonally stable water levels, and the avoidance of rapid fluctuations in flow would benefit beaver habitat suitability.

Small Side Channel

Fisheries

Holden *et al.* (1987) concluded that WUA in the small side channel increased for all species as discharge increased.

Small side channel habitat is limited by high velocities at flows greater than 2,000 cfs in the main channel. The flow carried down this channel has an estimated velocity of 5.96 f/s. While this calculation is unrealistic, actual velocities are still high. Flow begins to back up into the side channel when the flow is at or below 2,000 cfs in the main channel. Water becomes stagnant in areas near the southeast bank but remains cold due to the presence of several cold water springs. At a flow of 5,655 cfs the side channel is bank full with an average depth of 2.0 ft. (Figure 9). Wetted perimeter increased a total of 53.58% when the main channel discharge increased from 1,884 cfs to 5,655 cfs. Estimated velocities at 5,655 cfs approach 7 f/s and are not considered suitable for spawning or rearing (Appendix B). While this estimation is considered unrealistic, the actual velocity may preclude spawning and rearing activity. There are areas on the southeast bank that can provide cover and protection for fish in the form of overhanging trees, but only when the flow approximates 5,000 cfs in the main channel. While the estimated velocity at the lower flow (.78 f/s) is regarded as optimal for all three target species, depth is not sufficient to provide suitable habitat.

Wildlife

The island formed by this side channel is heavily damaged by grazing. The island could provide high quality nesting habitat for ducks and geese if the flow was enough to protect the island from cattle and predators.

Small pools formed by receding high flows create ideal brood rearing areas and feeding areas for mallards. Numerous willow saplings, tall grass, and perennial herbaceous vegetation provide good quality cover for mallards and Canada geese.

High flows during nest initiation and stabilized flows during the nesting season would benefit nesting success and habitat suitability for Canada geese.

Beaver and muskrat dens line the bank bordering the main channel. Signs of willows eaten by beaver and numerous tracks covering the island indicates the island receives much use by aquatic **furbearers.**

Summary

The biological appraisal of the Snake River below Blackfoot established a relationship between flow fluctuation and resident fish and wildlife habitat for several target species. The results of this study confirm or validate the results of an **instream** flow study completed on a similar segment of the Snake River by **Bio/West,** Inc.

A summary of microhabitat characteristics for the main channel and side channels is included in Table 5. Fisheries habitat in the main channel is limited by high summer flows and increased flow velocities. Daily flow fluctuations in early summer are dramatic due to irrigation and flood control releases from upstream reservoirs. Side channels are not sufficiently watered during the summer months to provide suitable habitat for trout rearing.

Most increases in habitat occur during spring runoff when habitat is not limiting, particularly in the side channels where fish can escape from higher velocities associated with flow increases in the main channel. High spring flows likely preclude spawning in the main channel; however, fish would probably migrate out of the study area or find suitable spawning habitat available in side channel and spring areas.

Canada geese nest primarily on islands in the study area. Flows at the beginning of **the** nesting season are important in providing maximum island area for nest establishment. Stable flows during the nesting season are significant in maintaining island integrity and providing protection from mainland predators.

Island and side channel mallard brood rearing habitat is limited by early summer decreases in flow. High flows create more wetted area, submerging vegetation that provides cover and dabbling areas for duck broods.

Beaver habitat is abundant in **the** study area. Bank dens in the main channel are susceptible to inundation by high spring flows. A rapid increase in flow can also destroy beaver dams constructed in side channels. Flow fluctuations probably do not have adverse impacts on the beaver population in the study **area** provided they are within a range that follows the natural hydrograph.

Table 6 provides a summary of the flow regime in the study area that would provide benefits to resident fish and wildlife habitat.

Table 5. Summary of Microhabitat in the Study Area

Channel Type	Flow Measurement (cfs)	% Increase in Wetted Perimeter	Average Depth (ft.)	Average Width (ft.)	Estimated Average Velocity (f/s)	% of Flow Carried by the Main Channel
Main	2,025		4.7	165	8.56	**100**
Channel	5,655	21.67	6.5	176	16.17	100
Med. Side	**2,009**		0.5	92	0	0
Channel	5,655	71.45	1.3	152	5.38	5
Small Side	1,884		0.62	30	5.96	2
Channel	5,655	53.58	2.0	133	7.0	10

Table 6. Flow **Regime Recommended to Protect and Enhance Resident Ash and Wildlife Habitat**

Target Species	Flow Regime	Reason
Rainbow trout Cutthroat trout Mountain whitefish	-High spring flows -After July 1 maintain stable flows at 2,000 cfs	Spawning Rearing
Canada goose	-March 1: **8,000-10,000** cfs -March-May: **8,000** cfs -March-May: **5,000-8,000** cfs	Nest establishment Preferred for island integrity Provides adequate protection
Mallard	-High spring flows -Maintain flows above 5,000 cfs until July 1	Brood rearing
Beaver	-High spring flows	Life requisites

Chapter 3:
1993-1994 Flow Augmentation

1993 Flow Augmentation

Upper Snake River

The IDWR 1993 accounting of water released for salmon flow augmentation is included in Appendix E. The total amount of water supplied by the upper Snake River reservoirs, including Brownlee, for salmon flow augmentation was 526,619 AF. The total amount of water supplied by the Water District 01 Rental Pool for salmon flow augmentation in 1993 was 65,000 AF at **a cost of $5.90/AF.** The Rental Pool Rules and Procedures require a portion of the cost **($2.00/AF)** to be paid **upfront** in case the reservoir system does not **fill** the following year. The water was released past **Milner** for 77 days beginning August **7, 1993** at an average rate of 220 **cfs/day.**

In addition to water rented for salmon flow augmentation, the USBR released 99,480 AF of water accrued to Mitigation Inc. storage space in Palisades and Ririe Reservoirs. A total of 107,139 **AF** of upper Snake powerhead storage was released past Milner at an average rate of 2,700 **cfs/day** from October **21, 1993** to January 16, 1994. Total releases out of **Brownlee** Reservoir were 102,000 AF beginning July 12, 1993 and **ending** August 22, 1993.

Boise River

The Boise River system contributed a total of **23,000** AF of water for flow augmentation (Table 7). All of this amount was released out of powerhead space in Anderson Ranch Reservoir. Flows in the Boise River below Lucky Peak increased by approximately 450 **cfs/day** from July 13, 1993 through August 7, 1993.

Table 7. 1993 Flow Augmentation Supplied by the Upper Snake River Basin

Source	Amount Delivered (AF)	Time Period
Brownlee Reservoir	102,000	July **12-Aug** 22
Water District 01		
Palisades and Ririe Mitigation Inc.	**99,480**	July **9-Aug** 7
Palisades and Minidoka Powerhead	107,139	**Oct** 21-Jan 16
Rental	**65,000**	Aug **7-Oct** 21
Water District 63		
Anderson Ranch Powerhead	**23,000**	July **13-Aug** 7
Water District 65		
Cascade and Deadwood Uncontracted Storage	**95,000**	July **13-Aug** 16
Rental	**35,000**	Aug **15-Aug** 29
Total	**526,619**	

Payette River

A total of 130,000 AF of water was released out of the Payette River system for salmon flow augmentation from July 13, 1993 through August 29, 1993 (Table 7). Idaho Power Company rented 35,000 AF from the Water District 65 Rental Pool at a cost of $5.40/AF. A portion of the rental cost ($2.00/AF) is a deposit required in the event the reservoir system does not refill the following year. Water rental releases were made from August 15, 1993 through August 29, 1993. A total of 95,000 AF of uncontracted storage was also released from the Payette system from July 13, 1993 through August 16, 1993.

1994 Flow Augmentation

The NMFS requested 527,000 AF of water from the upper Snake River Basin for salmon flow augmentation in 1994. The USBR contributed a total of 428,120 AF of water from the upper Snake River Basin above Brownlee Reservoir, including the upper Snake, Boise, and Payette River.

Upper Snake River

The USBR's contribution from within Water District 01 totaled 330,287 AF (Table 8).

Table 8. 1994 Flow Augmentation from the Upper Snake River Basin

Source	Estimated Yield[1]	Time Period[2]
Brownlee Reservoir[3]	358,600	April 20 - August 31
Water District 01[4]		
Palisades and Ririe Mitigation Inc.	36,110	April 13 - April 21
Palisades and Minidoka Powerhead	249,852	April 27 - July 25
City of Pocatello (Rental)	44,325	July 25 - August 10
Water District 63[5]		
Anderson Ranch Powerhead	10,950	July 5 - July 18
Lucky Peak Boise River Minimum Flow Account	25,000	July 19 - August 22
Water District 65[5]		
Cascade Uncontracted Storage	26,845	July 1 - August 10
Deadwood Uncontracted Storage	35,038	July 1 - August 10
Total	786,720	

1. Based on current water data and watermaster accounting. Upper Snake and Payette also include reductions for evaporation. Boise River watermaster does not incorporate evaporation losses into accounting of space.
2. F. Crase, USBR, pers. comm. July 29, 1994.
3. T. Brewer, Idaho Power Company, pers. comm. August 22, 1994.
4. R. Carlson, WD 01 Watermaster, pers. comm. August 30, 1994.
5. R. Wells, USBR, pers. comm. August 31, 1994.

An additional 358,600 AF was released from Brownlee Reservoir by Idaho Power Company.

Releases past Milner were held at 1,500 cfs/day through mid-August, 1994. Idaho Power Company used its storage space in American Falls Reservoir (45,000 AF) to provide flows below Milner after the USBR completed its augmentation schedule. The legislature allocated funds to rent 45,000 AF of water earlier this year for the aquifer recharge effort. Under terms of a multi-year agreement between the USBR and the state of Idaho, the USBR released 45,000 AF of water accrued to the city of Pocatello's reservoir storage space for salmon flow augmentation (F. Crase, USBR, pers. comm. June 27, 1994).

The rental price for water released past Milner Dam was $8.45/AF this year, an increase of 43 percent over the 1993 rental cost (Table 9). The Water District 01 water-master approved 74,639 AF in agricultural leases from the rental pool to date (R. Carlson, WD 01, pers. comm. August 30, 1994).

Winter releases were made from the upper Snake system by the USBR to replace advance releases made by Idaho Power Company out of Brownlee Reservoir.

Boise River

As part of the USBR's 1994 plan of operation for salmon migration, Lucky Peak's outflow was increased by 400 cfs for a 49day period (R. Wells, USBR, August 31, 1994). The release began July 5, 1994 and continued through August 22, 1994.

The total volume released was approximately 35,950 AF. Anderson Ranch powerhead space and water set aside in Lucky Peak for the maintenance of a wintertime minimum streamflow in the Boise River provided water for salmon flow augmentation.

The Water District 63 Rental Pool received 4,751 AF in consignments, and no water was available to lease for salmon flow augmentation (L. Sisco, WD 63, pers. comm. August 31, 1994).

Payette River

Approximately 62,000 AF was released out of the Payette system for salmon flow augmentation beginning July 5, 1994 and continuing through July 31, 1994 (Table 8). Cascade Reservoir did not fill in 1994. Fish kills resulting from large algal blooms and subsequent low oxygen levels were reported in summer 1994. Releases for salmon flow augmentation may exacerbate the problems associated with the minimum pool level in Cascade Reservoir (see Riggin and Hansen 1992). A total of

Table 9. 1994 Water District 01 Rental Price/AF

	Cost to Purchase		Return to Lessor	Rental Pool Administrative Fee	IWRB
Above Milner					
1993		$2.95	$2.00	$0.75	$0.20
1994		same	same	same	same
Below Milner					
1993	$5.90	$2.95/$2.95	$2.00/$2.00	$0.75/$0.75	$0.20/$0.20
1994	$8.45	$6.25/$2.20	$5.00/$2.00	$0.75/$0.20	$0.50/

Summary

Listing of the salmon and Idaho's lawsuit against the National Marine Fisheries Service has brought the issue of declining salmon runs to the forefront of Idaho's economic future. Suggested solutions for the recovery of the salmon range from drawdown of the four lower Snake River reservoirs to augmenting Lower Snake River flows from the upper Snake River Basin. The use of Idaho water to augment flows in the lower Snake River continues to be controversial as issues in southern Idaho focus the attention of conservation and irrigation groups alike. Declining water quality conditions in the middle Snake, the recent listing of five Snake River snails, aquifer recharge, and federal requests for increasing amounts of reservoir storage are issues that have created much concern.

Impacts to resident fish and wildlife resulting from salmon flow augmentation should be considered in discussions related to water management in the upper Snake River Basin. Several efforts are underway to explore the opportunities of managing water resources diierently in the basin. The Snake River adjudication process and recent water legislation signed by Governor Andrus may not only better define the amount of water beii put to beneficial use, but also may serve as a first step to resolving the issues surrounding conjunctive management of surface and groundwater resources.

The Idaho Water Rental Pilot Project seeks to quantify the relationship between resident fish and wildlife habitat availability and fluctuations in reservoir level and streamflow. A biological assessment was conducted on the Snake River between American Falls Reservoir and the city of Blackfoot. The purpose of the assessment was to gather fish and wildlife habitat information that was lacking in the upper Snake River system. Results of the study indicate flow fluctuations affect main channel spawning habitat and side channel rearing habitat for rainbow trout, cutthroat trout, and mountain whitefish. Mallard brood rearing habitat in side channel areas increases as flows remain high. Herbaceous vegetation becomes submerged and creates good quality cover for waterfowl broods. Stabilized flows during the goose nesting season will benefit nesting success as islands become protected from mainland predators at higher flows and nests are not inundated by flow increases. Beavers have adapted to fluctuations in flow. Flood flows can impact beaver dams and destroy main channel bank den sites.

A total of 526,619 AF of water was provided by the upper Snake River Basin above Brownlee for salmon flow augmentation in 1993. The same year, Idaho Power Company provided an additional 102,000 AF out of Brownlee Reservoir. The USBR contributed approximately 428,120 AF of water in 1994. Idaho Power contributed an estimated total of 358,600 AF from Brownlee Reservoir. Continued drought conditions, below normal snowpack and no carryover storage will stress resident fish and wildlife resources in 1995.

Competing water resources need not adversely impact resident fish and wildlife. Biologically sound alternatives within the framework of flow augmentation can provide ecological benefits such as stabilized steamflows, adequate reservoir levels for recreation, and increased available fish and wildlife habitat.

Idaho remains committed that the final solution to bring back declining salmon runs must include lower Snake River dam modifications to increase mainstem salmon survival. Drawdowns and dam modifications of the lower Snake reservoirs are critical to the long-term enhancement and recovery of salmon. Flow augmentation, as a near-term recovery action for rebuilding Snake River salmon and steelhead runs, must also make biological sense for Idaho's resident fish and wildlife.

Phase III: Water Rental Pilot Project

Federal and state agencies are working together to find solutions to meeting the storage and flow needs of salmon, resident fish and wildlife, agricultural water users, hydropower production, recreation, and local communities. As this report notes, several studies are ongoing to determine how Idaho's water resources might be used more effectively in meeting those needs. Duplication of effort remains a concern as agencies identify alternatives to "remanage" surface and groundwater resources for salmon flow augmentation.

The third phase of the Idaho Water Rental Pilot Project will focus on working closely with the IDWR, USBR, USFWS, Idaho Power Company, and the Tribes in the development of a model in which annual flow requests and resident fish and wildlife habitat suitability information are interfaced to produce quantifiable impacts to resident fish and wildlife resources. As the NPPC's Fish and Wildlife Program progresses, information regarding reservoir biological rule curves, resident fish substitution, and fish loss assessments will be incorporated. Idaho Power Company project relicensing, middle Snake snail recovery, and USBR efforts to acquire additional water for salmon flow augmentation should contribute useful information to a basin-wide approach toward managing the upper Snake River in a way that protects and enhances resident fish and wildlife resources.

Specific objectives for Phase III include the following:

1) Conduct flow augmentation simulation using the updated IDWR Snake River hydrologic model. Refinements to the model will include expanding the base period of record from 1928-1989 to 1928-1992. Pertinent data used to define water management strategies identified by the Snake River Basin Water Committee may be incorporated.

2) Relate expected changes in lacustrine habitat conditions to benefits/impacts to resident fish and wildlife resources resulting from releases made for salmon flow augmentation. Information gathered in the development of reservoir biological rule curves called for in the NPPC's Fish and Wildlife Program may be incorporated.

3) Determine in which river sections habitat versus flow relationships can be made and where additional information is needed.

4) Consult with local hydrologists and users of the Instream Flow Incremental Methodology and the Time Series Library to develop the framework for a resident fish and wildlife habitat model. The ability to predict benefits/impacts to resident fish and wildlife resources through time will be based on seasonal storage conditions, runoff forecasts, water rental releases, and requests for salmon flow augmentation.

5) Develop monitoring and evaluation criteria to evaluate a) resident fish and wildlife impacts as a result of releases made for salmon flow augmentation, and b) the effectiveness of the entire Water Rental Project in delivering water to Brownlee Reservoir for the improvement of anadromous fish migration.

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Appendix A: Summary Hydrograph Data

HYDROMET

SNAKE R. AT BLACKFOOT (CFS)
SNAI QD

WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1613.194	1846.522	2846.996	4257.073	4235.027	5150.207	2942.667	3230.098	11001.35	1991.759	2616.542	3025.017
2	1647.873	1868.388	2932.914	1634.781	4599.078	6107.713	2763.197	3586.681	12232.61	2540.176	2280.747	2868.616
3	1810.953	1924.846	2892.043	343.008	4296.258	1795.024	2731.151	3760.319	14298.99	2398.260	1385.586	3030.637
4	1676.695	1436.994	236.586	690.981	4501.611	3129.441	2644.682	3929.710	15435.37	2957.614	797.229	3070.816
5	1957.640	1895.161	477.894	827.919	4982.252	5709.833	2593.170	4582.603	16704.76	4036.194	864.326	2861.943
6	2059.904	1935.993	700.531	206.732	6978.961	5757.180	2671.455	5647.794	18574.19	4698.030	1315.176	2984.691
7	2018.243	1997.611	2473.331	254.116	6224.270	5893.583	2136.346	5932.600	18561.44	4828.713	1678.120	2964.176
8	2027.412	2003.346	2576.188	1851.850	3204.408	6046.947	2504.182	6149.862	18261.12	4628.425	2074.553	2561.230
9	2042.546	2043.369	2901.550	2154.140	5658.592	6133.973	2436.876	6476.419	20314.40	3535.237	2638.003	2072.326
10	1904.874	2100.989	2543.244	873.411	5999.458	6149.684	2357.207	6323.678	20744.23	2268.511	2817.152	1830.777
11	2539.482	2097.044	3034.613	523.277	6027.533	5969.941	2310.359	5764.846	19534.24	1779.536	2452.636	1557.216
12	2406.745	2205.853	2399.125	1482.525	5871.024	5693.620	2530.815	5239.729	11142.76	1599.344	2525.514	1562.033
13	2510.164	2203.364	599.937	687.303	5894.910	5361.475	2528.932	5439.659	15671.16	1269.654	3017.072	1785.870
14	2472.084	2261.984	522.256	3731.262	5198.238	5461.249	2361.892	5946.930	15500.77	1106.625	3567.240	1784.742
15	2283.776	2250.830	803.522	3808.381	1127.081	5542.690	2204.538	6965.815	13639.04	1452.060	3617.768	1833.676
16	2195.928	2248.352	333.971	2186.289	3473.500	5424.896	2166.287	8130.852	11915.80	1744.615	3451.002	1638.378
17	2124.094	2298.241	1008.262	2606.226	3406.857	5821.262	2253.154	9015.801	10393.97	1928.754	3110.413	1606.964
18	1987.167	2271.359	496.218	2971.460	4773.919	5204.061	2302.400	9315.922	10030.01	2025.351	3013.555	1652.530
19	1802.369	2286.576	537.462	5615.274	5585.731	2846.646	2333.560	8868.715	11187.49	2533.951	3002.032	1578.147
20	1763.415	2286.655	593.750	5557.945	5356.178	2489.266	2137.478	7720.116	9727.908	2280.698	2673.697	1770.505
21	1728.952	2189.453	2428.263	4672.530	4481.194	2271.191	2200.753	6780.970	8749.520	2287.205	2573.451	1736.566
22	1545.680	2312.086	2272.603	6114.116	5478.827	2406.411	2049.545	7107.761	7998.481	2266.676	2553.635	1787.308
23	1607.612	2126.498	4487.635	4766.174	3605.940	2454.363	2101.023	7731.959	7894.011	2540.173	2757.836	1684.868
24	1518.773	1534.393	2183.858	4634.829	5314.603	2326.604	2524.961	8314.757	8866.290	3830.106	2873.702	1441.698
25	1563.395	1373.621	1977.682	4972.263	3646.662	2350.784	2765.994	7443.547	10317.42	4744.687	2593.611	1460.348
26	1559.663	1576.099	1809.693	4536.751	4598.569	2626.519	2726.410	6353.708	9293.503	5258.279	2138.474	1426.575
27	1578.326	1353.680	3456.685	4808.636	4635.648	2913.132	2766.404	5267.868	6435.687	5521.952	2163.245	1241.032
28	1674.046	1732.935	3577.231	4902.627	4902.426	3040.366	2517.758	4499.950	3920.154	5250.981	2634.187	1084.864
29	1604.850	2157.513	5362.968	---		3142.116	2476.301	5088.833	1961.773	4863.404	3247 488	979.471
30	1728.356	1779.738	2346.264	---		3036.448	2759.251	6882.958	1484.506	4310.188	3376 413	949.664
31	1700.232		2233.357	---		3002.063		9159.614		3705.847	3272 460	
TOTAL	58654.45	59599.49	63046.63	81671.88	134058.8	131258.7	74398.76	196660.1	367792.9	96183.00	79282.87	57832.69
MEAN	1892.079	1986.650	2033.762	2916.853	4787.813	4234.151	2479.958	6343.873	12259.76	3102.677	2557.512	1927.756
MAX	2539.482	2312.086	5362.968	6114.116	6978.961	6149.684	2942.667	9315.922	20144.23	5521.952	3617.768	3070.816
	(11)	(22)	(29)	(22)	(6)	(10)	(1)	(18)	(10)	(27)	(15)	(4)
MIN	1518.773	1353.680	236.586	206.732	1127.081	1795.024	2049.545	3230.098	1484.51	1106.625	797.229	949.664
	(24)	(27)	(4)	(6)	(15)	(3)	(22)	(1)	(30)	(14)	(4)	(30)

