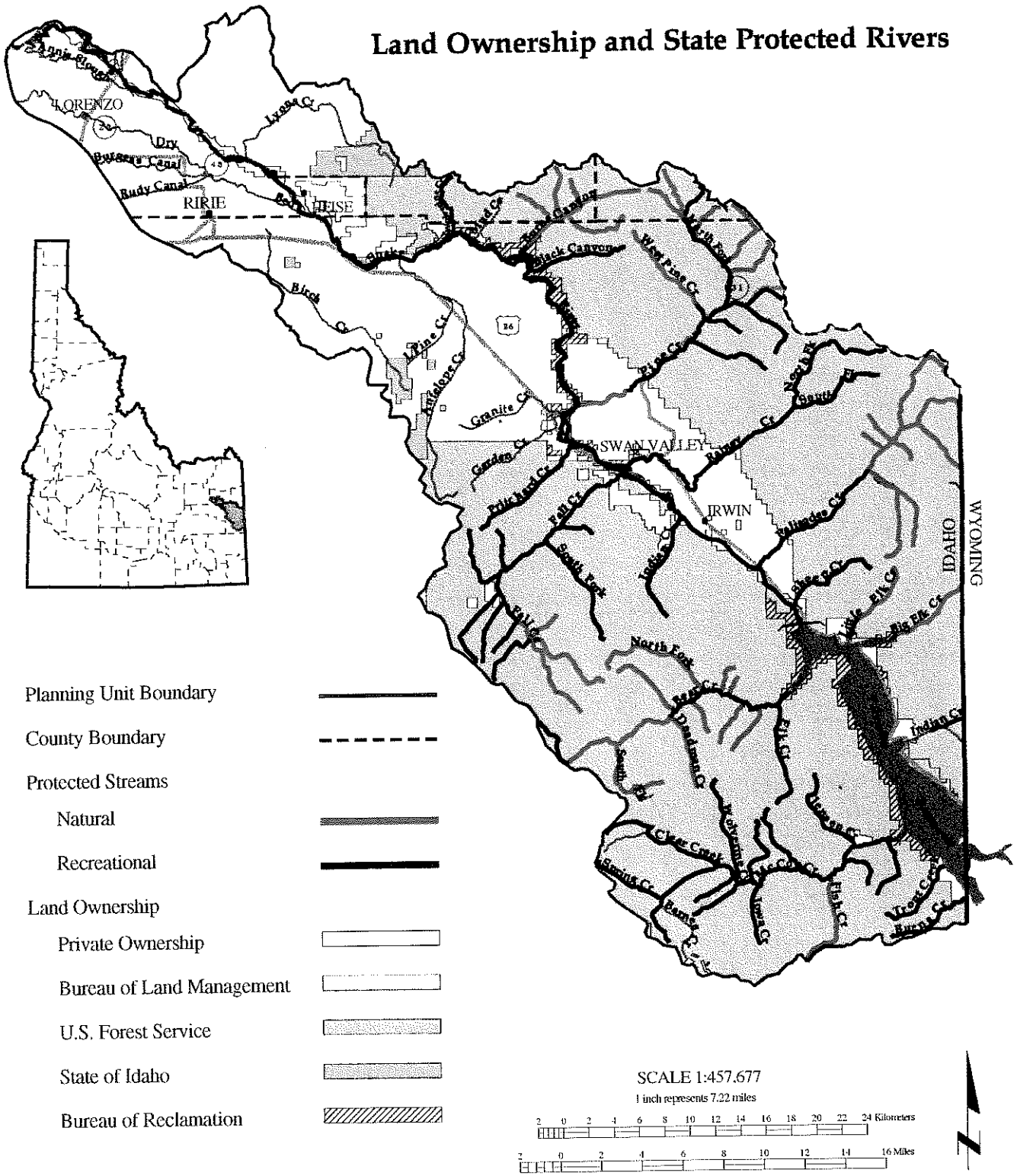
COMPREHENSIVE STATE WATER PLAN
South Fork Snake River Basin

PLAN SUMMARY

Adopted by the Idaho Water Resource Board
December 13, 1996

Figure 1

Land Ownership and State Protected Rivers



PLAN SUMMARY

The South Fork Snake River Basin encompasses all land draining into the South Fork Snake River from the Idaho-Wyoming state line to the confluence with the Henrys Fork (Figure 1). Technically the South Fork Snake River is not a fork, but the main stem of the Snake River as indicated on U.S. Geological Survey maps. The South Fork Snake is the name commonly used by many people and is used in the plan. The South Fork Snake River originates in Yellowstone National Park. The headwater tributaries originate in the Teton, Gros Ventre, and Salt River mountains located in Wyoming.