WATER YEAR 1993 TOTAL 1400440. MEAN 3868.62 MAX 20744.23 MIN 206.73

SNAKE RIV AT BLACKFOOT, ID

QD QD WATER YEAR OCTOBER 1993 TO SEPTEMBER 1996

MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	124.93	2585.00	3637.15	3580.05	2163.73	2852.54	1997.63	2515.05	4408.11	—	- -	—
2	397.80	2963.25	3561.17	5W9.35	2354.75	2122.12	2206.05	1841.70	-	—	—	—
3	777.05	2842.53	3541.19	3263.05	2501.51	2754.24	2363.33	1281.30	—	—	—	—
4	1037.89	2731.93	3350.59	3303.65	3113.60	2816.31	2872.19	1035.31	—	—	—	—
5	774.19	269J.65	3610.78	3182.54	2715.39	2757.36	3351.31	901.91	—	—	—	
6	1002.58	2791.51	3236.54	3597.20	2648.21	2745.66	3839.69	1342.52	—	—	—	
7	1262.56	2766.59	3205.38	3430.60	2629.41	2660.14	4161.96	1509.06	—	—	—	—
8	1231.08	2715.69	3255.98	3345.38	2913.06	2618.53	4245.75	1738.79		—	- -	—
9	1400.53	2739.27	3054.11	3662.29	3292.56	2539.55	3345.41	1708.83	—	—	—	4
10	1474.02	2752.06	3148.51	3452.35	3023.53	2515.93	3679.36	1561.46	—	—	—	
11	1 X47.42	2975.11	3059.58	3363.49	2865.00	2417.16	3515.49	1974.81	—	—	—	—
12	1169.96	2972.46	2986.26	3112.99	2958.63	3624	3523.69	2035.86	—	—	—	—
13	2028.63	2994.14	3060.87	3L22.56	[illegible]	2443.18	St64.69	2128.81	—	—	- -	—
14	2199.16	3037.14	2662.57	3M2.83	2683.64	2592.51	3575.20	3843.73	-	—	- -	—
15	2359.85	2908.18	2762.31	3102.01	2629.35	2353.34	3312.80	6580.71	-	—	—	—
16	2269.74	M25.17	2927.00	3302.08	27663.93	2396.10	3288.69	8996.91	—	—	—	—
17	2185.59	3001.22	3033.34	2775.16	2793.02	2421.42	3259.95	7163.11	—		- -	
18	1392.20	3021.50	3095.55	3115.86	2961.49	2491.29	3253.94	5655.27	—	—	—	
19	1391.33	3188.90	2957.71	3923.34	3033.88	2408.50	3557.75	4913.38	—	—	—	—
20	1775.57	3067.94	2987.71	2881.11	2965.65	2445.83	4136.06	4394.45	—	—	—	—
21	2170.86	3083.55	29B2.69	2B42.w	2925.30	2314.51	5524.05	4157.82	—	—	—	—
22	2LB6.37	3145.27	2956.57	2345.79	2962.38	2251.55	6068.53	3513.87	—	—	—	
23	2282.86	3287.27	2506.10	3309.70	2961.01	2384.84	6888.85	3050.66	—	—	—	—
24	2234.91	2882.44	3321.20	2373.24	2777.12	2418.38	1367.2'4	2062.82	—	—	- -	
25	2372.99	2777.85	3839.69	2323.64	2904.23	1 . 5 2	7513.28	1268.07	—	—	- -	—
26	1378.56	2576.45	3608.04	2J12.31	2593.13	2232.14	7788.33	1427.85	—	—	—	-
27	1383.86	2661.06	3990.11	2316.24	2662.06	2202.72	7298.71	1601.76	—	—	—	—
26	2363.90	3080.40	3637.05	2306.36	2745.00	2085.28	6527.65	2371.10	—	—	—	—
29	2118.55	3714.19	3963.58	2720.45	-- I	2009.39	5424.03	3155.46	—	—	—	—
30	2304.66	3755.40	4154.38	2176.W	- - I	1884.50	3782.71	4231.44	—	—	—	—
31	2549.66	-- I	3755.02	2330.51	---	2056.50	-	4374.66	—	0.00	—	—
TOTAL	55029.76	89735.13	102151.23	93955.13	78744.45	75615.19	131084.31	94321.48	4408.11	0.00	0.00	0.00
MEAN	1775.15	2957.77	3295.20	3092.10	2812.30	2439.14	4369.48	3042.63	4408.11		0.00	0.00
MAX	2349.64	3755.40	4154.38	3345.38	3292.56	2852.54	7788.33	8996.91	4408.11	0.00	0.00	0.00
MIN	397.80	2576.45	2506.70	2330.51	2163.73	1884.50	1897.63	(01.91	4408.11	0.00	0.00	0.00

WTR YR 1994 TOTAL 125940.88 MEAN 2975.17 MAX 8996.91 MIN 897.80

IDAHO DEPARTMENT OF WATER RESOURCES SUMMARY HYDROGRAPH DATA

SNAKE RIVER AT BLACKFOOT (1979-93) 13062500

		**** MONTHLY FLOW DATA ****						**** YEARLY FLOW DATA ****					
MONTH	YEAR	MAXIMUM	DAY	MINIMUM	DAY	AVERAGE	COUNT	MAXIMUM	DAY	MINIMUM	DAY	AVERAGE	COUNT
OCT	1978	2210.	31	546.	11	1037.	31						
NOV	1978	3850.	18	2280.	8	3143.	30						
DEC	1978	5600.	23	3400.	7	4772.	31						
JAN	1979	6500.	12	3600.	3	5226.	31						
FEB	1979	6100.	7	4400.	1	5456.	28						
MAR	1979	10000.	28	5560.	6	7695.	31						
APR	1979	9840.	11	7080.	28	8789.	30						
MAY	1979	11500.	31	2640.	16	6083.	31						
JUN	1979	10300.	1	4190.	16	5746.	30						
JUL	1979	6860.	2	1050.	12	2911.	31						
AUG	1979	4100.	15	968.	29	2097.	31						
SEP	1979	1280.	3	180.	9	770.	30	11500.	31 MAY	180.	9 SEP	4467.	365
OCT	1979	2110.	22	244.	10	1122.	31						
NOV	1979	2510.	26	1720.	1	1976.	30						
DEC	1979	2800.	6	1800.	30	2493.	31						
JAN	1980	4100.	16	1250.	30	2622.	31						
FEB	1980	5930.	22	1940.	1	2741.	29						
MAR	1980	6140.	31	1590.	24	2372.	31						
APR	1980	11400.	28	2750.	15	5683.	30						
MAY	1980	19100.	28	8060.	8	12239.	31						
JUN	1980	20600.	4	6100.	30	13304.	30						
JUL	1980	7720.	6	1570.	15	3291.	31						
AUG	1980	4300.	21	342.	29	2099.	31						
SEP	1980	2630.	15	465.	30	1336.	30	20600.	4 JUN	244.	10 OCT	4267.	366
OCT	1980	2900.	16	95.	2	1313.	31						
NOV	1980	2680.	4	2120.	18	2414.	30						
DEC	1980	2840.	29	2050.	11	2429.	31						
JAN	1981	2480.	1	2150.	10	2304.	31						
FEB	1981	3570.	21	1400.	11	2409.	28						
MAR	1981	2690.	30	1730.	24	2095.	31						
APR	1981	8400.	29	2070.	1	4090.	30						
MAY	1981	20800.	31	4440.	11	9236.	31						
JUN	1981	24000.	12	4920.	20	12806.	30						
JUL	1981	4180.	1	1630.	5	2117.	31						
AUG	1981	2350.	10	574.	22	1156.	31						
SEP	1981	1140.	8	223.	18	726.	30	24000.	12 JUN	95.	2 OCT	3585.	365
OCT	1981	1380.	31	140.	2	871.	31						
NOV	1981	2150.	26	1540.	1	1810.	30						
DEC	1981	2450.	22	1600.	31	2013.	31						
JAN	1982	3000.	11	1100.	6	1960.	31						
FEB	1982	3900.	28	980.	7	2561.	28						
MAR	1982	13700.	31	4200.	1	7988.	31						
APR	1982	17500.	30	8830.	12	12979.	30						
MAY	1982	21400.	21	17000.	27	19135.	31						
JUN	1982	18700.	1	6590.	16	11087.	30						
JUL	1982	17400.	8	7550.	24	12978.	31						
AUG	1982	8910.	1	2030.	19	3193.	31						
SEP	1982	6700.	30	1050.	12	3745.	30	21400.	21 MAY	140.	2 OCT	6720.	365
OCT	1982	7930.	9	3000.	18	5399.	31						
NOV	1982	6170.	1	4500.	23	5512.	30						

IDAHO DEPARTMENT OF WATER RESOURCES SUMMARY HYDROGRAPH DATA

SNAKE RIVER AT BLACKFOOT (1979-93) 13062500

		***** MONTHLY FLOW DATA *****						***** YEARLY FLOW DATA *****					
MONTH	YEAR	MAXIMIUM	DAY	MINIMUM	DAY	AVERAGE	COUNT	MAXIMUM	DAY	MINIMUM	DAY	AVERAGE	COUNT
DEC	1982	6170.	15	3900.	30	5535.	31						
JAN	1983	8320.	5	5700.	1	6625.	31						
FEB	1983	6060.	10	4370.	23	5101.	28						
MAR	1983	8610.	24	3810.	20	5948.	31						
APR	1983	14200.	29	5600.	10	9138.	30						
MAY	1983	21600.	11	14700.	1	18410.	31						
JUN	1983	25400.	14	16200.	24	19743.	30						
JUL	1983	20800.	13	3160.	31	13145.	31						
AUG	1983	9330.	24	1960.	5	4472.	31						
SEP	1983	5390.	1	1510.	15	2759.	30	25400.	14 JUN	1510.	15 SEP	8501.	365
OCT	1983	9510.	27	4170.	1	6093.	31						
NOV	1983	8890.	26	5970.	2	7926.	30						
DEC	1983	9210.	12	6500.	22	8271.	31						
JAN	1984	8870.	28	6950.	18	7995.	31						
FEB	1984	8580.	1	3800.	23	5033.	29						
MAR	1984	9670.	31	3720.	10	5385.	31						
APR	1984	17300.	21	7970.	3	13693.	30						
MAY	1984	28300.	18	13000.	9	20265.	31						
JUN	1984	27200.	11	18300.	28	22813.	30						
JUL	1984	18900.	1	7390.	22	13033.	31						
AUG	1984	11000.	1	4950.	11	6544.	31						
SEP	1984	9120.	27	4520.	19	6099.	30	28300.	18 MAY	3720.	10 MAR	10265.	366
OCT	1984	7540.	1	3180.	11	5012.	31						
NOV	1984	6380.	15	5190.	28	5631.	30						
DEC	1984	8000.	30	4900.	15	6540.	31						
JAN	1985	8100.	10	5810.	31	7065.	31						
FEB	1985	6320.	14	5200.	27	5701.	28						
MAR	1985	6250.	21	4700.	8	5396.	31						
APR	1985	12700.	21	5980.	2	10271.	30						
MAY	1985	22100.	13	8250.	22	15254.	31						
JUN	1985	14300.	1	2570.	30	6937.	30						
JUL	1985	3390.	15	672.	4	1726.	31						
AUG	1985	3220.	3	744.	8	1446.	31						
SEP	1985	3250.	14	1490.	29	2115.	30	22100.	13 MAY	672.	4 JUL	6093.	365
OCT	1985	3290.	27	1650.	1	2410.	31						
NOV	1985	3800.	29	2700.	24	3257.	30						
DEC	1985	3820.	3	2570.	13	3281.	31						
JAN	1986	5130.	17	3800.	27	4287.	31						
FEB	1986	7100.	28	2930.	8	4470.	28						
MAR	1986	19000.	27	7360.	4	13080.	31						
APR	1986	25100.	26	14000.	7	19447.	30						
MAY	1986	25600.	7	18800.	30	22077.	31						
JUN	1986	23900.	19	17000.	30	20953.	30						
JUL	1986	16400.	1	2320.	24	7760.	31						
AUG	1986	4470.	1	1700.	7	2546.	31						
SEP	1986	7510.	30	2890.	1	4782.	30	25600.	7 MAY	1650.	1 OCT	9033.	365
OCT	1986	7930.	1	4060.	9	4845.	31						
NOV	1986	6240.	29	4440.	5	5351.	30						
DEC	1986	6690.	21	5650.	11	6345.	31						
JAN	1987	6800.	5	3900.	18	5426.	31						

IDAHO DEPARTMENT OF WATER RESOURCES — SUMMARY HYDROGRAPH DATA

SNAKE RIVER AT BLACKFOOT (1979-93) — 13062500

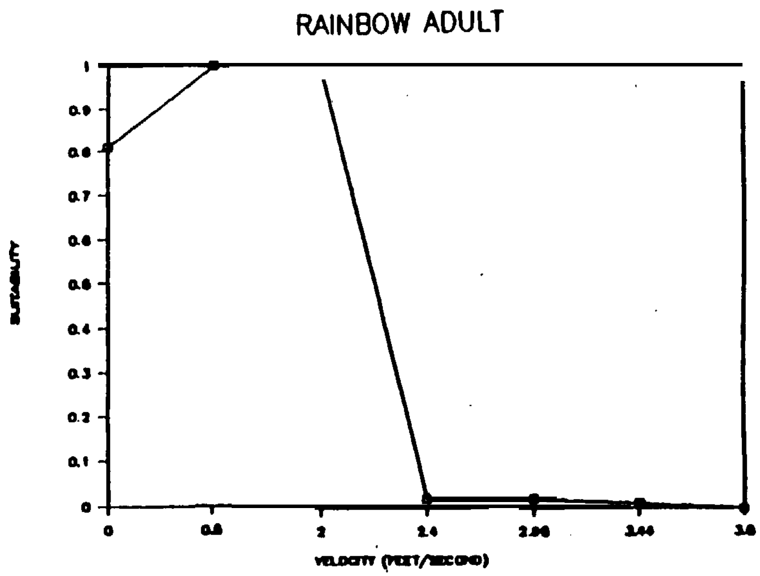
		* **** MONTHLY FLOW DATA * ****						* **** YEARLY FLOW DATA * ****					
MONTH	YEAR	MAXIMUM	DAY	MINIMUM	DAY	AVERAGE	COUNT	MAXIMUM	DAY	MINIMUM	DAY	AVERAGE	COUNT
FEB	1987	4930.	1	2760.	28	3779.	28						
MAR	1987	3740.	10	2350.	23	2914.	31						
APR	1987	6510.	20	1230.	29	3562.	30						
MAY	1987	11100.	30	1070.	15	4051.	31						
JUN	1987	10600.	1	1140.	9	3289.	30						
JUL	1987	5040.	20	813.	10	2394.	31						
AUG	1987	2400.	10	1040.	23	1555.	31						
SEP	1987	1820.	21	854.	10	1162.	30	11100.	30 MAY	813.	10 JUL	3726.	365
OCT	1987	2340.	18	984.	1	1542.	31						
NOV	1987	2610.	9	1240.	1	2284.	30						
DEC	1987	2390.	4	1600.	26	2045.	31						
JAN	1988	2230.	14	1750.	3	1922.	31						
FEB	1988	2040.	10	1540.	28	1759.	29						
MAR	1988	2330.	29	1060.	20	1489.	31						
APR	1988	3510.	23	628.	30	2151.	30						
MAY	1988	3300.	31	316.	7	1535.	31						
JUN	1988	4640.	10	811.	5	2050.	30						
JUL	1988	5130.	27	705.	7	2748.	31						
AUG	1988	4060.	5	1930.	17	2765.	31						
SEP	1988	4280.	6	537.	20	1929.	30	5130.	27 JUL	316.	7 MAY	2019.	366
OCT	1988	1930.	19	423.	6	1164.	31						
NOV	1988	2420.	6	1540.	29	2091.	30						
DEC	1988	2030.	8	840.	19	1535.	31						
JAN	1989	1650.	6	1130.	30	1398.	31						
FEB	1989	1940.	25	1230.	9	1553.	28						
MAR	1989	2660.	30	1600.	6	1981.	31						
APR	1989	6830.	28	1540.	14	3356.	30						
MAY	1989	11300.	13	6140.	30	8243.	31						
JUN	1989	6420.	6	618.	29	3132.	30						
JUL	1989	3050.	17	702.	6	1770.	31						
AUG	1989	2370.	7	1020.	31	1713.	31						
SEP	1989	2800.	20	1050.	6	1805.	30	11300.	13 MAY	423.	6 OCT	2485.	365
OCT	1989	3030.	6	1390.	1	2345.	31						
NOV	1989	3690.	1	2010.	30	2521.	30						
DEC	1989	2650.	6	1860.	12	2285.	31						
JAN	1990	3190.	13	1700.	20	2421.	31						
FEB	1990	2770.	11	1870.	8	2404.	28						
MAR	1990	2570.	6	1260.	31	2121.	31						
APR	1990	3960.	25	1590.	1	2526.	30						
MAY	1990	4290.	31	433.	4	2353.	31						
JUN	1990	5690.	2	1220.	10	2687.	30						
JUL	1990	5270.	30	1330.	1	2835.	31						
AUG	1990	6010.	20	1510.	31	4701.	31						
SEP	1990	8600.	21	995.	3	4496.	30	8600.	21 SEP	433.	4 MAY	2809.	365
OCT	1990	3700.	25	956.	8	2176.	31						
NOV	1990	3280.	2	2070.	29	2348.	30						
DEC	1990	2400.	11	830.	22	1641.	31						
JAN	1991	2310.	15	1120.	3	1751.	31						
FEB	1991	2510.	26	1510.	1	2218.	28						
MAR	1991	2910.	6	1910.	18	2321.	31						

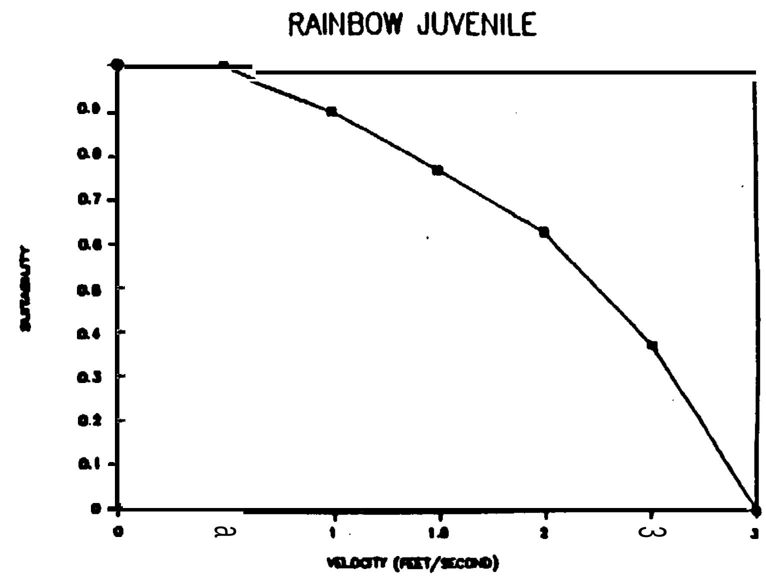
IDAHO DEPARTMENT OF WATER RESOURCES — SUMMARY HYDROGRAPH DATA

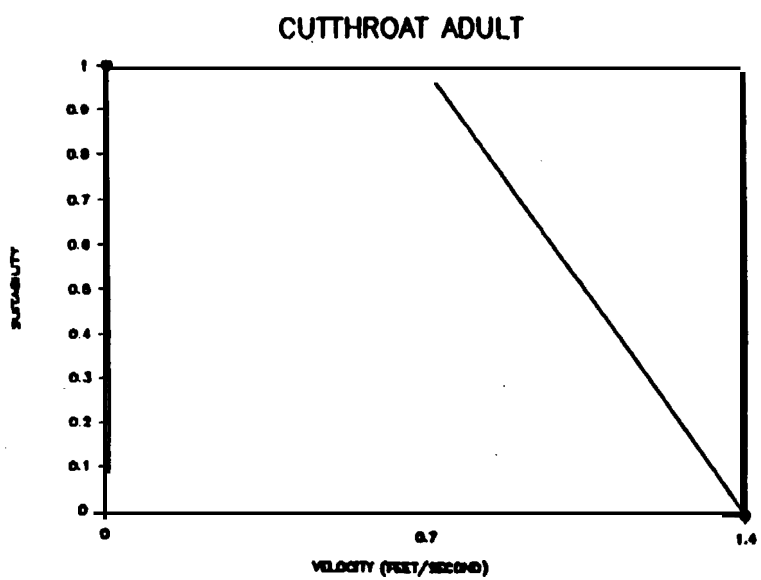
SNAKE RIVER AT BLACKFOOT (1979-93) — 13062500

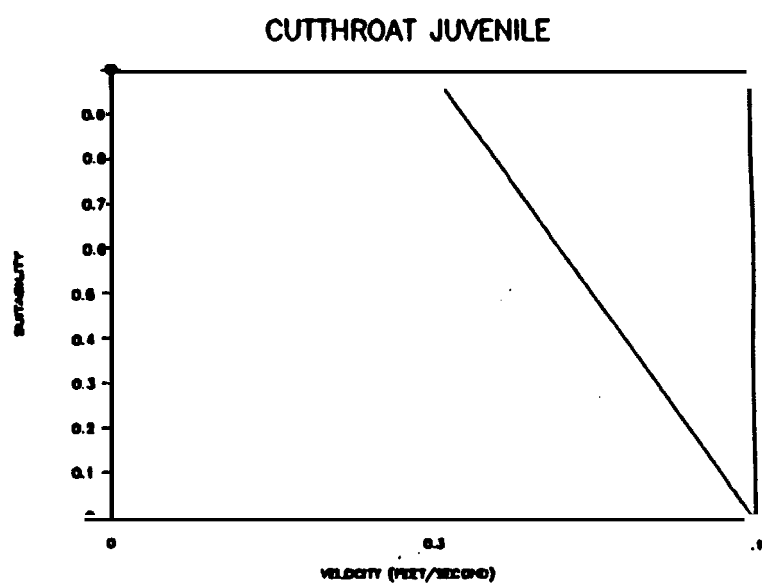
		***** MONTHLY FLOW DATA . ****						***** YEARLY FLOW DATA . ****					
MONTH	YEAR	MAXIMIUM	DAY	MINIMUM	DAY	AVERAGE	COUNT	MAXIMUM	DAY	MINIMUM	DAY	AVERAGE	COUNT
APR	1991	2290.	2	915.	17	1637.	30						
MAY	1991	8760.	21	1330.	7	4426.	31						
JUN	1991	14100.	16	1750.	1	6093.	30						
JUL	1991	3050.	1	1080.	10	2050.	31						
AUG	1991	2230.	5	999.	28	1525.	31						
SEP	1991	2060.	17	754.	7	1230.	30	14100.	16 JUN	754.	7 SEP	2449.	365
OCT	1991	3390.	29	825.	13	1655.	31						
NOV	1991	3830.	6	2200.	30	3154.	30						
DEC	1991	2890.	8	1790.	25	2178.	31						
JAN	1992	2150.	6	1500.	20	1832.	31						
FEB	1992	2570.	15	1870.	28	2160.	29						
MAR	1992	2230.	12	1560.	14	1767.	31						
APR	1992	3070.	20	35.	28	1788.	30						
MAY	1992	3770.	18	1790.	5	2758.	31						
JUN	1992	8160.	18	2040.	26	3925.	30						
JUL	1992	3810.	6	1580.	10	2679.	31						
AUG	1992	3720.	26	1840.	1	2656.	31						
SEP	1992	3100.	1	1450.	25	1980.	30	8160.	18 JUN	35.	28 APR	2375.	366
OCT	1992	2580.	11	1520.	24	1913.	31						
NOV	1992	2310.	22	1840.	1	2115.	30						
DEC	1992	2500.	12	1380.	4	1959.	31						
JAN	1993	2120.	2	1270.	8	1731.	31						
FEB	1993	2000.	12	1520.	1	1786.	28						
MAR	1993	3140.	29	1600.	2	2326.	31						
APR	1993	2940.	1	2090.	22	2503.	30						
MAY	1993	9360.	18	3310.	1	6394.	31						
JUN	1993	20700.	10	1490.	30	12253.	30						
JUL	1993	5580.	27	1130.	14	3135.	31						
AUG	1993	3760.	15	801.	4	2631.	31						
SEP	1993	3160.	4	943.	30	1957.	30	20700.	10 JUN	801.	4 AUG	3391.	365

Appendix B: Resident Fish and Wildlife Habitat Suitability Curves

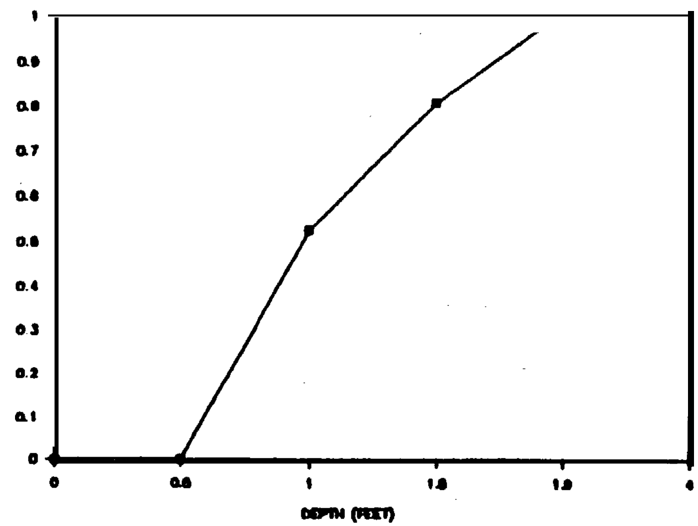

RAINBOW ADULT
SUITABILITY
VELOCITY (FEET/SECOND)


RAINBOW JUVENILE
SUITABILITY
VELOCITY (FEET/SECOND)

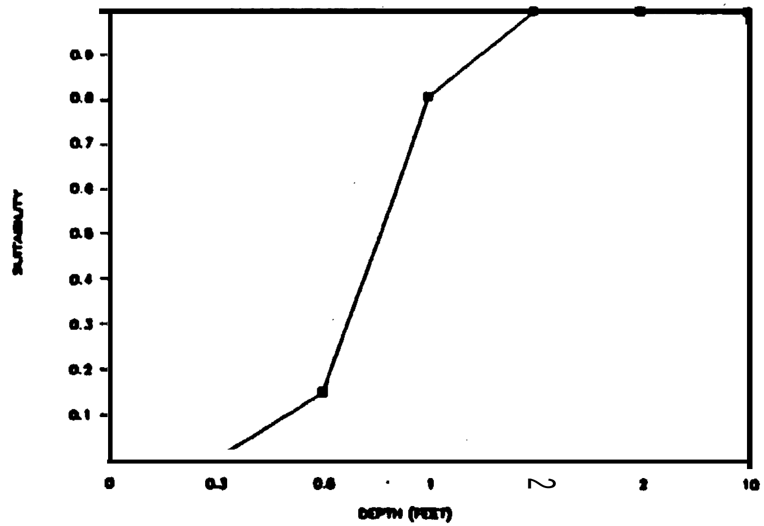

CUTTHROAT ADULT
SUITABILITY
VELOCITY (FEET/SECOND)


CUTTHROAT JUVENILE
SUITABILITY
VELOCITY (FEET/SECOND)

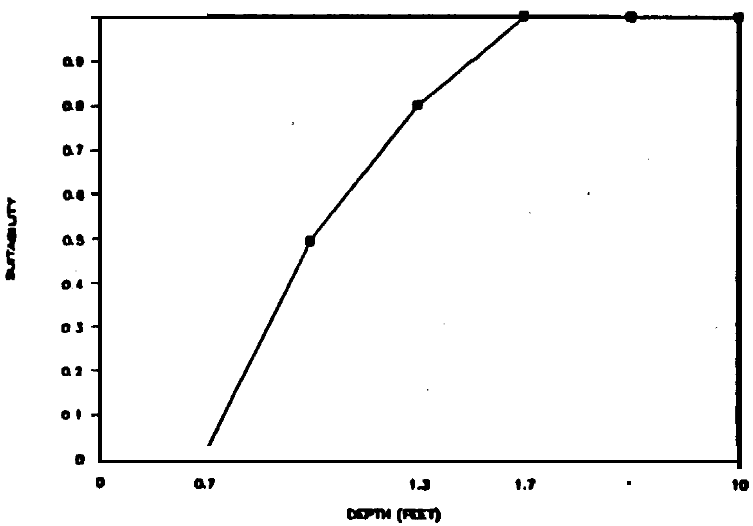
RAINBOW ADULT



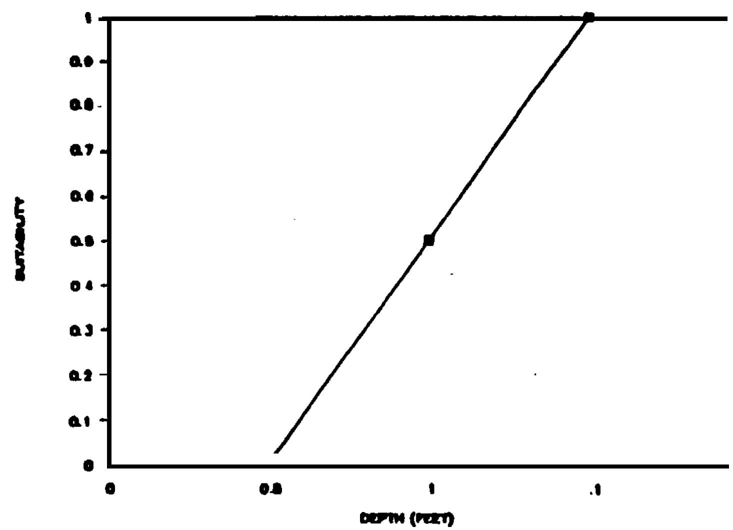
RAINBOW JUVENILE

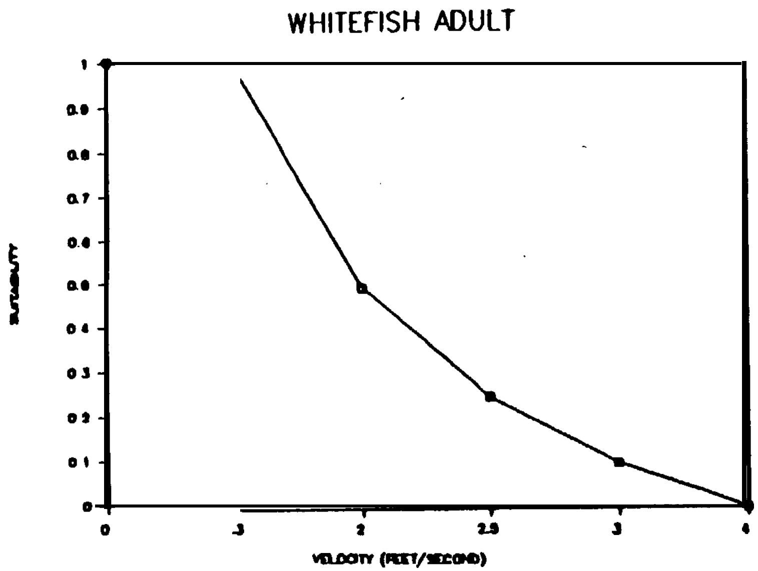


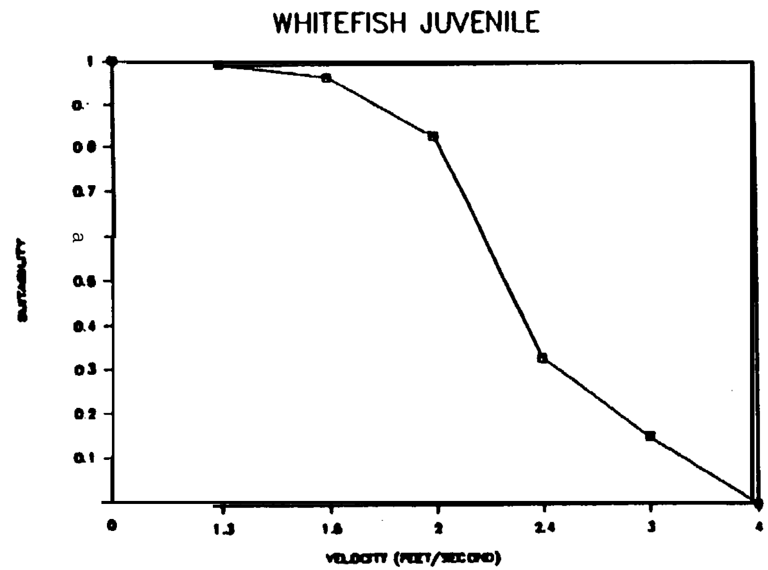
CUTTHROAT ADULT

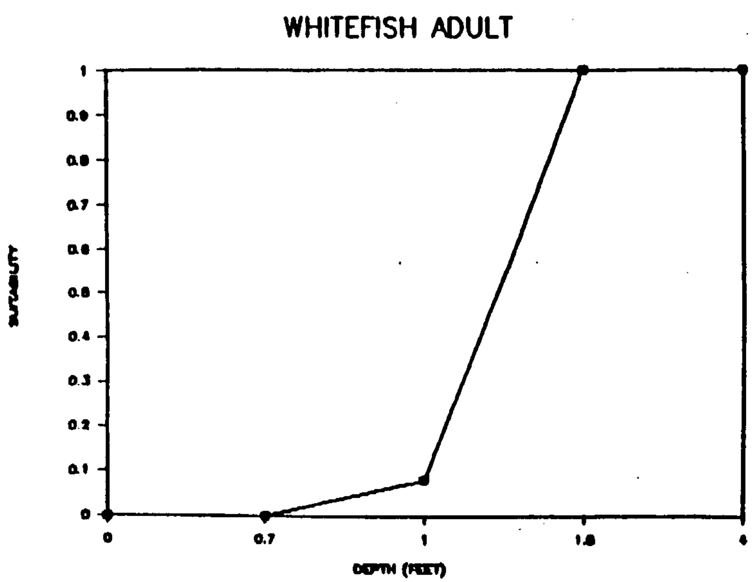


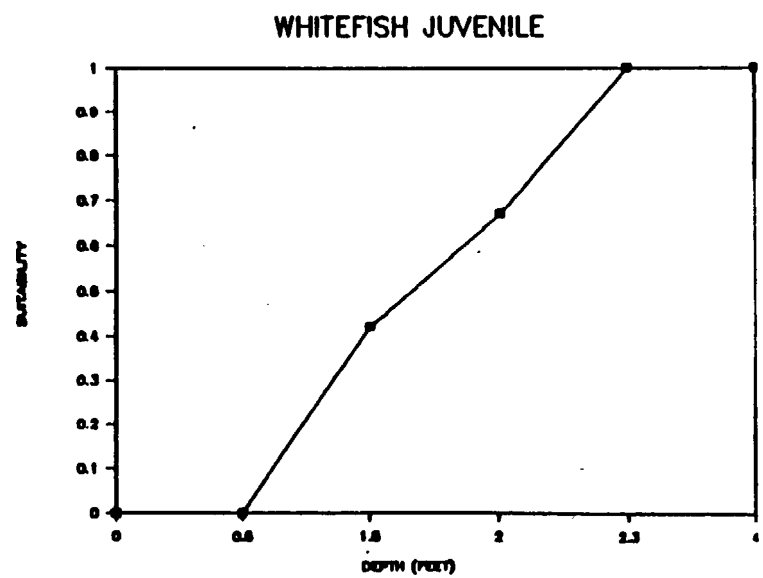
CUTTHROAT JUVENILE




WHITEFISH ADULT
SUITABILITY
VELOCITY (FEET/SECOND)

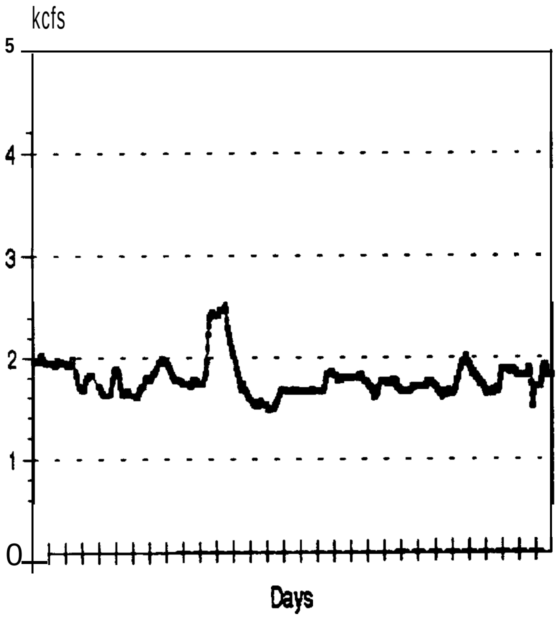

WHITEFISH JUVENILE
SUITABILITY
VELOCITY (FEET/SECOND)


WHITEFISH ADULT
SUITABILITY
DEPTH (FEET)

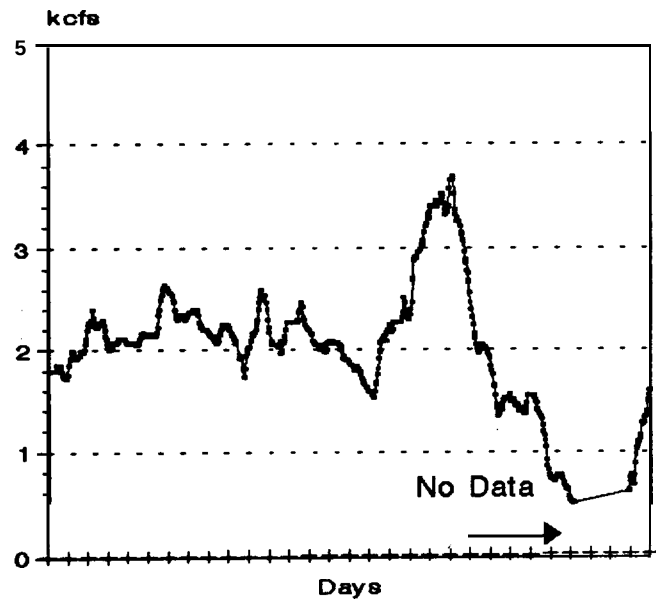

WHITEFISH JUVENILE
SUITABILITY
DEPTH (FEET)