Water flow of the South Fork Snake River is regulated by Palisades and Jackson Lake dams. Jackson Lake is in Grand Teton National Park, Wyoming. The portion of Palisades Reservoir located in Idaho defines the upstream boundary of the Board's South Fork Snake River Basin. Storage and releases from Jackson and Palisades reservoirs are coordinated with operation of five other Snake River storage reservoirs located above Milner Dam. The Upper Snake River Reservoir System is operated as a unit by the U.S. Bureau of Reclamation (USBR). Water rights are under the administrative control of the Director of the Idaho Department of Water Resources (IDWR) through the watermaster of Water District 01. Water is stored and distributed according to the water right priorities that have been established for Snake River water. While there are water rights on many of the tributary streams, most of the tributaries in the basin do not have storage impoundments.

Agriculture is a predominant industry in the basin. Dryland and irrigated farming are practiced in the area. Agricultural products include winter wheat, rapeseed, spring barley, potatoes, and alfalfa. Dryland farming mainly occurs upstream of Heise on benches above the river. The most significant irrigation diversions from the river occur below the Heise gage.

The basin possesses many outstanding natural resource values. The South Fork Snake River is a nationally renowned trout fishery supporting two varieties of cutthroat trout and brown trout. The cottonwood riparian complex bordering the river is considered one of "the most extensive and highest quality" in Idaho (U. S. Department of Interior, Fish and Wildlife Service, 1980). The river corridor is also critical bald eagle habitat, supporting 37 percent of Idaho's nesting population and half of the state's production (U. S. Department of Interior, Bureau of Land Management and U. S. Department of Agriculture, Forest Service, 1991). Outstanding scenery, a quality fishery, and wildlife values provide diverse recreation opportunities.

Planning Process

The planning process encompassed six steps which are described below. Not all steps occurred in the order presented. Some occurred throughout the planning process and/or simultaneously with others.

1) ***Inventory of resource attributes*** - The resource attribute inventory is summarized in the *Basin Description* section of the South Fork Snake River Basin Plan. Resource information, figures, and statistics for this plan were obtained through literature review, field reconnaissance, contact with agency personnel, and citizen input. Maps of resource data were prepared at a scale of 1:24,000 or 1:100,000 using a geographic information system (GIS). Resource data were reviewed for accuracy by government agencies, a local advisory group, and interested public.

2) ***Identify local issues and concerns, and develop goals*** - Issues, concerns and goals related to water use help frame the scope of the South Fork Snake River Basin Plan. Issues and concerns were identified through meetings with the public, formation of a local citizens advisory group, and meetings with management agencies and local officials. Goals were developed at the advisory group meetings.

3) ***Assess current and potential water uses and constraints*** - An assessment of current and potential

water uses and constraints is contained in the South Fork Snake River Basin Plan. This information was obtained by review of water right files, pertinent literature, regulations and law, and discussion with agency personnel.

4) ***Assess and identify river segments with outstanding resource values*** - Waterways possessing outstanding fish and wildlife, recreation, scenic or geologic values are eligible for state designation as natural or recreational waterways (Idaho Code, Sec. 42-1731). Outstanding resources are indicated by 1) unique or rare features regionally or nationally, 2) significant public concern voiced for protection, and/or 3) legal protection or special agency management designation to protect important resource values. Specific criteria for defining outstanding fish and wildlife, recreation and scenic resources are described in the *Resource Evaluation* section of the South Fork Snake River Basin Plan.

5) ***Generate strategies*** - Strategies may be actions, recommendations or policies to respond to issues and concerns identified, and achieve the selected goals. They represent alternatives considered by the Board. The strategies considered for the South Fork Snake River Basin are listed in Appendix C of the plan.

6) ***Develop actions and recommendations*** - After considering alternatives and the public interest, actions and recommendations relative to improving, developing, and conserving water resources are proposed by the Board. Many actions and recommendations were the result of consensus achieved at local citizens advisory group meetings, and are described in the *Actions and Recommendations* section of the South Fork Snake River Basin Plan.

PUBLIC PARTICIPATION

Public involvement is an important part of the planning process. Input from local citizens is necessary in assessing viewpoints and conditions in the basin. Information meetings, agency coordination meetings, and local advisory group meetings provided opportunity for public critique and suggestions on the South Fork Snake River Basin Plan. In February and March 1995, public information meetings were conducted in Irwin, Victor, Ririe and Idaho Falls to inform the public about preparation of a South Fork Snake River Basin Plan, and to ask the public to identify issues and concerns.

In April 1995, the Board selected a seventeen member advisory group comprised of local citizens. The South Fork Snake Advisory Group (SFSAG) informed the Board and its staff of local concerns, reviewed information used in the development of the plan, and provided feedback and suggestions for the Board's consideration. Members represented local government, water-users, conservation groups, industry, land owners, recreationists and private citizens. The group met nine times over a period of a year. All advisory group meetings were advertised and open to the public. Newsletters were circulated to more than 200 individuals summarizing the development of the South Fork Snake River Basin Plan, notifying of advisory group meetings, and requesting comment on key pieces of information.