Appendix C:
24-Hour Flow Fluctuations
for March-May 1992-1994

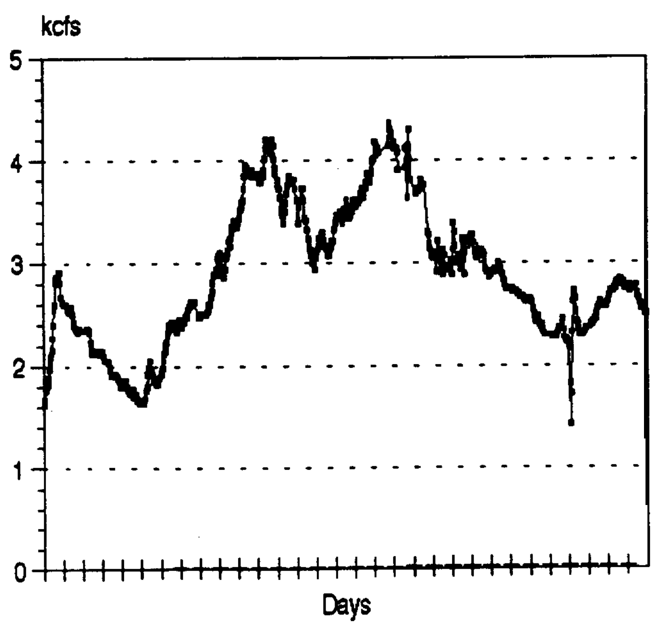
March 1992



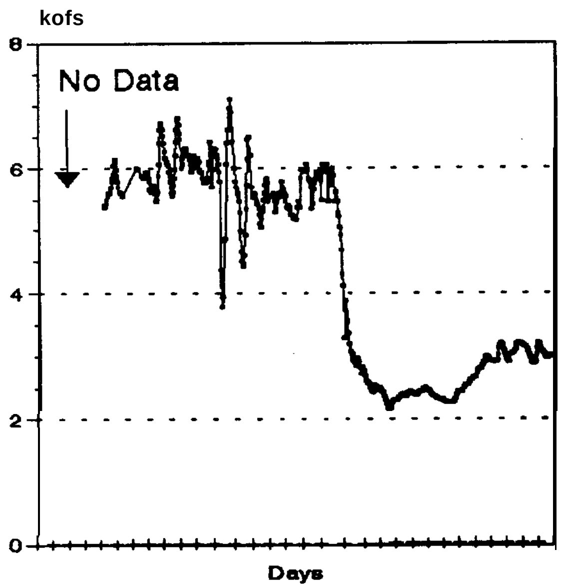
April 1992



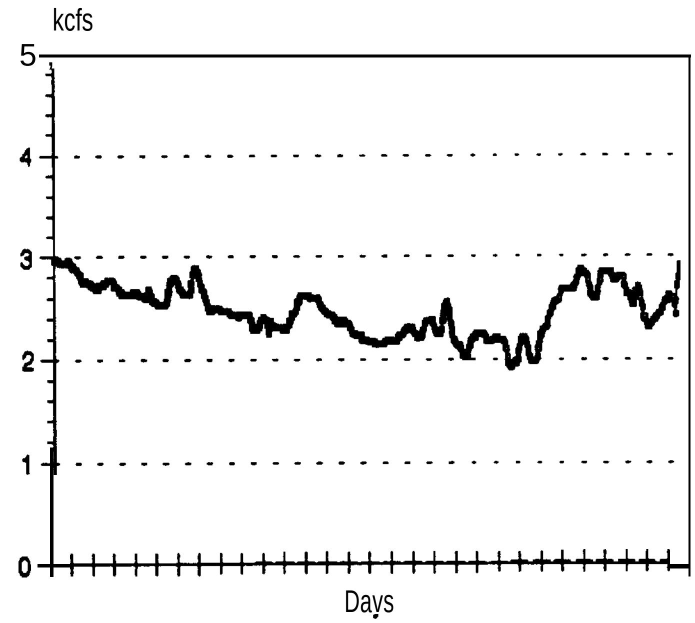
May 1992



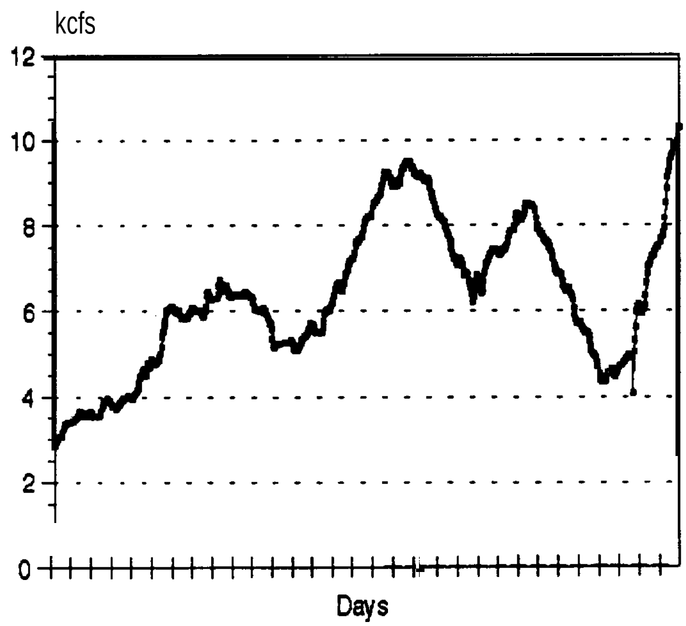
March 1993



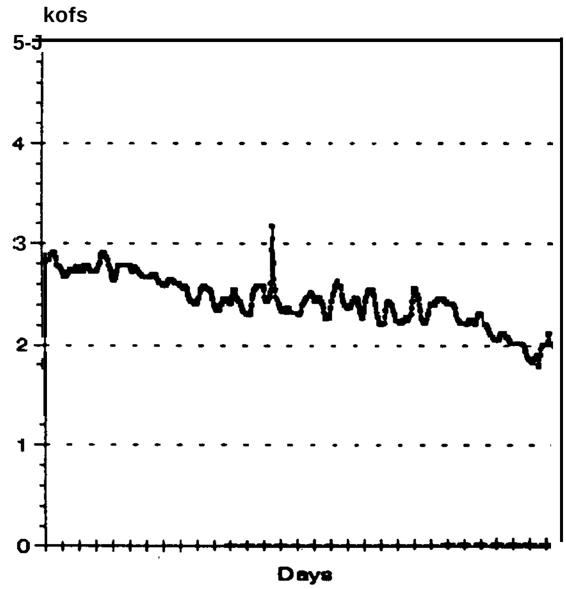
April 1993



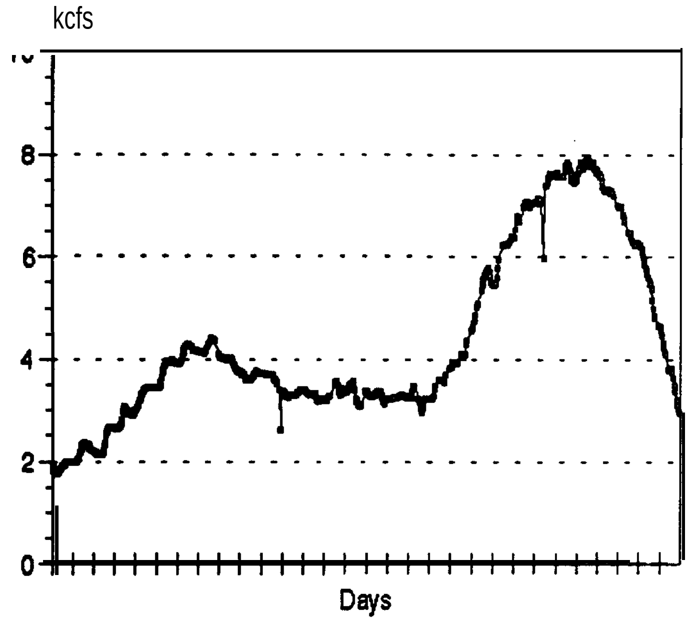
May 1993



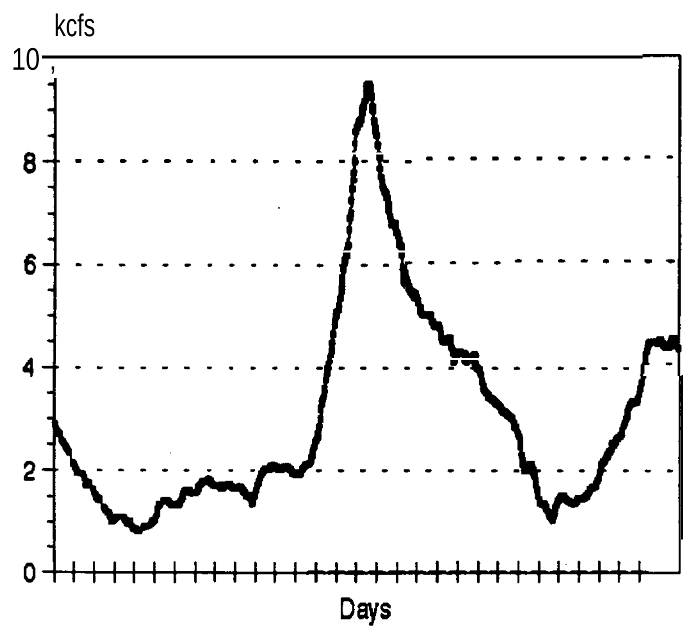
March 1994



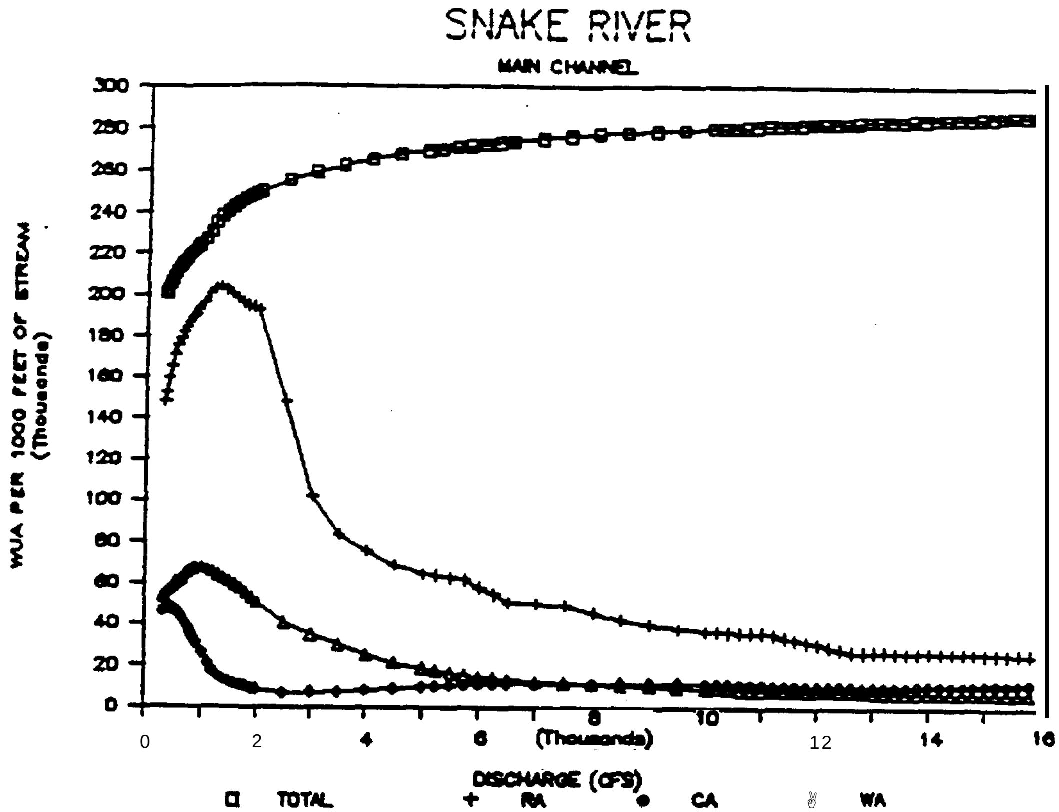
April 1994

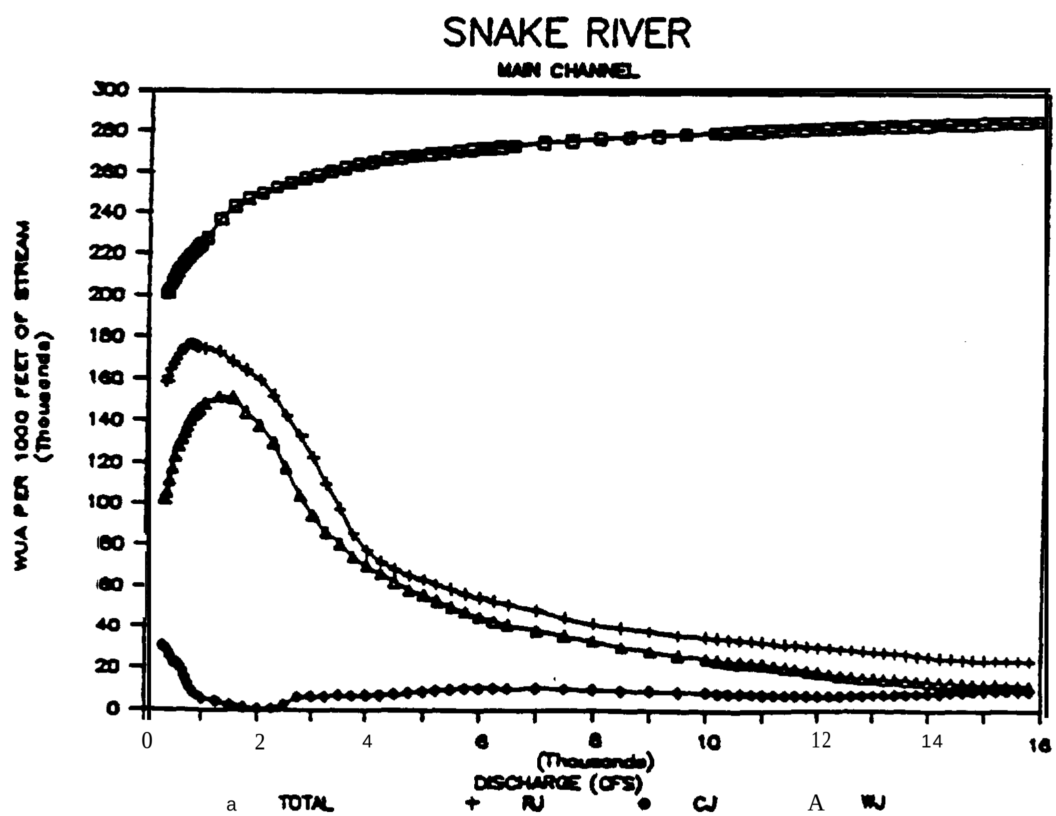


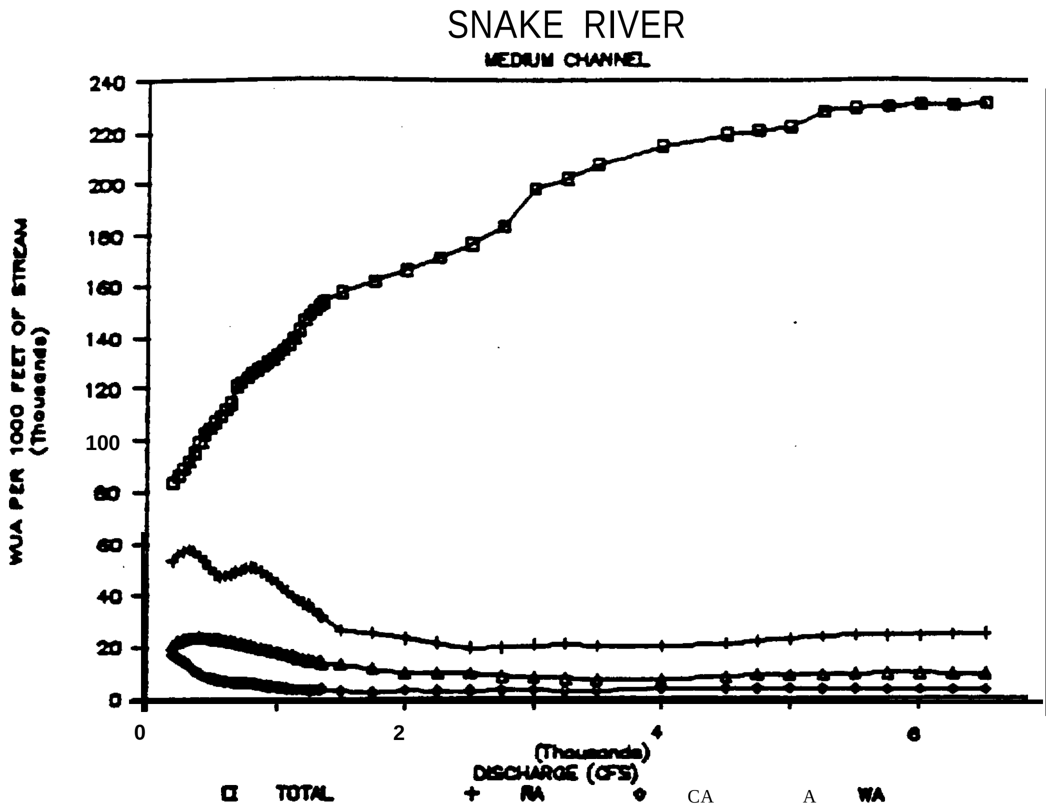
May 1994

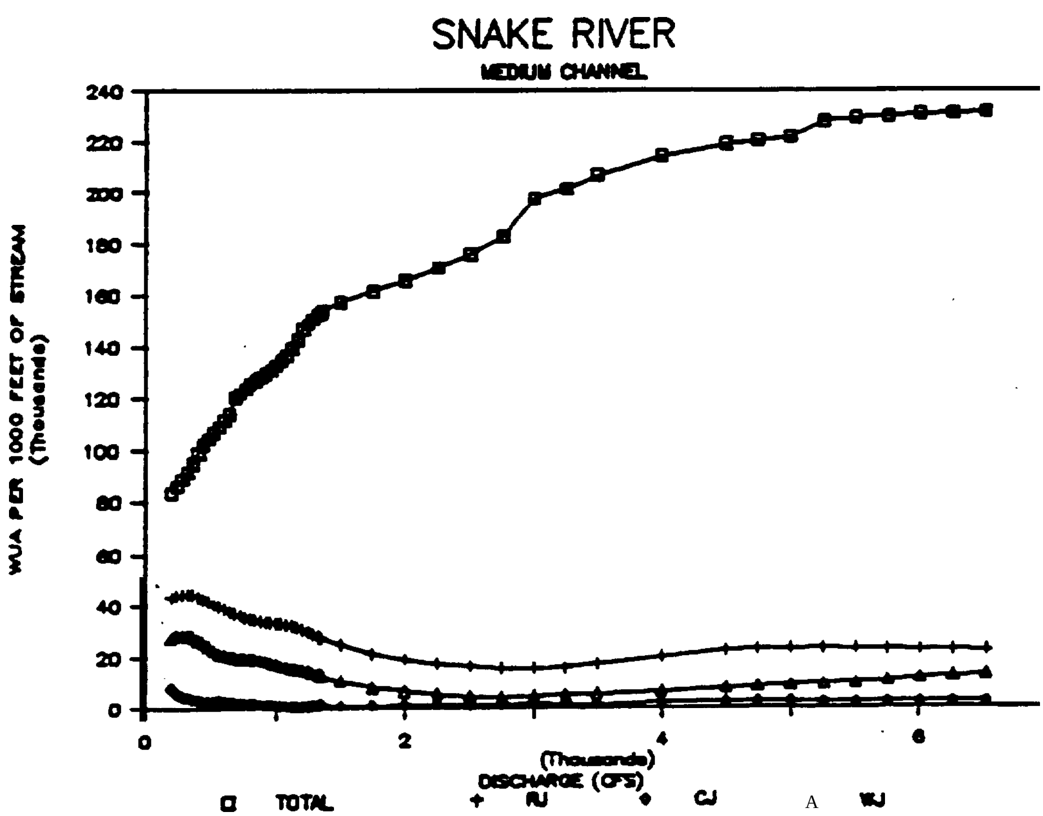


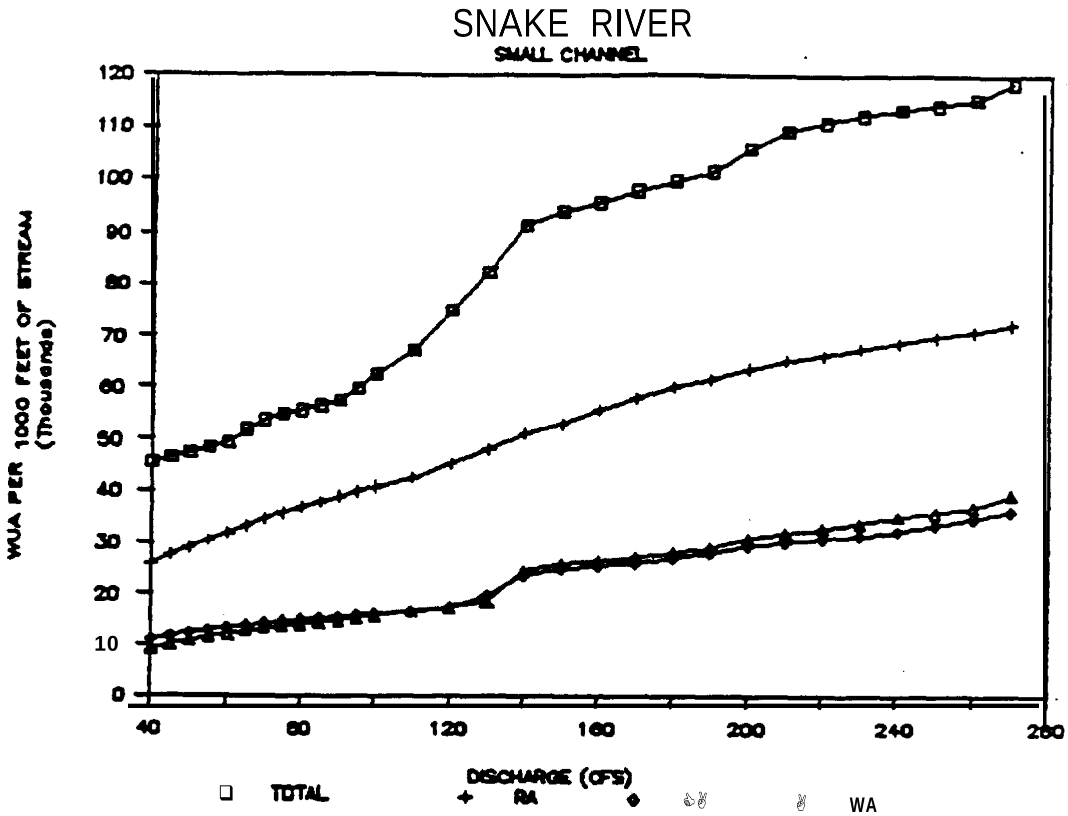
Appendix D:
Bio/West, Inc.
WUA Curves

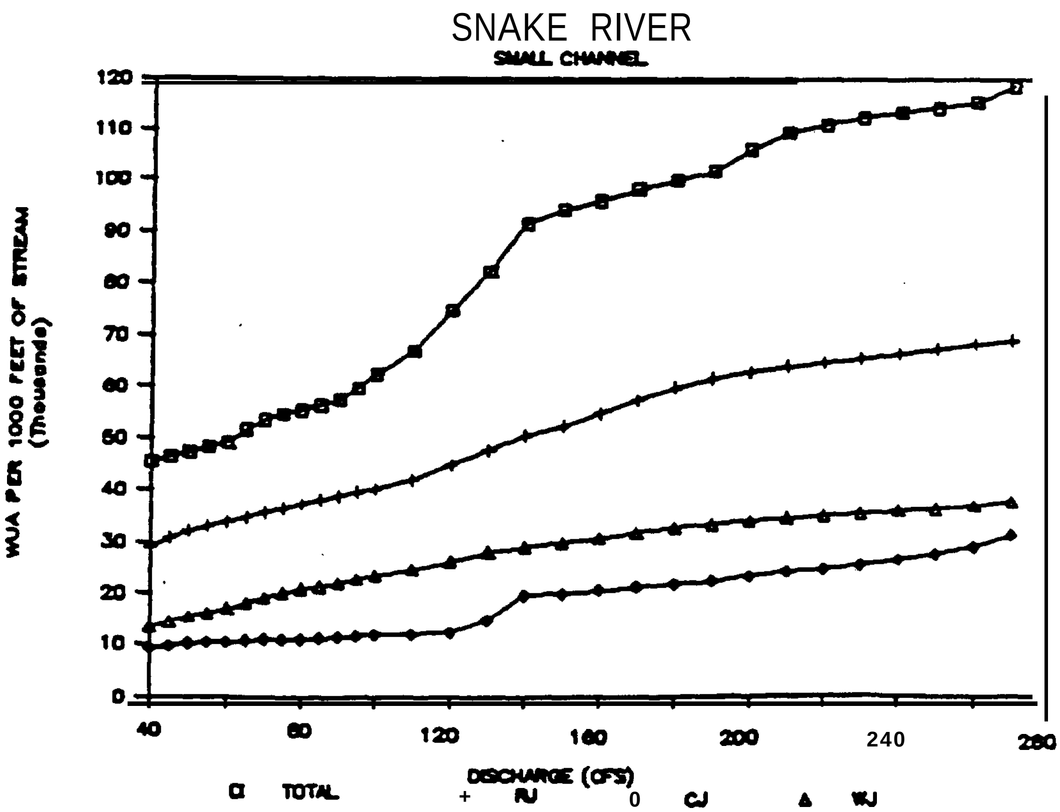

SNAKE RIVER
MAIN CHANNEL
WUA PER 1000 FEET OF STREAM (Thousands)
DISCHARGE (CFS) (Thousands)
TOTAL
RA
CA
WA


SNAKE RIVER
MAIN CHANNEL
WUA PER 1000 FEET OF STREAM (Thousands)
DISCHARGE (CFS) (Thousands)
TOTAL
RJ
CJ
WJ


SNAKE RIVER
MEDIUM CHANNEL
WUA PER 1000 FEET OF STREAM (Thousands)
0
20
40
60
80
100
120
140
160
180
200
220
240
0
2
4
6
(Thousands)
DISCHARGE (CFS)
TOTAL
RA
CA
A
WA


SNAKE RIVER
MEDIUM CHANNEL
WUA PER 1000 FEET OF STREAM (Thousands)
0
20
40
60
80
100
120
140
160
180
200
220
240
0
2
4
6
(Thousands)
DISCHARGE (CFS)
TOTAL
RJ
CJ
A
WJ


SNAKE RIVER
SMALL CHANNEL
WUA PER 1000 FEET OF STREAM (Thousands)
DISCHARGE (CFS)
TOTAL
RA
WA


SNAKE RIVER
SMALL CHANNEL
WUA PER 1000 FEET OF STREAM (Thousands)
DISCHARGE (CFS)
TOTAL
RJ
CJ
WJ

Appendix E: 1993 Accounting of Water Releases made for Salmon Flow Augmentation

A	B	C	D	E	F
	Meas.	Meas.	C-B	1.9835xD	
	DWORSHAK RES. STORAGE				
	Inflow In CFS	Outflow In CFS	Storage Release In CFS	Storage Release In AF	Accum. Storage Release in AF
July 1	3700	3900	200	397	397
July 2	4100	3800	-300	-595	-198
July 3	5600	1900	-3700	-7339	-7537
July 4	3400	9200	5800	11504	3967
July 5	3700	9200	5500	10909	14876
July 6	2900	9300	6400	12694	27571
July 7	3200	9200	6000	11901	39472
July 8	3200	9200	6000	11901	51373
July 9	2300	9200	6900	13686	65059
July 10	2600	9200	6600	13091	78150
July 11	1900	10500	8600	17058	95208
July 12	1800	13200	11400	22612	117820
July 13	1700	14900	13200	26182	144002
July 14	1600	14800	13200	26182	170184
July 15	1700	17400	15700	31141	201325
July 16	1200	19700	18500	36695	238020
July 17	2400	19500	17100	33918	271938
July 18	1600	19700	18100	35901	307839
July 19	900	18200	17300	34315	342154
July 20	3000	15000	12000	23802	365956
July 21	2100	13100	11000	21819	387774
July 22	1900	12100	10200	20232	408006
July 23	3000	12000	9000	17852	425857
July 24	2700	12000	9300	18447	444304
July 25	2300	12000	9700	19240	463544
July 26	2200	15800	13600	26976	490520
July 27	2600	12400	9800	19438	509958
July 28	1600	9400	7800	15471	525429
July 29	2100	9400	7300	14480	539909
July 30	2600	9400	6800	13488	553397
July 31	1700	9400	7700	15273	568669
August 1	1500	15000	13500	26777	595447
August 2	1400	21700	20300	40265	635712
August 3	1900	23000	21100	41852	677564
August 4	2000	23100	21100	41852	719415
August 5	1800	23600	21800	43240	762656
August 6	2000	25200	23200	46017	808673
August 7	1800	17200	15400	30546	839219
August 8	1700	16900	15200	30149	869368
August 9	1800	12100	10300	20430	889798
August 10	1500	10200	8700	17256	907055
August 11	1300	10200	8900	17653	924708
August 12	1300	10200	8900	17653	942361
August 13	1500	5400	3900	7736	950097
August 14	1400	1200	-200	-397	949700
August 15	2000	1200	-800	-1587	948113
August 16	2100	1200	-900	-1785	946328
August 17	2300	1200	-1100	-2182	944146
August 18	1600	1200	-400	-793	943353
August 19	1600	1200	-400	-793	942559
August 20	2400	1200	-1200	-2380	940179
August 21	1700	1200	-500	-992	939187
August 22	1900	1200	-700	-1388	937799
August 23	1700	1200	-500	-992	936807
August 24	1400	1200	-200	-397	936410
August 25	1400	1200	-200	-397	936014
August 26	1700	1200	-500	-992	935022
August 27	1300	1200	-100	-198	934824
August 28	1700	1200	-500	-992	933832
August 29	1700	1200	-500	-992	932840
August 30	1600	1200	-400	-793	932047
August 31	1400	1200	-200	-397	931650
September 1	1400	1200	-200	-397	931253
September 2	1400	1200	-200	-397	930857
September 3	1200	1200	0	0	930857

	A	B	C	D	E	F
1		Meas.	Meas.	C-B	1.9835xD	
2						
3		DWORSHAK RES. STORAGE				
4-7		Inflow In CFS	Outflow In CFS	Storage Release In CFS	Storage Release In AF	Accum. Storage Release in AF
73	September 4	1300	1200	-100	-198	930658
74	September 5	1200	1200	0	0	930658
75	September 6	1200	1200	0	0	930658
76	September 7	1200	1200	0	0	930658
77	September 8	1200	1200	0	0	930658
78	September 9	1200	1200	0	0	930658
79	September 10	1200	1200	0	0	930658
80	September 11	900	1200	300	595	931253
81	September 12	1100	1200	100	198	931452
82	September 13	1200	1200	0	0	931452
83	September 14	1400	1200	-200	-397	931055
84	September 15	1600	1200	-400	-793	930262
85	September 16	1600	1200	-400	-793	929468
86	September 17	1200	1200	0	0	929468
87	September 18	1200	1200	0	0	929468
88	September 19	1200	1200	0	0	929468
89	September 20	1100	1200	100	198	929666
90	September 21	1200	1200	0	0	929666
91	September 22	1100	1200	100	198	929865
92	September 23	1100	1200	100	198	930063
93	September 24	1200	1200	0	0	930063
94	September 25	900	1200	300	595	930658
95	September 26	1200	1200	0	0	930658
96	September 27	1000	1200	200	397	931055
97	September 28	900	1200	300	595	931650
98	September 29	2400	1200	-1200	-2380	929270
99	September 30	930	1200	270	536	929805
100	October 1	1100	1200	100	198	930004
101	October 2	1200	1200	0	0	930004
102	October 3	1000	1200	200	397	930400
103	October 4	1000	1200	200	397	930797
104	October 5	800	1200	400	793	931590
105	October 6	800	1200	400	793	932384
106	October 7	1500	1200	-300	-595	931789
107	October 8	1900	1200	-700	-1388	930400
108	October 9	1200	1200	0	0	930400
109	October 10	1200	1200	0	0	930400
110	October 11	1000	1200	200	397	930797
111	October 12	1100	1200	100	198	930995
112	October 13	1200	1200	0	0	930995
113	October 14	1200	1200	0	0	930995
114	October 15	1700	1200	-500	-992	930004
115	October 16	1500	1200	-300	-595	929409
116	October 17	1400	1200	-200	-397	929012
117	October 18	1300	1200	-100	-198	928814
118	October 19	1200	1200	0	0	928814
119	October 20	1200	1200	0	0	928814
120	October 21	1100	1200	100	198	929012
121	October 22	1100	1200	100	198	929210
122	October 23	1000	1200	200	397	929607
123	October 24	1000	1200	200	397	930004
124	October 25	900	1200	300	595	930599
125	October 26	1000	1200	200	397	930995
126	October 27	700	1200	500	992	931987
127	October 28	1100	1200	100	198	932185
128	October 29	1200	1200	0	0	932185
129	October 30	1100	1200	100	198	932384
130	October 31	800	1200	400	793	933177
131	November 1	1200	1200	0	0	933177
132	November 2	1200	1200	0	0	933177
133	November 3	1100	1500	400	793	933971
134	November 4	1300	1200	-100	-198	933772
135	November 5	1200	1200	0	0	933772
136	November 6	1200	1200	0	0	933772
137	November 7	1200	1200	0	0	933772

B	A	B	C	D	E	F
1		Meas.	Meas.	C-B	1.9835xD	
2						
3		DWORSHAK RES. STORAGE				
4		Inflow	Outflow	Storage	Storage	Accum.
5		n CFS	In CFS	Release	Release	Storage
6				In	In	Release
7				CFS	AF	in AF
138	November 8	1300	1300	0	0	933772
139	November 9	1100	1200	100	198	933971
140	November 10	1200	1200	0	0	933971
141	November 11	1200	1200	0	0	933971
142	November 12	1100	1200	100	198	934169
143	November 13	1200	1200	0	0	934169
144	November 14	1200	1200	0	0	934169
145	November 15	1200	1200	0	0	934169
146	November 16	700	1200	500	992	935161
147	November 17	1200	1200	0	0	935161
148	November 18	100	1200	1100	2182	937343
149	November 19	1200	1200	0	0	937343
150	November 20	800	1200	400	793	938136
151	November 21	700	1200	500	992	939128
152	November 22	1200	1200	0	0	939128
153	November 23	300	1200	900	1785	940913
154	November 24	600	1200	600	1190	942103
155	November 25	400	1200	800	1587	943690
156	November 26	650	1200	550	1091	944781
157	November 27	725	1200	475	942	945723
158	November 28	800	1200	400	793	946516
159	November 29	1500	1200	-300	-595	945921
160	November 30	1700	1200	-500	-992	944929
161	December 1	2000	1200	-800	-1587	943343
162	December 2	1900	1200	-700	-1388	941954
163	December 3	1700	1200	-500	-992	940962
164	December 4	1500	1200	-300	-595	940367
165	December 5	1800	1200	-600	-1190	939177
166	December 6	1200	1200	0	0	939177
167	December 7	1300	1200	-100	-198	938979
168	December 8	1500	1200	-300	-595	938384
169	December 9	2000	1200	-800	-1587	936797
170	December 10	1700	1200	-500	-992	935805
171	December 11	1300	1200	-100	-198	935607
172	December 12	1600	1200	-400	-793	934814
173	December 13	1400	1100	-300	-595	934219
174	December 14	1100	1200	100	198	934417
175	December 15	1300	1200	-100	-198	934219
176	December 16	1200	1200	0	0	934219
177	December 17	1200	1200	0	0	934219
178	December 18	1000	1200	200	397	934615
179	December 19	1000	1200	200	397	935012
180	December 20	1100	1200	100	198	935210
181	December 21	1000	1200	200	397	935607
182	December 22	1000	1200	200	397	936004
183	December 23	1200	1200	0	0	936004
184	December 24	800	1200	400	793	936797
185	December 25	500	1200	700	1388	938186
186	December 26	500	1200	700	1388	939574
187	December 27	100	1200	200	397	939971
188	December 28	900	1200	300	595	940566
189	December 29	800	1200	400	793	941359
190	December 30	1200	1200	0	0	941359
191	December 31	1210	1200	-10	-20	941339
192						
193	January 1	1800	1200	-600	-1190	940149
194	January 2	1500	1200	-300	-595	939554
195	January 3	1900	1200	-700	-1388	938166
196	January 4	2200	1200	-1000	-1984	936182
197	January 5	3000	1200	-1800	-3570	932612
198	January 6	2200	1200	-1000	-1984	930628
199	January 7	1900	1200	-700	-1388	929240
200	January 8	1700	1200	-500	-992	928248
201	January 9	1600	1200	-400	-793	927455
202	January 10	1800	1200	-600	-1190	926265

B	A	B	C	D	E	F
1		Meas.	Meas.	C-B	1.9835xD	
2						
3		DWORSHAK RES. STORAGE				
4–7		Inflow n CFS	Outflow In CFS	Storage Release In CFS	Storage Release In AF	Accum. Storage Release in AF
203	January 11	2000	1200	-800	-1587	924678
204	January 12	2400	1200	-1200	-2380	922298
205	January 13	2500	1200	-1300	-2579	919719
206	January 14	3000	1200	-1800	-3570	916149
207	January 15	2890	1200	-1690	-3352	912797
208	January 16	2700	1200	-1500	-2975	909822
209	January 17	2200	1200	-1000	-1984	907838
210	January 18	2000	1200	-800	-1587	906251
211	January 19	1900	1200	-700	-1388	904863
212	January 20	1700	1200	-500	-992	903871
213	January 21	1700	1200	-500	-992	902879
214	January 22	1600	1200	-400	-793	902086
215	January 23	1600	1200	-400	-793	901292
216	January 24	1600	1200	-400	-793	900499
217	January 25	1400	1200	-200	-397	900102
218	January 26	1500	1200	-300	-595	899507
219	January 27	1600	1200	-400	-793	898714
220	January 28	1400	1200	-200	-397	898317
221	January 29	1200	1200	0	0	898317
222	January 30	1400	1200	-200	-397	897921

B	A	G	H	I	J	K	L	M	N	O	P	Q
1		Meas.	Meas.	Meas.	Computed	H+I+J	1.9835xK		G-K	Meas.	Given	
2		5	6 + 7	8	9 + 10	11		12	13=5-11	1	2	3
3		IPCo. BROWNLEE/HELLS CANYON COMPLEX STORAGE										
4		Measured	Adjustments to Brownlee Flow			Total	Total	Accum	Adjusted	Hells Can.	Request	ACCUM.
5		Brownlee	Milner Fish	Boise Fish	Payette Fish	Fish Flow	Fish Flow	Flow	Brownlee	Measured	For	REQUEST
6		Inflow	Release	Release	Release	Adust.	Adjust.	Adjust.	Inflow	Flow	Fish	FOR FISH
7		in CFS	Delay=7	Delay=3	Delay=0	in CFS	in AF	in AF	in CFS	in CFS	in CFS	IN AF
8	July 1	11700							11700	11060		0
9	July 2	11100							11100	10913		0
10	July 3	10600							10600	8451		0
11	July 4	11210							11210	8538		0
12	July 5	11390							11390	11747		0
13	July 6	11540							11540	14973		0
14	July 7	10140							10140	10544		0
15	July 8	10600							10600	11531		0
16	July 9	9560							9560	10550		0
17	July 10	9340							9340	8810		0
18	July 11	9120							9120	8685		0
19	July 12	9250			0	0	0		9250	13356	4000	7934
20	July 13	9220			455	455	902	902	8765	13425	4000	15868
21	July 14	10700	0	0	1204	1204	2388	3291	9496	13096	4000	23802
22	July 15	11125	0	0	1569	1569	3112	6403	9556	12901	4000	31736
23	July 16	11550	75	403	1879	2357	4675	11078	9193	13278	4000	39670
24	July 17	12400	833	443	1929	3205	6357	17435	9195	14847	4000	47604
25	July 18	13570	2029	444	1915	4388	8704	26139	9182	12227	4000	55538
26	July 19	12370	1655	446	1842	3943	7821	33959	8427	18956	10000	75373
27	July 20	12500	1645	458	1725	3828	7594	41553	8672	19094	10000	95208
28	July 21	12960	1648	464	1678	3790	7517	49071	9170	20026	10000	115043
29	July 22	13070	1651	462	1636	3749	7435	56506	9321	19682	10000	134878
30	July 23	13620	1651	464	1723	3838	7612	64118	9782	20252	10000	154713
31	July 24	13680	1651	479	1901	4031	7996	72114	9649	17911	7000	168598
32	July 25	14160	1652	490	1772	3914	7763	79877	10246	16818	6000	180499
33	July 26	15200	1654	479	1767	3900	7736	87614	11300	21767	11500	203309
34	July 27	14680	1652	452	1634	3738	7414	95027	10942	22133	11500	226119
35	July 28	13790	1652	466	1595	3713	7366	102393	10077	23198	11500	248929
33	July 29	14190	1652	471	1461	3584	7110	109502	10606	20191	8000	264797
37	July 30	12840	1655	476	1315	3446	6835	116337	9394	10216	0	264797
38	July 31	12530	1658	453	1251	3362	6668	123005	9168	19586	10000	284632
39	August 1	12030	1655	436	1374	3465	6873	129878	8565	14540	3300	291178
40	August 2	11150	1654	438	1349	3441	6825	136703	7709	13303	3300	297723
41	August 3	11710	1658	445	1289	3392	6728	143431	8318	12232	3300	304269
42	August 4	11800	1659	448	1240	3347	6639	150070	8453	11564	3300	310814
43	August 5	10780	1654	456	1218	3328	6601	156671	7452	11645	3300	317360
44	August 6	11330	1651	471	1009	3131	6210	162882	8199	12316	3300	323906
45	August 7	12120	1367	483	1138	2988	5927	168808	9132	15079	7000	337790
46	August 8	11840	1651	481	1167	3299	6544	175352	8541	15214	7000	351675
47	August 9	12900	1766	450	1181	3397	6738	182090	9503	20616	12000	375477
48	August 10	14490	1885	138	1178	3201	6349	188439	11289	20214	11500	398287
49	August 11	13690	1659	0	1146	2805	5564	194003	10885	19636	10600	419312
50	August 12	12830	2248	0	1119	3367	6678	200681	9463	10457	4800	428833
51	August 13	13460	2627	0	1094	3721	7381	208062	9739	14602	3000	434783
52	August 14	12990	2655		1175	3830	7597	215659	9160	9491	0	434783
53	August 15	13050	2654		1179	3833	7603	223261	9217	8877	0	434783
54	August 16	14200	2658		1252	3910	7755	231017	10290	16108	6900	448469
55	August 17	13830	2656		1609	4265	8460	239477	9565	16779	8000	464337
56	August 18	14400	2656		1801	4457	8840	248317	9943	16760	6000	476238
57	August 19	13390	1989		1580	3569	7079	355396	9821	19077	5900	487941
58	August 20	12630	1643		1439	3082	6113	261509	9548	21139	9000	505793
59	August 21	12150	806		1322	2128	4221	265730	10022	11772	5300	516305
60	August 22	11810	220		1261	1481	2938	268668	10329	11479	5200	526619
61	August 23	11240	223		1258	1481	2938	271605	9759	12282		526619
62	August 24	10840	223		1178	1401	2779	274384	9439	12156		526619
63	August 25	10520	223		1190	1413	2803	277187	9107	13848		526619
64	August 26	11000	223		1155	1378	2733	279920	9622	10679		526619
65	August 27	10650	222		1126	1348	2674	282594	9302	11381		526619
66	August 28	10890	222		1067	1289	2557	285151	9601	10118		526619
67	August 29	9960	227		-196	423	839	285990	9537	7215		526619
68	August 30	10720	228		0	228	452	286442	10492	13216		526619
69	August 31	10600	223		0	223	442	286884	10377	12300		526619
70	September 1	10620	222			222	440	287324	10398	13714		526619
71	September 2	10540	223			223	442	287767	10317	13878		526619
72	[September31	102501	223			2231	442	2882091	100271	135041		5266191

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B	A	G	H	I	J	K	L	M	N	O	P	Q
1		Meas.	Meas.	Meas.	Computed	H+I+J	1.9835xK		G-K	Meas.	Given	
2		5	6 + 7	8	9 + 10	11		12	13=5-11	1	2	3
3		IPCo. BROWNLEE/HELLS CANYON COMPLEX STORAGE										
4–7		Measured Brownlee Inflow in CFS	Adjustments to Brownlee Flow: Milner Fish Release Delay=7	Boise Fish Release Delay=3	Payette Fish Release Delay=0	Total Fish Flow Adust. in CFS	Total Fish Flow Adjust. in AF	Accum Flow Adjust. in AF	Adjusted Brownlee Inflow in CFS	Hells Can. Measured Flow in CFS	Request For Fish in CFS	ACCUM. REQUEST FOR FISH IN AF
73	September 4	10040	221			221	438	288647	9819	14172		526619
74	September 5	10190	221			221	438	289086	9969	12126		526619
75	September 6	10930	221			221	438	289524	10709	13869		526619
76	September 7	10980	221			221	438	289963	10759	15197		526619
77	September 8	10410	221			221	438	290401	10189	14865		526619
78	September 9	9780	221			221	438	290839	9559	15951		526619
79	September 10	10400	221			221	438	291278	10179	15216		526619
80	September 11	9880	221			221	438	291716	9659	13121		526619
81	September 12	9650	221			221	438	292154	9429	9055		526619
82	September 13	10340	221			221	438	292593	10119	5598		526619
83	September 14	10390	221			221	438	293031	10169	5580		526619
84	September 15	11300	221			221	438	293469	11079	5624		526619
85	September 16	11130	221			221	438	293908	10909	5677		526619
86	September 17	11550	222			222	440	294348	11328	5691		526619
87	September 18	11560	221			221	438	294786	11339	11635		526619
88	September 19	11470	221			221	438	295225	11249	9489		526619
89	September 20	11950	221			221	438	295663	11729	12727		526619
90	September 21	11260	221			221	438	296101	11039	12451		526619
91	September 22	11670	221			221	438	296540	11449	13608		526619
92	September 23	12360	221			221	438	296978	12139	18346		526619
93	September 24	11810	221			221	438	297417	11589	12468		526619
94	September 25	12350	221			221	438	297855	12129	13822		526619
95	September 26	13250	221			221	438	298293	13029	16909		526619
96	September 27	12350	221			221	438	298732	12129	16901		526619
97	September 28	12270	221			221	438	299170	12049	20704		526619
98	September 29	12240	221			221	438	299608	12019	22004		526619
99	September 30	12500	225			225	446	300055	12275	19352		526619
100	October 1	12680	221			221	438	300493	12459	22277		526619
101	October 2	11970	221			221	438	300931	11749	23067		526619
102	October 3	11430	218			218	432	301364	11212	14941		526619
103	October 4	12720	221			221	438	301802	12499	24243		526619
104	October 5	12180	221			221	438	302240	11959	18567		526619
105	October 6	12270	221			221	438	302679	12049	18148		526619
106	October 7	12070	221			221	438	303117	11849	19166		526619
107	October 8	12550	221			221	438	303555	12329	17932		526619
108	October 9	12430	221			221	438	303994	12209	14808		526619
109	October 10	12550	221			221	438	304432	12329	13165		526619
110	October 11	12790	229			229	454	304886	12561	17990		526619
111	October 12	12920	223			223	442	305329	12697	17677		526619
112	October 13	13650	227			227	450	305779	13423	16955		526619
113	October 14	13370	221			221	438	306217	13149	20941		526619
114	October 15	13260	221			221	438	306656	13039	21573		526619
115	October 16	13050	223			223	442	307098	12827	19295		526619
116	October 17	13390	227			227	450	307548	13163	16129		526619
117	October 18	12910	224			224	444	307993	12686	14046		526619
118	October 19	14010	223			223	442	308435	13787	10838		526619
119	October 20	13450	223			223	442	308877	13227	13365		526619
120	October 21	12580	223			223	442	309320	12357	11246		526619
121	October 22	13220	228			228	452	309772	12992	11173		526619
122	October 23	13310	237			237	470	310242	13073	9130		526619
123	October 24	14510	234			234	464	310706	14276	9170		526619
124	October 25	14630	278			278	551	311257	14352	9092		526619
125	October 26	12810	374			374	742	311999	12436	9117		526619
126	October 27	12660	1297			1297	2573	314572	11363	9132		526619
127	October 28	12010	3727			3727	7393	321964	8283	9160		526619
128	October 29	12470	1013			1013	2009	323974	11457	9141		526619
129	October 30	11870	259			259	514	324487	11611	9105		526619
130	October 31	12530	223			223	442	324930	12307	9093		526619
131	November 1	11980	826			826	1638	326568	11154	9061		526619
132	November 2	12190	258			258	512	327080	11932	9066		526619
133	November 3	11860	228			228	452	327532	11632	9059		526619
134	November 4	11400	223			223	442	327974	11177	9080		526619
135	November 5	12880	223			223	442	328417	12657	9123		526619
136	November 6	11970	223			223	442	328859	11747	9076		526619
137	November 7	11790	239			239	474	329333	11551	9060		526619

B	A	G	H	I	J	K	L	M	N	O	P	Q
1		Meas.	Meas.	Meas.	Computed	H+I+J	1.9835xK		G-K	Meas.	Given	
2		5	6 + 7	8	9 + 10	11		12	13=5-11	1	2	3
3		IPCo. BROWNLEE/HELLS CANYON COMPLEX STORAGE										
4		Measured	Adjustments to Brownlee Flow			Total	Total	Accum	Adjusted	Hells Can.	Request	ACCUM.
5		Brownlee	Milner Fish	Boise Fish	Payette Fish	Fish Flow	Fish Flow	Flow	Brownlee	Measured	For	REQUEST
6		Inflow	Release	Release	Release	Adust.	Adjust.	Adjust.	Inflow	Flow	Fish	FOR FISH
7		in CFS	Delay=7	Delay=3	Delay=0	in CFS	in AF	in AF	in CFS	in CFS	in CFS	IN AF
138	November 8	12020	0			0	0	329333	12020	9110		526619
139	November 9	12450	0			0	0	329333	12450	9187		526619
140	November 10	11950	0			0	0	329333	11950	9151		526619
141	November 11	12520	0			0	0	329333	12520	9134		526619
142	November 12	11970	0			0	0	329333	11970	9105		526619
143	November 13	11730	0			0	0	329333	11730	9111		526619
144	November 14	12250	0			0	0	329333	12250	9134		526619
145	November 15	11100	0			0	0	329333	11100	9211		526619
146	November 16	12160	0			0	0	329333	12160	9131		526619
147	November 17	12110	0			0	0	329333	12110	9068		526619
148	November 18	11300	0			0	0	329333	11300	9246		526619
149	November 19	12170	0			0	0	329333	12170	9217		526619
150	November 20	12120	0			0	0	329333	12120	9184		526619
151	November 21	12040	0			0	0	329333	12040	9166		526619
152	November 22	11430	0			0	0	329333	11430	9193		526619
153	November 23	11790	0			0	0	329333	11790	9200		526619
154	November 24	12080	0			0	0	329333	12080	9147		526619
155	November 25	12300	0			0	0	329333	12300	9086		526619
156	November 26	12320	106			106	209	329542	12214	9131		526619
157	November 27	12020	495			495	982	330524	11525	9141		526619
158	November 28	12310	483			483	957	331481	11827	9118		526619
159	November 29	12230	527			527	1045	332526	11703	9111		526619
160	November 30	12850	492			492	976	333502	12358	9126		526619
161	December 1	13520	490			490	972	334474	13030	9158		526619
162	December 2	12960	482			482	955	335429	12478	9167		526619
163	December 3	13680	501			501	994	336424	13179	9137		526619
164	December 4	12560	504			504	1000	337424	12056	9156		526619
165	December 5	13070	496			496	983	338407	12574	9098		526619
166	December 6	12470	500			500	992	339398	11970	9106		526619
167	December 7	13260	485			485	962	340360	12775	9112		526619
168	December 8	13270	488			488	969	341328	12782	9154		526619
169	December 9	13510	485			485	961	342290	13025	9150		526619
170	December 10	13030	501			501	993	343283	12529	9296		526619
171	December 11	12050	518			518	1028	344311	11532	9387		526619
172	December 12	13320	491			491	974	345285	12829	9391		526619
173	December 13	14200	506			506	1003	346289	13694	9393		526619
174	December 14	12560	525			525	1041	347330	12035	9418		526619
175	December 15	13500	872			872	1730	349060	12628	9397		526619
176	December 16	12980	965			965	1915	350975	12015	9379		526619
177	December 17	12980	977			977	1939	352914	12003	9363		526619
178	December 18	13710	992			992	1967	354881	12718	10065		526619
179	December 19	13180	1003			1003	1990	356871	12177	12337		526619
180	December 20	13150	959			959	1903	358774	12191	14120		526619
181	December 21	13450	948			948	1880	360654	12502	13060		526619
182	December 22	11870	888			888	1762	362416	10982	12286		526619
183	December 23	12920	961			961	1905	364322	11959	12875		526619
184	December 24	12930	968			968	1919	366241	11962	11406		526619
185	December 25	13070	993			993	1969	368210	12077	11271		526619
186	December 26	13510	1016			1016	2015	370226	12494	11528		526619
187	December 27	13630	1032			1032	2047	372273	12598	11530		526619
188	December 28	12760	1017			1017	2016	374289	11743	12238		526619
189	December 29	11970	988			988	1961	376249	10982	12008		526619
190	December 30	13000	985			985	1953	378203	12015	12043		526619
191	December 31	13550	1008			1008	2000	380203	12542	10472		526619
192												
193	January 1	13880	1003			1003	1990	382192	12877	9574		526619
194	January 2	13570	990			990	1963	384155	12580	9342		526619
195	January 3	13540	986			986	1956	386111	12554	9383		526619
196	January 4	13300	979			979	1942	388053	12321	9438		526619
197	January 5	13390	973			973	1931	389984	12417	13243		526619
198	January 6	14160	983			983	1950	391934	13177	12190		526619
199	January 7	14260	996			996	1976	393909	13264	14295		526619
200	January 8	13640	969			969	1921	395831	12671	14040		526619
201	January 9	14270	977			977	1937	397768	13293	13876		526619
202	January 10	13740	1006			1006	1995	399763	12734	13794		526619

B	A	G	H	I	J	K	L	M	N	O	P	Q
1		Meas.	Meas.	Meas.	Computed	H+I+J	1.9835xK		G-K	Meas.	Given	
2		5	6 + 7	8	9 + 10	11		12	13=5-11	1	2	3
3		IPCo. BROWNLEE/HELLS CANYON COMPLEX STORAGE										
4		Measured	Adjustments to Brownlee Flow			Total	Total	Accum	Adjusted	Hells Can.	Request	ACCUM.
5		Brownlee	Milner Fish	Boise Fish	Payette Fish	Fish Flow	Fish Flow	Flow	Brownlee	Measured	For	REQUEST
6		Inflow	Release	Release	Release	Adust.	Adjust.	Adjust.	Inflow	Flow	Fish	FOR FISH
7		in CFS	Delay=7	Delay=3	Delay=0	in CFS	in AF	in AF	in CFS	in CFS	in CFS	IN AF
203	January 11	14080	997			997	1977	401739	13083	15196		526619
204	January 12	13940	1011			1011	2005	403745	12929	12477		526619
205	January 13	13640	990			990	1964	405709	12650	14268		526619
206	January 14	13740	1002			1002	1988	407696	12738	15431		526619
207	January 15	13320	1003			1003	1990	409686	12317	11570		526619
208	January 16	13970	1023			1023	2029	411715	12947	13446		526619
209	January 17	13840	1028			1028	2040	413755	12812	18988		526619
210	January 18	13910	956			956	1896	415651	12954	19129		526619
211	January 19	13440	952			952	1889	417540	12488	14992		526619
212	January 20	13680	988			988	1959	419499	12692	15306		526619
213	January 21	13590	1001			1001	1985	421484	12589	17484		526619
214	January 22	12500	989			989	1963	423446	11511	11907		526619
215	January 23	13060	592			592	1174	424620	12468	11929		526619
216	January 24	13280	0			0	0	424620	13280	13019		526619
217	January 25	13650	0			0	0	424620	13650	12982		526619
218	January 26	13780	0			0	0	424620	13780	16204		526619
219	January 27	13350	0			0	0	424620	13350	15468		526619
220	January 28	13100	0			0	0	424620	13100	9969		526619
221	January 29	12750	0			0	0	424620	12750	9444		526619
222	January 30	13110	0			0	0	424620	13110	9889		526619

B	A	R	S	T	U	V	W
1		O-P	O-G	Sx1.9835		R-N	
2		4	14=1-5		15		
3				CONT'D - HELLS CANYON COMPLEX			
4		Hells Can.	Brownlee	Brownlee	ACCUM.	LESS	ACCUM
5		Release	Measured	Measured	Measured	BROWNLEE	COL V
6		W/O FISH	Storage Rel.	Storage Rel.	Storage Rel.	RELEASE	IN AF
7			in CFS	in AF	in AF	in CFS	
8	July 1	11060				-640	-1270
9	July 2	10913				-187	-1641
10	July 3	8451				-2149	-5904
11	July 4	8538				-2672	-11204
12	July 5	11747				357	-10496
13	July 6	14973				3433	-3686
14	July 7	10544				404	-2883
15	July 8	11531				931	-1037
16	July 9	10550				990	927
17	July 10	8810	-530	-1051	-1051	-530	-124
18	July 11	8685	-435	-863	-1914	-435	-987
19	July 12	9356	4106	8143	6229	106	-778
20	July 13	9425	4205	8341	14570	660	532
21	July 14	9096	2396	4753	19323	-400	-261
22	July 15	8901	1776	3524	22847	-655	-1560
23	July 16	9278	1728	3427	26274	85	-1391
24	July 17	10847	2447	4853	31127	1652	1885
25	July 18	8227	-1343	-2664	28463	-955	-9
26	July 19	8956	6586	13064	41527	529	1041
27	July 20	9094	6594	13079	54606	422	1878
28	July 21	10026	7066	14016	68622	856	3577
29	July 22	9682	6612	13116	81738	361	4293
30	July 23	10252	6632	13154	94892	470	5224
31	July 24	10911	4231	8391	103284	1262	7727
32	July 25	10818	2658	5273	108556	572	8862
33	July 26	10267	6567	13025	121582	-1033	6813
34	July 27	10633	7453	14782	136364	-310	6199
35	July 28	11698	9408	18662	155025	1622	9416
36	July 29	12191	6001	11903	166928	1585	12560
37	July 30	10216	-2624	-5206	161723	821	14189
38	July 31	9586	7056	13995	175717	417	15017
39	August 1	11240	2510	4978	180695	2675	20322
40	August 2	10003	2153	4271	184966	2294	24872
41	August 3	8932	522	1035	186001	614	26090
42	August 4	8264	-236	-469	185532	-189	25715
43	August 5	8345	865	1716	187248	893	27486
44	August 6	9016	986	1956	189204	817	29107
45	August 7	8079	2959	5869	195073	-1053	27018
46	August 8	8214	3374	6692	201765	-327	26369
47	August 9	8616	7716	15304	217069	-887	24610
48	August 10	8714	5724	11354	228423	-2575	19502
49	August 11	9036	5946	11794	240217	-1849	15835
50	August 12	5657	-2373	-4707	235510	-3806	8286
51	August 13	11602	1142	2265	237775	1863	11981
52	August 14	9491	-3499	-6940	230835	331	12637
53	August 15	8877	-4173	-8277	222558	-340	11963
54	August 16	9208	1908	3785	226342	-1082	9817
55	August 17	8779	2949	5849	232192	-786	8258
56	August 18	10760	2360	4681	236873	817	9878
57	August 19	13177	5687	11280	248153	3356	16535
58	August 20	12139	8509	16878	265030	2591	21674
59	August 21	6472	-378	-750	264281	-3550	14633
60	August 22	6279	-331	-657	263624	-4050	6600
61	August 23	12282	1042	2067	265691	2523	11604
62	August 24	12156	1316	2610	268301	2717	16993
63	August 25	13848	3328	6601	274902	4741	26397
64	August 26	10679	-321	-637	274266	1057	28493
65	August 27	11381	731	1450	275716	2079	32617
66	August 28	10118	-772	-1531	274184	517	33643
67	August 29	7215	-2745	-5445	268740	-2322	29037
68	August 30	13216	2496	4951	273690	2724	34440
69	August 31	12300	1700	3372	277062	1923	38254
70	September 1	13714	3094	6137	283199	3316	44832
71	September2	13878	3338	6621	289820	3561	51895
72	September3	13504	3254	6454	296275	3477	58791

B	A	R	S	T	U	V	W
1		O-P	O-G	Sx1.9835		R-N	
2		4	14=1-5		15		
3	CONT'D - HELLS CANYON COMPLEX						
4		Hells Can.	Brownlee	Brownlee	ACCUM.	LESS	ACCUM
5		Release	Measured	Measured	Measured	BROWNLEE	COL V
6		W/O FISH	Storage Rel.	Storage Rel.	Storage Rel.	RELEASE	IN AF
7			in CFS	in AF	in AF	in CFS	
73	September 4	14172	4132	8196	304470	4353	67426
74	September 5	12126	1936	3840	308310	2157	71704
75	September 6	13869	2939	5830	314140	3160	77972
76	September 7	15197	4217	8364	322504	4438	86775
77	September 8	14865	4455	8836	331341	4676	96049
78	September 9	15951	6171	12240	343581	6392	108728
79	September 10	15216	4816	9553	353134	5037	118719
80	September 11	13121	3241	6429	359562	3462	125586
81	September 12	9055	-595	-1180	358382	-374	124844
82	September 13	5598	-4742	-9406	348976	-4521	115877
83	September 14	5580	-4810	-9541	339436	-4589	106774
84	September 15	5624	-5676	-11258	328177	-5455	95954
85	September 16	5677	-5453	-10816	317361	-5232	85577
86	September 17	5691	-5859	-11621	305740	-5637	74396
87	September 18	11635	75	149	305889	296	74983
88	September 19	9489	-1981	-3929	301959	-1760	71492
89	September 20	12727	777	1541	303500	998	73471
90	September 21	12451	1191	2362	305863	1412	76272
91	September 22	13608	1938	3844	309707	2159	80554
92	September 23	18346	5986	11873	321580	6207	92866
93	September 24	12468	658	1305	322885	879	94609
94	September 25	13822	1472	2920	325805	1693	97967
95	September 26	16909	3659	7258	333063	3880	105663
96	September 27	16901	4551	9027	342089	4772	115129
97	September 28	20704	8434	16729	358818	8655	132296
98	September 29	22004	9764	19367	378185	9985	152101
99	September 30	19352	6852	13591	391776	7077	166138
100	October 1	22277	9597	19036	410812	9818	185612
101	October 2	23067	11097	22011	432823	11318	208062
102	October 3	14941	3511	6964	439787	3729	215458
103	October 4	24243	11523	22856	462643	11744	238752
104	October 5	18567	6387	12669	475311	6608	251859
105	October 6	18148	5878	11659	486970	6099	263957
106	October 7	19166	7096	14075	501045	7317	278470
107	October 8	17932	5382	10675	511720	5603	289584
108	October 9	14808	2378	4717	516437	2599	294739
109	October 10	13165	615	1220	517657	836	296397
110	October 11	17990	5200	10314	527971	5429	307165
111	October 12	17677	4757	9436	537407	4980	317043
112	October 13	16955	3305	6555	543962	3532	324049
113	October 14	20941	7571	15017	558979	7792	339504
114	October 15	21573	8313	16489	575468	8534	356431
115	October 16	19295	6245	12387	587855	6468	369261
116	October 17	16129	2739	5433	593288	2966	375144
117	October 18	14046	1136	2253	595541	1360	377841
118	October 19	10838	-3172	-6292	589249	-2949	371992
119	October 20	13365	-85	-169	589081	138	372266
120	October 21	11246	-1334	-2646	586435	-1111	370062
121	October 22	11173	-2047	-4060	582375	-1819	366454
122	October 23	9130	-4180	-8291	574084	-3943	358633
123	October 24	9170	-5340	-10592	563492	-5106	348505
124	October 25	9092	-5538	-10985	552507	-5260	338072
125	October 26	9117	-3693	-7325	545182	-3319	331489
126	October 27	9132	-3528	-6998	538184	-2231	327064
127	October 28	9160	-2850	-5653	532531	877	328803
128	October 29	9141	-3329	-6603	525928	-2316	324209
129	October 30	9105	-2765	-5484	520444	-2506	319239
130	October 31	9093	-3437	-6817	513627	-3214	312864
131	November 1	9061	-2919	-5790	507837	-2093	308712
132	November 2	9066	-3124	-6196	501640	-2866	303028
133	November 3	9059	-2801	-5556	496084	-2573	297924
134	November 4	9080	-2320	-4602	491483	-2097	293765
135	November 5	9123	-3757	-7452	484031	-3534	286755
136	November 6	9076	-2894	-5740	478290	-2671	281457
137	November 7	9060	-2730	-5415	472876	-2491	276516

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B	A	R	S	T	U	V	W
1		O-P	O-G	Sx1.9835		R-N	
2		4	14=1-5		15		
3	CONT'D - HELLS CANYON COMPLEX						
4-7		Hells Can. Release W/O FISH	Brownlee Measured Storage Rel. in CFS	Brownlee Measured Storage Rel. in AF	ACCUM. Measured Storage Rel. in AF	LESS BROWNLEE RELEASE in CFS	ACCUM COL V IN AF
138	November 8	9110	-2910	-57'72	467104	-2910	270744
139	November 9	9187	-3263	-6472	460631	-32631	264272
140	November 10	9151	-2799	-5552	455080	-2799	258720
141	November 11	9134	-3386	-6716	448363	-3386	252004
142	November 12	9105	-2865	-5683	442681	-2865	246321
143	November 13	9111	-2619	-5195	437486	-2619	241127
144	November 14	9134	-3116	-6181	431305	-3116	234946
145	November151	9211	-1889	-3747	427558	-1889	231199
146	November 16	9131	-3029	-6008	421550	-3029	225191
147	November 17	9068	-3042	-6034	415517	-3042	219157
148	November 18	9246	-2054	-4074	411443	-2054	215083
149	November 19	9217	-2953	-5857	405585	-2953	209226
150	November 20	9184	-2936	-5824	399762	-2936	203402
151	November 21	9 '166	-2874	-5701	394061	-2874	197702
152	November 22	9193	-2237	-4437	389624	-2237	193265
153	November 23	9200	-2590	-5137	384487	-2590	188127
154	November 24	9147	-2933	-5818	378669	-2933	182310
155	November 25	9086	-3214	-6375	372294	-3214	175935
156	November 26	9131	-3189	-6325	365969	-3083	169819
157	November 27	9141	-2879	-5710	360258	-2384	165090
158	November 28	9118	-3192	-6331	353927	-2709	159716
159	November 29	9111	-3119	-6187	347740	-2592	154574
160	November 30	9126	-3724	-7387	340354	-3232	148163
161	December 1	9158	-4362	-8652	331702	-3872	140484
162	December 2	9167	-3793	-7523	324178	-3311	133915
163	December 3	9137	-4543	-9011	315167	-4042	125899
164	December 4	9156	-3404	-6752	308416	-2900	120147
165	December 5	9098	-3972	-7878	300537	-3476	113252
166	December 6	9106	-3364	-6672	293865	-2864	107571
167	December 7	9112	-4148	-8228	285637	-3663	100305
168	December 8	9154	-4116	-8164	277473	-3628	93109
169	December 9	9150	-4360	-8648	268825	-3875	85422
170	December 10	9296	-3734	-7406	261419	-3233	79009
171	December 11	9387	-2663	-5282	256136	-2145	74755
172	December 12	9391	-3929	-7793	248343	-3438	67936
173	December 13	9393	-4807	-9535	238809	-4301	59405
174	December 14	9418	-3142	-6232	232576	-2617	54214
175	December 15	9397	-4103	-8138	224438	-3231	47806
176	December 16	9379	-3601	-7143	217296	-2636	42578
177	December 17	9363	-3617	-7174	210121	-2640	37343
178	December 18	10065	-3645	-7230	202891	-2653	32080
179	December 19	12337	-843	-1672	201219	160	32398
180	December 20	14120	970	1924	203143	1929	36225
181	December 21	13060	-390	-774	202370	558	37332
182	December 22	12286	416	825	203195	1304	39919
183	December 23	12875	-45	-89	203106	916	41735
184	December 24	11406	-1524	-3023	200083	-556	40632
185	December 25	11271	-1799	-3568	196514	-806	39032
186	December 26	11528	-1982	-3931	192583	-966	37117
187	December 27	11530	-2100	-4165	188418	-1068	34998
188	December 28	12238	-522	-1035	187382	495	35979
189	December 29	12008	38	75	187458	1026	38015
190	December 30	12043	-957	-1898	185560	28	38070
191	December 31	10472	-3078	-6105	179454	-2070	33965
192							
193	January 1	9574	-4306	-8541	170913	-3303	27413
194	January 2	9342	-4228	-83%	162527	-3238	20990
195	January 3	9383	- 4 175	-8245	154282	-3171	14701
196	January4	9438	-3862	-7660	1466221	-2883	8982
197	January 5	13243	-147	-2921	1463301	8261	10621
198	January 6	12190	-1970	-39071	142422	-9871	8664
199	January 7	14295	35	69	142492	1031	10709
200	January8	14040	400	793	143285	1369	13424
201	January 9	13876	-394	-781	142504	583	14579
202	Januarv 10	13794	54	107	142611	1060	16681

B	A	R	S	T	U	V	W
1		O-P	O-G	sxl .9835		R-N	
2		4	14=1-5		15		
3		CONT'D - HELLS CANYON COMPLEX					
4–7		Hells Canyon Release W/O FISH	Brownlee Measured Storage Rel. in CFS	Brownlee Measured Storage Rel. in AF	ACCUM Measured Storage Rel. in AF	LESS BROWNLEE RELEASE in CFS	ACCUM COLV IN AF
203	January 11	15196	1116	2214	144824	2113	20872
204	January 12	12477	-1463	-2902	141923	-452	19975
205	January 13	14268	628	1246	143168	1618	23185
206	January 14	15431	1691	3354	146522	2693	28526
207	January 15	11570	-1750	-3471	143051	-747	27045
208	January 16	13446	-524	-1039	142012	499	28035
209	January 17	18988	5148	10211	152223	6176	40285
210	January 18	19129	5219	10352	162575	6175	52533
211	January 19	14992	1552	3078	165653	2504	57501
212	January 20	15306	1626	3225	168878	2614	62685
213	January 21	17484	3894	7724	176602	4895	72393
214	January 22	11907	-593	-1176	175426	396	73180
215	January 23	11929	-1131	-2243	173183	-539	72111
216	January 24	13019	-261	-518	172665	-668	71593
217	January 25	12982	-668	-1325	171340	2424	70268
218	January 26	16204	2424	4808	176148		75076
219	January 27	19969	2118	4201	180349	2118	79277
220	January 28	9444	-3306 -3131	-6557 -6210	174139	-3306	73067
221	January 29						
222	January 30	9889	-3221	-6389	161192	-3221	66509 60120

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B / A	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI
			Meas.	Assumed	Z - AA OR = Y	1.98(X-Y)	Allocated	Alloc.	Allocated	Alloc.		AD+AF+AG
							UPPER SNAKE SYSTEM STORAGE					
	Meas. Flow Am. Falls at Neeley in CFS	AFTER 10/31 Fish Rel = Neeley - 1180 in CFS	Flow Past Milner in CFS	Assumed Release NOT for fish in CFS	Milner Release for Fish in CFS	Milner Release For Fish in AF	Not Contracted Mitigation Inc. in AF	Accum. in AF	Water Rental from WD1 in AF	Upper Snake P. Head in AF	Accum. U. Snake P. Head in AF	ACCUM. RELEASE IN AF
July 1			216	216	0	0	0	0				0
July 2			218	218	0	0	0	0				0
July 3			214	214	0	0	0	0				0
July 4			218	218	0	0	0	0				0
July 5			220	220	0	0	0	0				0
July 6			221	221	0	0	0	0				0
July 7			222	222	0	0	0	0				0
July 8			223	223	0	0	0	0				0
July 9			225	150	75	149	149	149				149
July 10			833	0	833	1652	1652	1801				1801
July 11			2029	0	2029	4025	4025	5826				5826
July 12			1655	0	1655	3282	3282	9108				9108
July 13			1645	0	1645	3264	3264	12372				12372
July 14			1648	0	1648	3269	3269	15641				15641
July 15			1651	0	1651	3274	3274	18915				18915
July 16			1651	0	1651	3274	3274	22189				22189
July 17			1651	0	1651	3275	3275	25464				25464
July 18			1652	0	1652	3277	3277	28741				28741
July 19			1654	0	1654	3281	3281	32022				32022
July 20			1652	0	1652	3276	3276	35298				35298
July 21			1652	0	1652	3278	3278	38576				38576
July 22			1652	0	1652	3277	3277	41853				41853
July 23			1655	0	1655	3282	3282	45135				45135
July 24			1658	0	1658	3288	3288	48423				48423
July 25			1655	0	1655	3283	3283	51706				51706
July 26			1654	0	1654	3280	3280	54987				54987
July 27			1658	0	1658	3289	3289	58276				58276
July 28			1659	0	1659	3291	3291	61566				61566
July 29			1654	0	1654	3281	3281	64847				64847
July 30			1651	0	1651	3275	3275	68122				68122
July 31			1367	0	1367	2711	2711	70833				70833
August 1			1651	0	1651	3275	3275	74108				74108
August 2			1766	0	1766	3503	3503	77611				77611
August 3			1885	0	1885	3739	3739	81350				81350
August 4			1659	0	1659	3291	3291	84641				84641
August 5			2248	0	2248	4459	4459	89099				89099
August 6			2627	0	2627	5211	5211	94310				94310
August 7			2655	0	2655	5266	5170	**99480**	96			99576
August 8			2654	0	2654	5264			5264			104840
August 9			2658	0	2658	5272			5272			110112
August 10			2656	0	2656	5268			5268			115380
August 11			2656	0	2656	5268			5268			120648
August 12			1989	0	1989	3945			3945			124594
August 13			1643	0	1643	3259			3259			127853
August 14			806	0	806	1599			1599			129451
August 15			220	0	220	436			436			129888
August 16			223	0	223	442			442			130330
August 17			223	0	223	442			442			130772
August 18			223	0	223	442			442			131215
August 19			223	0	223	442			442			131657
August 20			222	0	222	440			440			132097
August 21			222	0	222	440			440			132538
August 22			227	0	227	450			450			132988
August 23			228	0	228	452			452			133440
August 24			223	0	223	442			442			133882
August 25			222	0	222	440			440			134323
August 26			223	0	223	442			442			134765
August 27			223	0	223	442			442			135207
August 28			221	0	221	438			438			135646
August 29			221	0	221	438			438			136084
August 30			221	0	221	438			438			136522
August 31			221	0	221	438			438			136961
September 1			221	0	221	438			438			137399
September 2			221	0	221	438			438			137837
September 3			221	0	221	438			438			138276

B	A	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI
1				Meas.	Assumed	Z - AA	1.98(X-Y)	Allocated	Alloc.	Allocated	Alloc.		AD+AF+
2						OR = Y							AG
3		UPPER SNAKE SYSTEM STORAGE											
4-7		Meas. Flow Am. Falls at Neeley in CFS	AFTER 10/31 Fish Rel = Neeley - 1180 in CFS	Flow Past Milner in CFS	Assumed Release NOT for fish in CFS	Milner Release for Fish in CFS	Milner Release For Fish in AF	Not Contracted Mitigation Inc. in AF	Accum. in AF	Water Rental from WD1 in AF	Upper Snake P. Head in AF	Accum. U. Snake P. Head in AF	ACCUM. RELEASE IN AF
73	September 4			221	0	221	438			438			138714
74	September 5			221	0	221	438			438			139153
75	September 6			221	0	221	438			438			139591
76	September 7			221	0	221	438			438			140029
77	September 8			221	0	221	438			438			140468
78	September 9			221	0	221	438			438			140906
79	September 10			222	0	222	440			440			141346
80	September 11			221	0	221	438			438			141785
81	September 12			221	0	221	438			438			142223
82	September 13			221	0	221	438			438			142661
83	September 14			221	0	221	438			438			143100
84	September 15			221	0	221	438			438			143538
85	September 16			221	0	221	438			438			143976
86	September 17			221	0	221	438			438			144415
87	September 18			221	0	221	438			438			144853
88	September 19			221	0	221	438			438			145291
89	September 20			221	0	221	438			438			145730
90	September 21			221	0	221	438			438			146168
91	September 22			221	0	221	438			438			146607
92	September 23			225	0	225	446			446			147053
93	September 24			221	0	221	438			438			147491
94	September 25			221	0	221	438			438			147930
95	September 26			218	0	218	432			432			148362
96	September 27			221	0	221	438			438			148800
97	September 28			221	0	221	438			438			149239
98	September 29			221	0	221	438			438			149677
99	September 30			221	0	221	438			438			150115
100	October 1			221	0	221	438			438			150554
101	October 2			221	0	221	438			438			150992
102	October 3			221	0	221	438			438			151430
103	October 4			229	0	229	454			454			151885
104	October 5			223	0	223	442			442			152327
105	October 6			227	0	227	450			450			152777
106	October 7			221	0	221	438			438			153216
107	October 8			221	0	221	438			438			153654
108	October 9			223	0	223	442			442			154096
109	October 10			227	0	227	450			450			154546
110	October 11			224	0	224	444			444			154991
111	October 12			223	0	223	442			442			155433
112	October 13			223	0	223	442			442			155875
113	October 14			223	0	223	442			442			156318
114	October 15			228	0	228	452			452			156770
115	October 16			237	0	237	470			470			157240
116	October 17			234	0	234	464			464			157704
117	October 18			278	0	278	551			551			158256
118	October 19			374	0	374	742			742			158997
119	October 20			1297	0	1297	2573			2573			161570
120	October 21			3727	0	3727	7393			2910	4483	4483	168963
121	October 22			1013	0	1013	2009			T=65,000	2009	6492	170972
122	October 23			259	0	259	514			0	514	7006	171486
123	October 24			223	0	223	442			0	442	7448	171928
124	October 25			826	0	826	1638			0	1638	9086	173566
125	October 26			258	0	258	512			0	512	9598	174078
126	October 27			228	0	228	452			0	452	10050	174530
127	October 28			223	0	223	442			0	442	10493	174973
128	October 29			223	0	223	442			0	442	10935	175415
129	October 30			223	0	223	442			0	442	11377	175857
130	October 31			239	0	239	474			0	474	11851	176331
131	November 1	1158.95	0.00	924	924	0	0			0	0	11851	176331
132	November 2	1151.21	0.00	1356	1356	0	0			0	0	11851	176331
133	November 3	1164.93	0.00	1295	1295	0	0			0	0	11851	176331
134	November 4	1163.08	0.00	1234	1234	0	0			0	0	11851	176331
135	November 5	1184.72	0.00	1431	1431	0	0			0	0	11851	176331
136	November 6	1181.54	0.00	1466	1466	0	0			0	0	11851	176331
137	November 7	1176.86	0.00	1332	1332	0	0			0	0	11851	176331

B	A	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI
1				Meas.	Assumed	Z - AA	1.98(X-Y)	Allocated	Alloc.	Allocated	Alloc.		AD+AF+
2						OR = Y							AG
3		UPPER SNAKE SYSTEM STORAGE											
4		Meas. Flow	AFTER 10/31	Flow	Assumed	Milner	Milner	Not Contracted		Water	Upper	Accum.	ACCUM.
5		Am. Falls	Fish Rel =	Past	Release	Release	Release	Mitigation	Accum.	Rental	Snake	U. Snake	RELEASE
6		at Neeley	Neeley - 1180	Milner	NOT for fish	for Fish	For Fish	Inc.		from WD1	P. Head	P. Head	IN AF
7		in CFS	in CFS	in CFS	in CFS	in CFS	in AF	in AF	in AF	in AF	in AF	in AF	
138	November 8	1177.92	0.00	1283	1283	0	0			0	0	11851	176331
139	November 9	1174.15	0.00	1233	1233	0	0			0	0	11851	176331
140	November 10	1180.94	0.00	1214	1214	0	0			0	0	11851	176331
141	November 11	1186.32	0.00	1214	1214	0	0			0	0	11851	176331
142	November 12	1186.77	0.00	1214	1214	0	0			0	0	11851	176331
143	November 13	1182.61	0.00	1213	1213	0	0			0	0	11851	176331
144	November 14	1181.84	0.00	1182	1182	0	0			0	0	11851	176331
145	November 15	1182.94	0.00	1197	1197	0	0			0	0	11851	176331
146	November 16	1188.34	0.00	1203	1203	0	0			0	0	11851	176331
147	November 17	1174.62	0.00	1205	1205	0	0			0	0	11851	176331
148	November 18	1167.6	0.00	1176	1176	0	0			0	0	11851	176331
149	November 19	1285.51	105.51	1297	1191.49	105.51	209			0	209	12060	176541
150	November 20	1674.85	494.85	1758	1263.15	494.85	982			0	982	13042	177522
151	November 21	1662.56	482.56	2157	1674.44	482.56	957			0	957	13999	178479
152	November 22	1706.91	526.91	2130	1603.09	526.91	1045			0	1045	15044	179524
153	November 23	1671.94	491.94	2093	1601.06	491.94	976			0	976	16020	180500
154	November 24	1670.11	490.11	2043	1552.89	490.11	972			0	972	16992	181472
155	November 25	1661.56	481.56	2139	1657.44	481.56	955			0	955	17947	182427
156	November 26	1681.35	501.35	2200	1698.65	501.35	994			0	994	18942	183422
157	November 27	1684.34	504.34	2149	1644.66	504.34	1000			0	1000	19942	184422
158	November 28	1675.51	495.51	2045	1549.49	495.51	983			0	983	20925	185405
159	November 29	1679.88	499.88	1967	1467.12	499.88	992			0	992	21917	186397
160	November 30	1664.75	484.75	1953	1468.25	484.75	962			0	962	22878	187358
161	December 1	1668.29	488.29	2013	1524.71	488.29	969			0	969	23847	188327
162	December 2	1664.65	484.65	2047	1562.35	484.65	961			0	961	24808	189288
163	December 3	1680.7	500.70	2111	1610.3	500.7	993			0	993	25801	190281
164	December 4	1698.47	518.47	2213	1694.53	518.47	1028			0	1028	26829	191309
165	December 5	1671.03	491.03	2244	1752.97	491.03	974			0	974	27803	192283
166	December 6	1685.85	505.85	2243	1737.15	505.85	1003			0	1003	28807	193287
167	December 7	1705.01	525.01	2172	1646.99	525.01	1041			0	1041	29848	194328
168	December 8	2052.37	872.37	2186	1313.63	872.37	1730			0	1730	31578	196058
169	December 9	2145.3	965.30	2647	1681.7	965.3	1915			0	1915	33493	197973
170	December 10	2157.47	977.47	2651	1673.53	977.47	1939			0	1939	35432	199912
171	December 11	2171.92	991.92	2713	1721.08	991.92	1967			0	1967	37399	201879
172	December 12	2183.38	1003.38	2643	1639.62	1003.4	1990			0	1990	39390	203870
173	December 13	2139.24	959.24	2698	1738.76	959.24	1903			0	1903	41292	205772
174	December 14	2127.93	947.93	2742	1794.07	947.93	1880			0	1880	43172	207652
175	December 15	2068.39	888.39	2676	1787.61	888.39	1762			0	1762	44935	209415
176	December 16	2140.65	960.65	2643	1682.35	960.65	1905			0	1905	46840	211320
177	December 17	2147.71	967.71	2674	1706.29	967.71	1919			0	1919	48759	213239
178	December 18	2172.69	992.69	2723	1730.31	992.69	1969			0	1969	50728	215208
179	December 19	2196.12	1016.12	2740	1723.88	1016.1	2015			0	2015	52744	217224
180	December 20	2211.96	1031.96	2749	1717.04	1032	2047			0	2047	54791	219271
181	December 21	2196.54	1016.54	2730	1713.46	1016.5	2016			0	2016	56807	221287
182	December 22	2168.42	988.42	2710	1721.58	988.42	1961			0	1961	58768	223248
183	December 23	2164.7	984.70	2693	1708.3	984.7	1953			0	1953	60721	225201
184	December 24	2188.35	1008.35	2696	1687.65	1008.4	2000			0	2000	62721	227201
185	December 25	2183.08	1003.08	2699	1695.92	1003.1	1990			0	1990	64710	229191
186	December 26	2169.7	989.70	2696	1706.3	989.7	1963			0	1963	66674	231154
187	December 27	2166.11	986.11	2701	1714.89	986.11	1956			0	1956	68629	233110
188	December 28	2158.91	978.91	2703	1724.09	978.91	1942			0	1942	70571	235051
189	December 29	2153.34	973.34	2704	1730.66	973.34	1931			0	1931	72502	236982
190	December 30	2163.07	983.07	2703	1719.93	983.07	1950			0	1950	74452	238932
191	December 31	2176.12	996.12	2702	1705.88	996.12	1976			0	1976	**76428**	**240908**
192													
193	January 1	2148.69	968.69	2701	1732.31	968.69	1921			0	1921	78349	242829
194	January 2	2156.65	976.65	2702	1725.35	976.65	1937			0	1937	80286	244766
195	January 3	2185.69	1005.69	2699	1693.31	1005.7	1995			0	1995	82281	246761
196	January 4	2176.57	996.57	2739	1742.43	996.57	1977			0	1977	84258	248738
197	January 5	2191	1011.00	2771	1760	1011	2005			0	2005	86263	250743
198	January 6	2170.14	990.14	2720	1729.86	990.14	1964			0	1964	88227	252707
199	January 7	2182.08	1002.08	2705	1702.92	1002.1	1988			0	1988	90214	254694
200	January 8	2183.17	1003.17	2704	1700.83	1003.2	1990			0	1990	92204	256684
201	January 9	2203	1023.00	2702	1679	1023	2029			0	2029	94233	258713
202	January 10	2208.33	1028.33	2706	1677.67	1028.3	2040			0	2040	96273	260753

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B	A	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI
1				Meas.	Assumed	Z - AA	1.98(X-Y)	Allocated	Alloc.	Allocated	Alloc.		AD+AF+
2						OR = Y							AG
3		UPPER SNAKE SYSTEM STORAGE											
4		Meas. Flow	AFTER 10/31	Flow	Assumed	Milner	Milner	Not Contracted		Water	Upper	Accum.	ACCUM.
5		Am. Falls	Fish Rel =	Past	Release	Release	Release	Mitigation	Accum.	Rental	Snake	U. Snake	RELEASE
6		at Neeley	Neeley - 1180	Milner	NOT for fish	for Fish	For Fish	Inc.		from WD1	P. Head	P. Head	IN AF
7		in CFS	in CFS	in CFS	in CFS	in CFS	in AF	in AF	in AF	in AF	in AF	in AF	
203	January 11	2135.9	955.90	2698	1742.1	955.9	1896			0	1896	98169	262649
204	January 12	2132.34	952.34	2693	1740.66	952.34	1889			0	1889	100058	264538
205	January 13	2167.71	987.71	2694	1706.29	987.71	1959			0	1959	102017	266497
206	January 14	2180.55	1000.55	2694	1693.45	1000.6	1985			0	1985	104002	268482
207	January 15	2169.47	989.47	2693	1703.53	989.47	1963			0	1963	105964	270444
208	January 16	2186.67	1006.67	2694	2102	592	1174			0	1174	107139	271619
209	January 17	2106.88	0.00	2655	2655	0	0			0	0	107139	271619
210	January 18	2146.6	0.00	2656	2656	0	0			0	0	107139	271619
211	January 19	2156.98	0.00	2641	2641	0	0			0	0	107139	271619
212	January 20	2158.4	0.00	2640	2640	0	0			0	0	107139	271619
213	January 21	2161.36	0.00	2683	2683	0	0			0	0	107139	271619
214	January 22	2149.88	0.00	2699	2699	0	0			0	0	107139	271619
215	January 23	2180.52	0.00	2701	2701	0	0			0	0	107139	271619
216	January 24	2178.93	0.00	2661	2661	0	0			0	0	107139	271619
217	January 25	2191.02	0.00	2641	2641	0	0			0	0	107139	271619
218	January 26	2207.3	0.00	2577	2577	0	0			0	0	107139	271619
219	January 27	1739	0.00	2205	2205	0	0			0	0	107139	271619
220	January 28	1394	0.00	1948	1948	0	0			0	0	107139	271619
221	January 29	1168	0.00	1537	1537	0	0			0	0	107139	271619
222	January 30	1172	0.00	1426	1426	0	0			0	0	107139	271619

B | A | AJ Meas. | AK Assumed | AL AJ-AK | AM ALx1.9835 | AN

	BOISE RIVER SYSTEM STORAGE				
	Boise River Total Flow in CFS	Assumed Natural Flow (CFS)	Boise River Storage Flow (CFS)	Boise River Fish Flow in AF	ACCUMULATED RELEASE FOR FISH IN AF
July 1	512	512	0	0	0
July 2	400	400	0	0	0
July 3	343	343	0	0	0
July 4	307	307	0	0	0
July 5	318	318	0	0	0
July 6	307	307	0	0	0
July 7	307	307	0	0	0
July 8	308	308	0	0	0
July 9	295	295	0	0	0
July 10	284	284	0	0	0
July 11	276	276	0	0	0
July 12	293	293	0	0	0
July 13	503	100	403	799	799
July 14	543	100	443	879	1678
July 15	544	100	444	881	2559
July 16	546	100	446	885	3443
July 17	558	100	458	908	4352
July 18	564	100	464	920	5272
July 19	562	100	462	916	6189
July 20	564	100	464	920	7109
July 21	579	100	479	950	8059
July 22	590	100	490	972	9031
July 23	579	100	479	950	9981
July 24	552	100	452	897	10878
July 25	566	100	466	924	11802
July 26	571	100	471	934	12736
July 27	576	100	476	944	13680
July 28	553	100	453	899	14579
July 29	536	100	436	865	15444
July 30	538	100	438	869	16312
July 31	545	100	445	883	17195
August 1	548	100	448	889	18084
August 2	556	100	456	904	18988
August 3	571	100	471	934	19922
August 4	583	100	483	958	20880
August 5	581	100	481	954	21834
August 6	550	100	450	893	22727
August 7	541	403	138	274	**23001**
August 8	446	446	0		23001
August 9	422	422	0		23001
August 10	377	377	0		23001
August 11	384	384	0		23001
August 12	372	372	0		23001
August 13	346	346	0		23001
August 14	273	273	0		23001
August 15	286	286	0		23001
August 16	326	326	0		23001
August 17	346	346	0		23001
August 18	320	320	0		23001
August 19	343	343	0		23001
August 20	337	337	0		23001
August 21	309	309	0		23001
August 22	280	280	0		23001
August 23	275	275	0		23001
August 24	271	271	0		23001
August 25	270	270	0		23001
August 26	241	241	0		23001
August 27	242	242	0		23001
August 28	240	240	0		23001
August 29	243	243	0		23001
August 30	246	246	0		23001
August 31	240	240	0		23001
September 1	245	245	0		23001
September 2	267	267	0		23001
September 3	291	291	0		23001

B	A	AJ Meas.	AK Assumed	AL AJ-AK	AM ALx1.9835	AN
1						
2						
3		BOISE RIVER SYSTEM STORAGE				
4-6		Boise River Total Flow in CFS	Assumed Natural Flow (CFS)	Boise River Storage Flow (CFS)	Boise River Fish Flow in AF	ACCUMULATED RELEASE FOR FISH IN AF
7						
73	September 4	281	281	0		23001
74	September 5	282	282	0		23001
75	September 6	284	284	0		23001
76	September 7	278	278	0		23001
77	September 8	280	280	0		23001
78	September 9	271	271	0		23001
79	September 10	277	277	0		23001
80	September 11	280	280	0		23001
81	September 12	273	273	0		23001
82	September 13	295	295	0		23001
83	September 14	321	321	0		23001
84	September 15	305	305	0		23001
85	September 16	287	287	0		23001
86	September 17	279	279	0		23001
87	September 18	275	275	0		23001
88	September 19	285	285	0		23001
89	September 20	294	294	0		23001
90	September 21	298	298	0		23001
91	September 22	299	299	0		23001
92	September 23	285	285	0		23001
93	September 24	281	281	0		23001
94	September 25	290	290	0		23001
95	September 26	279	279	0		23001
96	September 27	291	291	0		23001
97	September 28	307	307	0		23001
98	September 29	311	311	0		23001
99	September 30	291	291	0		23001
100	October 1	272	272	0		23001
101	October 2	276	276	0		23001
102	October 3	281	281	0		23001
103	October 4	289	289	0		23001
104	October 5	297	297	0		23001
105	October 6	298	298	0		23001
106	October 7	302	302	0		23001
107	October 8	295	295	0		23001
108	October 9	295	295	0		23001
109	October 10	323	323	0		23001
110	October 11	339	339	0		23001
111	October 12	384	384	0		23001
112	October 13	366	366	0		23001
113	October 14	337	337	0		23001
114	October 15	365	365	0		23001
115	October 16	302	302	0		23001
116	October 17	277	277	0		23001
117	October 18	269	269	0		23001
118	October 19	269	269	0		23001
119	October 20	267	267	0		23001
120	October 21	271	271	0		23001
121	October 22	279	279	0		23001
122	October 23	281	281	0		23001
123	October 24	279	279	0		23001
124	October 25	277	277	0		23001
125	October 26	276	276	0		23001
126	October 27	272	272	0		23001
127	October 28	287	287	0		23001
128	October 29	297	297	0		23001
129	October 30	283	283	0		23001
130	October 31	260	260	0		23001
131	November 1	276	276	0		23001
132	November 2	335	335	0		23001
133	November 3	343	343	0		23001
134	November 4	339	339	0		23001
135	November 5	335	335	0		23001
136	November 6	335	335	0		23001
137	November 7	342	342	0		23001

B	A	AJ	AK	AL	AM	AN
1		Meas.	Assumed	AJ-AK	ALx1.9835	
2						
3		BOISE RIVER SYSTEM STORAGE				
4–6		Boise River Total Flow in CFS	Assumed Natural Flow (CFS)	Boise River Storage Flow (CFS)	Boise River Fish Flow in AF	ACCUMULATED RELEASE FOR FISH IN AF
7						
138	November 8	343	343	0		23001
139	November 9	333	333	0		23001
140	November 10	335	335	0		23001
141	November 11	329	329	0		23001
142	November 12	327	327	0		23001
143	November 13	323	323	0		23001
144	November 14	322	322	0		23001
145	November 15	320	320	0		23001
146	November 16	326	326	0		23001
147	November 17	330	330	0		23001
148	November 18	331	331	0		23001
149	November 19	348	348	0		23001
150	November 20	348	348	0		23001
151	November 21	350	350	0		23001
152	November 22	355	355	0		23001
153	November 23	354	354	0		23001
154	November 24	349	349	0		23001
155	November 25	343	343	0		23001
156	November 26	353	353	0		23001
157	November 27	374	374	0		23001
158	November 28	352	352	0		23001
159	November 29	356	356	0		23001
160	November 30	388	388	0		23001
161	December 1	392	392	0		23001
162	December 2	477	477	0		23001
163	December 3	479	479	0		23001
164	December 4	369	369	0		23001
165	December 5	364	364	0		23001
166	December 6	363	363	0		23001
167	December 7	361	361	0		23001
168	December 8	370	370	0		23001
169	December 9	361	361	0		23001
170	December 10	360	360	0		23001
171	December 11	355	355	0		23001
172	December 12	354	354	0		23001
173	December 13	351	351	0		23001
174	December 14	350	350	0		23001
175	December 15	361	361	0		23001
176	December 16	364	364	0		23001
177	December 17	364	364	0		23001
178	December 18	365	365	0		23001
179	December 19	360	360	0		23001
180	December 20	361	361	0		23001
181	December 21	363	363	0		23001
182	December 22	355	355	0		23001
183	December 23	336	336	0		23001
184	December 24	331	331	0		23001
185	December 25	331	331	0		23001
186	December 26	330	330	0		23001
187	December 27	333	333	0		23001
188	December 28	334	334	0		23001
189	December 29	334	334	0		23001
190	December 30	334	334	0		23001
191	December 31	338	338	0		23001
192						
193	January 1	345	345	0		23001
194	January 2	359	359	0		23001
195	January 3	373	373	0		23001
196	January 4	365	365	0		23001
197	January 5	363	363	0		23001
198	January 6	355	355	0		23001
199	January 7	350	350	0		23001
200	January 8	360	360	0		23001
201	January 9	389	389	0		23001
202	January 10	367	367	0		23001

B	A	AJ	AK	AL	AM	AN
1		Meas.	Assumed	AJ-AK	ALx1.9835	
2						
3		BOISE RIVER SYSTEM STORAGE				
4–7		Boise River Total Flow in CFS	Assumed Natural Flow (CFS)	Boise River Storage Flow (CFS)	Boise River Fish Flow in AF	ACCUMULATED RELEASE FOR FISH IN AF
203	January 11	356	356	0		23001
204	January 12	354	354	0		23001
205	January 13	352	352	0		23001
206	January 14	351	351	0		23001
207	January 15	352	352	0		23001
208	January 16	351	351	0		23001
209	January 17	347	347	0		23001
210	January 18	356	356	0		23001
211	January 19	368	368	0		23001
212	January 20	318	318	0		23001
213	January 21	269	269	0		23001
214	January 22	293	293	0		23001
215	January 23	314	314	0		23001
216	January 24	346	346	0		23001
217	January 25	377	377	0		23001
218	January 26	355	355	0		23001
219	January 27	348	348	0		23001
220	January 28	329	329	0		23001
221	January 29	321	321	0		23001
222	January 30	321	321	0		23001

B	A	AO Meas.	AP ADx1.983	AQ Allocated	AR Allocated	AS	AT AS+AN+AI	AU AT+U	AV AU+F
1									
2									
3		PAYETTE RIVER SYSTEM STORAGE					ACCUM.	ACCUM.	TOTAL
4		Release	Release	Not	Water	ACCUM.	MILNER+BOISE	MILNER+BOISE	W/DWOR
5		For Fish	For Fish	Contracted	Rental	RELEASE	+PAYETTE	+PAYETTE+BRN	ACCUM
6		In CFS	in AF			IN AF	RELEASE	STOR. REL.	STORAGE
7									
8	July 1						0	0	397
9	July 2						0	0	-198
10	July 3						0	0	-7537
11	July 4						0	0	3967
12	July 5						0	0	14876
13	July 6						0	0	27571
14	July 7						0	0	39472
15	July 8						0	0	51373
16	July 9						149	149	65208
17	July 10						1801	750	78900
18	July 11						5826	3912	99120
19	July 12						9108	15338	133157
20	July 13	455	902	902	0	902	14074	28644	172646
21	July 14	1204	2388	2388	0	3291	20609	39932	210117
22	July 15	1569	3112	3112	0	6403	27876	50723	252048
23	July 16	1879	3727	3727	0	10130	35762	62036	300056
24	July 17	1929	3826	3826	0	13956	43772	74899	346837
25	July 18	1915	3798	3798	0	17754	51767	80230	388070
26	July 19	1842	3654	3654	0	21408	59618	101146	443299
27	July 20	1725	3422	3422	0	24829	67236	121842	487798
28	July 21	1678	3328	3328	0	28158	74792	143414	531189
29	July 22	1636	3245	3245	0	31403	82287	164025	572031
30	July 23	1723	3418	3418	0	34820	89936	184829	610686
31	July 24	1901	3771	3771	0	38591	97892	201175	645479
32	July 25	1772	3515	3515	0	42106	105614	214170	677714
33	July 26	1767	3505	3505	0	45611	113333	234915	725435
34	July 27	1634	3241	3241	0	48852	120808	257171	767129
35	July 28	1595	3164	3164	0	52015	128161	283186	808615
36	July 29	1461	2898	2898	0	54913	135204	302132	842041
37	July 30	1315	2608	2608	0	57522	141956	303678	857075
38	July 31	1251	2481	2481	0	60003	148031	323749	892418
39	August 1	1374	2725	2725	0	62728	154920	335615	931062
40	August 2	1349	2676	2676	0	65404	162003	346968	982680
41	August 3	1289	2557	2557	0	67961	169233	355234	1032797
42	August 4	1240	2460	2460	0	70420	175941	361473	1080889
43	August 5	1218	2416	2416	0	72836	183770	371018	1133674
44	August 6	1009	2001	2001	0	74837	191874	381078	1189751
45	August 7	1138	2257	2257	0	77095	199671	394744	1233963
46	August 8	1167	2315	2315	0	79409	207250	409015	1278383
47	August 9	1181	2343	2343	0	81752	214865	431934	1321732
48	August 10	1178	2337	2337	0	84088	222469	450892	1357947
49	August 11	1146	2273	2273	0	86362	230011	470228	1394935
50	August 12	1119	2220	2220	0	88581	236175	471685	1414046
51	August 13	1094	2170	2170	0	90751	241604	479379	1429476
52	August 14	1175	2331	2331	0	93082	245534	476369	1426068
53	August 15	1179	2339	1918	421	95420	248308	470866	1418979
54	August 16	1252	2483	**T=95,000**	2483	97904	251234	477576	1423904
55	August 17	1609	3191		3191	101095	254868	487060	1431206
56	August 18	1801	3572		3572	104667	258883	495755	1439108
57	August 19	1580	3134		3134	107801	262459	510612	1453171
58	August 20	1439	2854		2854	110655	265753	530784	1470963
59	August 21	1322	2622		2622	113278	268816	533097	1472284
60	August 22	1261	2501		2501	115779	271767	535392	1473190
61	August 23	1258	2495		2495	118274	274715	540406	1477213
62	August 24	1178	2337		2337	120611	277494	545795	1482205
63	August 25	1190	2360		2360	122971	280294	555197	1491210
64	August 26	1155	2291		2291	125262	283028	557293	1492315
65	August 27	1126	2233		2233	127495	285703	561419	1496243
66	August 28	1067	2116		2116	129612	288258	562443	1496274
67	August 29	196	389		389	130001	289085	557825	1490665
68	August 30	0	0		**T=35,000**	130001	289524	563214	1495261
69	August 31	0	0			130001	289962	567024	1498674
70	September 1	0	0			130001	290400	573600	1504853
71	September 2	0	0			130001	290839	580659	1511516
72	September 3	0	0			130001	291277	587552	1518408

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B	A	AO	AP	AQ	AR	AS	AT	AU	AV
1		Meas.	ADx1.983	Allocated	Allocated		AS+AN+AI	AT+U	AU+F
2									
3		PAYETTE RIVER SYSTEM STORAGE					ACCUM.	ACCUM.	TOTAL
4–6		Release For Fish In CFS	Release For Fish in AF	Not Contracted	Water Rental	ACCUM. RELEASE IN AF	MILNER+BOISE +PAYETTE RELEASE	MILNER+BOISE +PAYETTE+BRN STOR. REL.	W/DWOR ACCUM STORAGE
7									
73	September 4	0	0			130001	291715	596186	1526844
74	September 5	0	0			130001	292154	600464	1531122
75	September 6	0	0			130001	292592	606732	1537390
76	September 7	0	0			130001	293030	615535	1546193
77	September 8	0	0			130001	293469	624810	1555468
78	September 9	0	0			130001	293907	637488	1568146
79	September 10	0	0			130001	294348	647481	1578139
80	September 11	0	0			130001	294786	654348	1585601
81	September 12	0	0			130001	295224	653606	1585058
82	September 13	0	0			130001	295663	644639	1576090
83	September 14	0	0			130001	296101	635536	1566591
84	September 15	0	0			130001	296539	624716	1554978
85	September 16	0	0			130001	296978	614339	1543807
86	September 17	0	0			130001	297416	603156	1532624
87	September 18	0	0			130001	297854	603743	1533211
88	September 19	0	0			130001	298293	600252	1529720
89	September 20	0	0			130001	298731	602232	1531898
90	September 21	0	0			130001	299169	605032	1534699
91	September 22	0	0			130001	299608	609315	1539179
92	September 23	0	0			130001	300054	621634	1551697
93	September 24	0	0			130001	300492	623378	1553441
94	September 25	0	0			130001	300931	626736	1557394
95	September 26	0	0			130001	301363	634426	1565084
96	September 27	0	0			130001	301802	643891	1574946
97	September 28	0	0			130001	302240	661058	1592708
98	September 29	0	0			130001	302678	680863	1610133
99	September 30	0	0			130001	303117	694893	1624698
100	October 1	0	0			130001	303555	714367	1644370
101	October 2	0	0			130001	303993	736816	1666820
102	October 3	0	0			130001	304432	744218	1674619
103	October 4	0	0			130001	304886	767528	1698326
104	October 5	0	0			130001	305328	780639	1712230
105	October 6	0	0			130001	305778	792749	1725133
106	October 7	0	0			130001	306217	807262	1739051
107	October 8	0	0			130001	306655	818376	1748776
108	October 9	0	0			130001	307097	823535	1753935
109	October 10	0	0			130001	307548	825205	1755605
110	October 11	0	0			130001	307992	835963	1766760
111	October 12	0	0			130001	308434	845841	1776836
112	October 13	0	0			130001	308877	852839	1783834
113	October 14	0	0			130001	309319	868298	1799294
114	October 15	0	0			130001	309771	885239	1815243
115	October 16	0	0			130001	310241	898096	1827505
116	October 17	0	0			130001	310705	903993	1833005
117	October 18	0	0			130001	311257	906798	1835611
118	October 19	0	0			130001	311999	901248	1830062
119	October 20	0	0			130001	314571	903652	1832466
120	October 21	0	0			130001	321964	908399	1837411
121	October 22	0	0			130001	323973	906348	1835558
122	October 23	0	0			130001	324487	898570	1828177
123	October 24	0	0			130001	324929	888421	1818424
124	October 25	0	0			130001	326567	879075	1809673
125	October 26	0	0			130001	327079	872261	1803257
126	October 27	0	0			130001	327531	865716	1797703
127	October 28	0	0			130001	327974	860505	1792691
128	October 29	0	0			130001	328416	854344	1786530
129	October 30	0	0			130001	328858	849302	1781686
130	October 31	0	0			130001	329332	842959	1776136
131	November 1	0	0			130001	329332	837169	1770346
132	November 2	0	0			130001	329332	830973	1764150
133	November 3	0	0			130001	329332	825417	1759388
134	November 4	0	0			130001	329332	820815	1754588
135	November 5	0	0			130001	329332	813363	1747135
136	November 6	0	0			130001	329332	807623	1741395
137	November 7	0	0			130001	329332	802208	1735980

B	A	AO	AP	AQ	AR	AS	AT	AU	AV
1		Meas.	ADx1.983	Allocated	Allocated		AS+AN+AI	AT+U	AU+F
2									
3		PAYETTE RIVER SYSTEM STORAGE					ACCUM.	ACCUM.	TOTAL
4-6		Release For Fish In CFS	Release For Fish in AF	Not Contracted	Water Rental	ACCUM. RELEASE IN AF	MILNER+BOISE +PAYETTE RELEASE	MILNER+BOISE +PAYETTE+BRN STOR. REL.	W/DWOR ACCUM STORAGE
7									
138	November 8	0	0			130001	329332	796436	1730208
139	November 9	0	0			130001	329332	789964	1723934
140	November 10	0	0			130001	329332	784412	1718383
141	November 11	0	0			130001	329332	777696	1711667
142	November 12	0	0			130001	329332	772013	1706182
143	November 13	0	0			130001	329332	766818	1700987
144	November 14	0	0			130001	329332	760638	1694807
145	November 15	0	0			130001	329332	756891	1691060
146	November 16	0	0			130001	329332	750883	1686044
147	November 17	0	0			130001	329332	744849	1680010
148	November 18	0	0			130001	329332	740775	1678118
149	November 19	0	0			130001	329542	735127	1672470
150	November 20	0	0			130001	330523	730285	1668421
151	November 21	0	0			130001	331480	725542	1664669
152	November 22	0	0			130001	332526	722150	1661277
153	November 23	0	0			130001	333501	717988	1658901
154	November 24	0	0			130001	334473	713143	1655246
155	November 25	0	0			130001	335429	707723	1651413
156	November 26	0	0			130001	336423	702392	1647173
157	November 27	0	0			130001	337423	697682	1643405
158	November 28	0	0			130001	338406	692333	1638850
159	November 29	0	0			130001	339398	687138	1633059
160	November 30	0	0			130001	340359	680713	1625643
161	December 1	0	0			130001	341328	673030	1616372
162	December 2	0	0			130001	342289	666468	1608422
163	December 3	0	0			130001	343282	658450	1599412
164	December 4	0	0			130001	344311	652726	1593094
165	December 5	0	0			130001	345285	645822	1584999
166	December 6	0	0			130001	346288	640153	1579330
167	December 7	0	0			130001	347329	632966	1571945
168	December 8	0	0			130001	349060	626533	1564917
169	December 9	0	0			130001	350974	619799	1556596
170	December 10	0	0			130001	352913	614332	1550137
171	December 11	0	0			130001	354881	611017	1546624
172	December 12	0	0			130001	356871	605214	1540028
173	December 13	0	0			130001	358773	597582	1531801
174	December 14	0	0			130001	360654	593230	1527647
175	December 15	0	0			130001	362416	586854	1521073
176	December 16	0	0			130001	364321	581617	1515835
177	December 17	0	0			130001	366241	576362	1510581
178	December 18	0	0			130001	368210	571101	1505716
179	December 19	0	0			130001	370225	571445	1506456
180	December 20	0	0			130001	372272	575415	1510626
181	December 21	0	0			130001	374288	576658	1512265
182	December 22	0	0			130001	376249	579444	1515448
183	December 23	0	0			130001	378202	581308	1517311
184	December 24	0	0			130001	380202	580285	1517082
185	December 25	0	0			130001	382192	578706	1516892
186	December 26	0	0			130001	384155	576738	1516312
187	December 27	0	0			130001	386111	574529	1514499
188	December 28	0	0			130001	388052	575435	1516001
189	December 29	0	0			130001	389983	577441	1518800
190	December 30	0	0			130001	391933	577493	1518852
191	December 31	0	0			130001	**393909**	573363	1514702
192									
193	January 1	0	0			130001	395830	566744	1506893
194	January 2	0	0			130001	397767	560295	1499849
195	January 3	0	0			130001	399762	554044	1492210
196	January 4	0	0			130001	401739	548360	1484543
197	January 5	0	0			130001	403744	550074	1482686
198	January 6	0	0			130001	405708	548131	1478759
199	January 7	0	0			130001	407696	550188	1479428
200	January 8	0	0			130001	409686	552971	1481219
201	January 9	0	0			130001	411715	554218	1481673
202	January 10	0	0			130001	413754	556365	1482630

B	A	AO	AP	AQ	AR	AS	AT	AU	AV
1		Meas.	ADx1.983	Allocated	Allocated		AS+AN+AI	AT+U	AU+F
2									
3		PAYETTE RIVER SYSTEM STORAGE					ACCUM.	ACCUM.	TOTAL
4 5 6		Release For Fish In CFS	Release For Fish in AF	Not Contracted	Water Rental	ACCUM. RELEASE IN AF	MILNER+BOISE +PAYETTE RELEASE	MILNER+BOISE +PAYETTE+BRN STOR. REL.	W/DWOR ACCUM STORAGE
7									
203	January 11	0	0			130001	415650	560475	1485153
204	January 12	0	0			130001	417539	559462	1481760
205	January 13	0	0			130001	419498	562667	1482386
206	January 14	0	0			130001	421483	568005	1484154
207	January 15	0	0			130001	423446	566497	1479294
208	January 16	0	0			130001	**424620**	566632	1476453
209	January 17	0	0			130001	424620	576843	1484681
210	January 18	0	0			130001	424620	587195	1493446
211	January 19	0	0			130001	424620	590273	1495136
212	January 20	0	0			130001	424620	593498	1497369
213	January 21	0	0			130001	424620	601222	1504101
214	January 22	0	0			130001	424620	600046	1502132
215	January 23	0	0			130001	424620	597802	1499095
216	January 24	0	0			130001	424620	597285	1497784
217	January 25	0	0			130001	424620	595960	1496062
218	January 26	0	0			130001	424620	600768	1500275
219	January 27	0	0			130001	424620	604969	1503683
220	January 28	0	0			130001	424620	598758	1497076
221	January 29	0	0			130001	424620	592201	1490518
222	January 30	0	0			130001	424620	585812	1483733

B	A	AW	AX	AY	AZ	BA
1		Meas.	AW-K-D			
2						
3		LOWER GRANITE			Dworshak	ACCUM.
4		Measured	Computed		Outflow	release
5		Inflow	Adjusted		less	from
6		In CFS	Inflow (CFS)		1200 cfs	storage
7						
8	July 1	49400	49200		2700	5355.45
9	July 2	48400	48700		2600	10512.55
10	July 3	45400	49100		700	11901
11	July 4	54200	48400		8000	27769
12	July 5	53900	48400		8000	43637
13	July 6	55600	49200		8100	59703.35
14	July 7	52700	46700		8000	75571.35
15	July 8	49100	43100		8000	91439.35
16	July 9	48100	41200		8000	107307.35
17	July 10	46000	39400		8000	123175.35
18	July 11	43000	34400		9300	141621.9
19	July 12	46200	34800		12000	165423.9
20	July 13	49700	36045		13700	192597.85
21	July 14	49600	35196		13600	219573.45
22	July 15	50200	32931		16200	251706.15
23	July 16	53100	32243		18500	288400.9
24	July 17	53500	33195		18300	324698.95
25	July 18	54600	32112		18500	361393.7
26	July 19	51900	30657		17000	395113.2
27	July 20	54000	38172		13800	422485.5
28	July 21	50900	36110		11900	446089.15
29	July 22	49100	35151		10900	467709.3
30	July 23	48900	36062		10800	489131.1
31	July 24	50400	37069		10800	510552.9
32	July 25	48900	35286		10800	531974.7
33	July 26	50000	32500		14600	560933.8
34	July 27	50000	36462		11200	583149
35	July 28	52200	40687		8200	599413.7
36	July 29	50200	39316		8200	615678.4
37	July 30	44800	34554		8200	631943.1
38	July 31	38400	27338		8200	648207.8
39	August 1	47100	30135		13800	675580.1
40	August 2	49400	25659		20500	716241.85
41	August 3	50000	25508		21800	759482.15
42	August 4	48300	23853		21900	802920.8
43	August 5	47100	21972		22400	847351.2
44	August 6	48100	21769		24000	894955.2
45	August 7	45200	26812		16000	926691.2
46	August 8	43400	24901		15700	957832.15
47	August 9	42200	28503		10900	979452.3
48	August 10	42200	30299		9000	997303.8
49	August 11	41200	29495		9000	1015155.3
50	August 12	36000	23733		9000	1033006.8
51	August 13	29800	22179		4200	1041337.5
52	August 14	26900	23270		0	1041337.5
53	August 15	21100	18067		0	1041337.5
54	August 16	23200	20190		0	1041337.5
55	August 17	30900	27735		0	1041337.5
56	August 18	32200	28143		0	1041337.5
57	August 19	31400	28231		0	1041337.5
58	August 20	33900	32018		0	1041337.5
59	August 21	31500	29872		0	1041337.5
60	August 22	24000	23219		0	1041337.5
61	August 23	24400	23419		0	1041337.5
62	August 24	25400	24199		0	1041337.5
63	August 25	24100	22887		0	1041337.5
64	August 26	24800	23922		0	1041337.5
65	August 27	24000	22752		0	1041337.5
66	August 28	23200	22411		0	1041337.5
67	August 29	20200	20277		0	1041337.5
68	August 30	18400	18572		0	1041337.5
69	August 31	24300	24277		0	1041337.5
70	September 1	21900	21878		0	1041337.5
71	September 2	23300	23277		0	1041337.5
72	September 3	22500	22277		0	1041337.5

B	A	AW	AX	AY	AZ	BA
1		Meas.	AW-K-D			
2						
3		LOWER GRANITE			Dworshak	ACCUM.
4		Measured	Computed		Outflow	release
5		Inflow	Adjusted		less	from
6		In CFS	Inflow (CFS)		1200 cfs	storage
7						
73	September 4	22800	22679		0	1041337.5
74	September 5	23200	22979		0	1041337.5
75	September 6	21100	20879		0	1041337.5
76	September 7	22700	22479		0	1041337.5
77	September 8	23400	23179		0	1041337.5
78	September 9	24100	23879		0	1041337.5
79	September 10	22700	22479		0	1041337.5
80	September 11	23000	22479		0	1041337.5
81	September 12	21000	20679		0	1041337.5
82	September 13	16200	15979		0	1041337.5
83	September 14	14000	13979		0	1041337.5
84	September 15	14200	14379		0	1041337.5
85	September 16	13700	13879		0	1041337.5
86	September 17	13900	13678		0	1041337.5
87	September 18	14300	14079		0	1041337.5
88	September 19	19300	19079		0	1041337.5
89	September 20	17800	17479		0	1041337.5
90	September 21	20800	20579		0	1041337.5
91	September 22	19700	19379		0	1041337.5
92	September 23	23800	23479		0	1041337.5
93	September 24	23400	23179		0	1041337.5
94	September 25	19300	18779		0	1041337.5
95	September 26	23100	22879		0	1041337.5
96	September 27	27000	26579		0	1041337.5
97	September 28	24400	23879		0	1041337.5
98	September 29	27800	28779		0	1041337.5
99	September 30	29900	29405		0	1041337.5
100	October 1	27600	27279		0	1041337.5
101	October 2	30500	30279		0	1041337.5
102	October 3	27400	26982		0	1041337.5
103	October 4	22400	21979		0	1041337.5
104	October 5	30200	29579		0	1041337.5
105	October 6	25700	25079		0	1041337.5
106	October 7	24800	24879		0	1041337.5
107	October 8	27900	28379		0	1041337.5
108	October 9	26200	25979		0	1041337.5
109	October 10	23100	22879		0	1041337.5
110	October 11	23000	22571		0	1041337.5
111	October 12	25500	25177		0	1041337.5
112	October 13	27100	26873		0	1041337.5
113	October 14	24000	23779		0	1041337.5
114	October 15	31000	31279		0	1041337.5
115	October 16	28500	28577		0	1041337.5
116	October 17	27200	27173		0	1041337.5
117	October 18	25200	25076		0	1041337.5
118	October 19	22800	22577		0	1041337.5
119	October 20	20300	20077		0	1041337.5
120	October 21	21500	21177		0	1041337.5
121	October 22	20000	19672		0	1041337.5
122	October 23	20600	20163		0	1041337.5
123	October 24	18000	17566		0	1041337.5
124	October 25	17700	17122		0	1041337.5
125	October 26	17300	16726		0	1041337.5
126	October 27	16700	14903		0	1041337.5
127	October 28	17400	13573		0	1041337.5
128	October 29	17400	16387		0	1041337.5
129	October 30	17500	17141		0	1041337.5
130	October 31	18000	17377		0	1041337.5
131	November 1	17800	16974		0	1041337.5
132	November 2	17500	17242		0	1041337.5
133	November 3	18000	17372		300	1041932.6
134	November 4	16700	16577		0	1041932.6
135	November 5	18000	17777		0	1041932.6
136	November 6	16500	16277		0	1041932.6
137	November 7	17600	17361		0	1041932.6

B	A	AW	AX	AY	AZ	BA
1		Meas.	AW-K-D			
2						
3		LOWER GRANITE			Dworshak	ACCUM.
4		Measured	Computed		Outflow	release
5		Inflow	Adjusted		less	from
6		In CFS	Inflow (CFS)		1200 cfs	storage
7						
138	November 8	16500	16500		100	1042130.9
139	November 9	16800	16700		0	1042130.9
140	November 10	16100	16100		0	1042130.9
141	November 11	16600	16600		0	1042130.9
142	November 12	16500	16400		0	1042130.9
143	November 13	17100	17100		0	1042130.9
144	November 14	16400	16400		0	1042130.9
145	November 15	16700	16700		0	1042130.9
146	November 16	16600	16100		0	1042130.9
147	November 17	16500	16500		0	1042130.9
148	November 18	16800	15700		0	1042130.9
149	November 19	16900	16900		0	1042130.9
150	November 20	17400	17000		0	1042130.9
151	November 21	16000	15500		0	1042130.9
152	November 22	15500	15500		0	1042130.9
153	November 23	16100	15200		0	1042130.9
154	November 24	15800	15200		0	1042130.9
155	November 25	15400	14600		0	1042130.9
156	November 26	14200	13544		0	1042130.9
157	November 27	13600	12630		0	1042130.9
158	November 28	13800	12917		0	1042130.9
159	November 29	15100	14873		0	1042130.9
160	November 30	16100	16108		0	1042130.9
161	December 1	18400	18710		0	1042130.9
162	December 2	18400	18618		0	1042130.9
163	December 3	18800	18799		0	1042130.9
164	December 4	17500	17296		0	1042130.9
165	December 5	18000	18104		0	1042130.9
166	December 6	17700	17200		0	1042130.9
167	December 7	16600	16215		0	1042130.9
168	December 8	17100	16912		0	1042130.9
169	December 9	17500	17815		0	1042130.9
170	December 10	17000	16999		0	1042130.9
171	December 11	17500	17082		0	1042130.9
172	December 12	17900	17809		0	1042130.9
173	December 13	21600	21394		0	1042130.9
174	December 14	18000	17375		0	1042130.9
175	December 15	17000	16228		0	1042130.9
176	December 16	16600	15635		0	1042130.9
177	December 17	16600	15623		0	1042130.9
178	December 18	16900	15708		0	1042130.9
179	December 19	17300	16097		0	1042130.9
180	December 20	20100	19041		0	1042130.9
181	December 21	19600	18452		0	1042130.9
182	December 22	18800	17712		0	1042130.9
183	December 23	18700	17739		0	1042130.9
184	December 24	18400	17032		0	1042130.9
185	December 25	16600	14907		0	1042130.9
186	December 26	17000	15284		0	1042130.9
187	December 27	17100	15868		0	1042130.9
188	December 28	17900	16583		0	1042130.9
189	December 29	18600	17212		0	1042130.9
190	December 30	18900	17915		0	1042130.9
191	December 31	18600	17602		0	1042130.9
192						
193	January 1	18200	17797		0	1042130.9
194	January 2	17700	17010		0	1042130.9
195	January 3	17400	17114		0	1042130.9
196	January 4	19300	19321		0	1042130.9
197	January 5	21000	21827		0	1042130.9
198	January 6	24200	24217		0	1042130.9
199	January 7	21900	21604		0	1042130.9
200	January 8	23100	22631		0	1042130.9
201	January 9	22400	21823		0	1042130.9
202	January 10	22500	22094		0	1042130.9

B	A	AW	AX	AY	AZ	BA
1		Meas.	AW-K-D			
2						
3		LOWER GRANITE			Dworshak	ACCUM.
4–7		Measured Inflow In CFS	Computed Adjusted Inflow (CFS)		Outflow less 1200 cfs	release from storage
203	January 11	21600	21403		0	1042130.9
204	January 12	23300	23489		0	1042130.9
205	January 13	21500	21810		0	1042130.9
206	January 14	24300	25098		0	1042130.9
207	January 15	24100	24787		0	1042130.9
208	January 16	22200	22677		0	1042130.9
209	January 17	24700	24672		0	1042130.9
210	January 18	27100	26944		0	1042130.9
211	January 19	27200	26948		0	1042130.9
212	January 20	21900	21412		0	1042130.9
213	January 21	24100	23599		0	1042130.9
214	January 22	23600	23011		0	1042130.9
215	January 23	19600	19408		0	1042130.9
216	January 24	19400	19800		0	1042130.9
217	January 25	21400	21600		0	1042130.9
218	January 26	21800	22100		0	1042130.9
219	January 27	23000	23400		0	1042130.9
220	January 28	23100	23300		0	1042130.9
221	January 29	17500	17500		0	1042130.9
222	January 30	17200	174001		0	1042130.9