The Idaho Water Resource Board circulated a Draft Comprehensive State Water Plan for the South Fork Snake River Basin on October 11, 1996. Information meetings and hearings were scheduled in Ririe, Rexburg, Boise, Twin Falls and Idaho Falls in October and November 1996 to discuss and receive comment on the draft plan. Twenty people testified at public hearings and 69 written comments were received by the Board prior to the close of the comment period on December 10, 1996.

After considering the record, the Board revised the draft plan. The Board adopted the final plan in 1996. The South Fork Snake River Basin Plan was presented to the Idaho Legislature for its consideration as required by Section 42-1734B, Idaho Code. The Legislature ratified the plan in 1997. The South Fork Snake River Basin Plan is a component of the comprehensive State Water Plan of the Board.

Goals and Objectives

In adopting a comprehensive state water plan, the Board is guided by these criteria from the Idaho Code 42-1734A:

1. Existing rights, established duties, and the relative priorities of water established in the Idaho Constitution shall be protected and preserved.

2. Optimum economic development in the interest of and for the benefit of the state as a whole shall be achieved by integration and coordination of the use of water, the augmentation of existing supplies, and the protection of designated waterways for all beneficial purposes.

3. Adequate and safe water supplies for human consumption and maximum supplies for other beneficial uses shall be preserved and protected.
4. Minimum streamflow for aquatic life, recreation, aesthetics and water quality, and the protection and preservation of waterways shall be fostered and encouraged. Consideration shall be given to the development and protection of water recreation facilities.

5. Watershed conservation practices consistent with sound engineering and economic principles shall be encouraged.

Specific goals and objectives for the South Fork Snake River Basin Plan reflect current local issues, current and future uses of water, and the natural resources of the basin. The top ranking issues identified by the public led to identification of a list of wants and needs, or desired outcomes, for the South Fork Snake River Basin. The South Fork Snake Advisory Group reviewed the desired outcomes at the March 1996 meeting, and developed a list of goals for each of the eleven issue categories. Goals are general statements about the outcome or desired future for the basin. Specific goals for the basin include:

Water Quality

1. Protect water quality of the South Fork Snake and all tributaries.

2. Accumulate data to allow monitoring and verification of water quality impacts.

3. Monitor and manage activities in the river corridor potentially impacting water quality to minimize pollution.

4. Minimize soil erosion.

5. Maintain or improve water in a biologically beneficial condition.

Fisheries

6. Maintain or improve the health of the cutthroat fishery.

7. Prevent over harvest of the fishery.

Riparian Management

8. Maintain or improve the health of the riparian area.

Wildlife

9. Maintain or improve wildlife habitat.

10. Recognize the value of waterfowl, wildlife and birds of prey.

11. Maintain or improve basin ecological integrity.

Recreation

12. Maintain or improve the quality of the outdoor recreation experience.

13. Maintain or improve the quality of the fishing experience.

14. Improve safety at the Big Feeder for boaters.

Development & Growth

15. Minimize or prevent adverse effects from development along the river corridor, particularly the canyon.

16. Protect private property rights.

17. Encourage citizens to be involved in the development or revision of county land use plans.

Agency Management

18. Management decisions should use the best available science.

19. Improve coordination among agencies, private landowners and the public in managing resources in the South Fork Snake River Basin.

Water Allocation

20. Work toward cooperation between all water users.

21. Look at ways to allow greater flexibility in allocating water to different uses and address the changing demands for water in the basin and state while respecting existing rights.

22. Identify areas where instream flows are appropriate.

Operation of Palisades

23. Balance flows and timing from Palisades Reservoir to meet the needs of irrigators, flood management, power generation, private property owners, fisheries, wildlife, cottonwood regeneration, and recreation.

Irrigation

24. Encourage irrigation efficiency.

Flood Management

25. Address future flood management in the South Fork Snake River Basin

Actions and Recommendations

Actions and recommendations of the Board are consistent with the Idaho Code, private property rights, local and state management plans, and recognize public consensus achieved at South Fork Snake Advisory Group meetings conducted April, May and June, 1996. These actions and recommendations reflect the desires of local citizens of the basin and in the region. All local, state, and federal agencies are encouraged to administer their activities to help achieve the actions and recommendations contained in the Comprehensive State Water Plan for the South Fork Snake River Basin.

ACTIONS

The South Fork Snake Plan comprised a review and analysis of the present and future needs and opportunities for fifteen resource categories[1] specified by the Idaho Legislature. A need was identified to provide for state protected river designation to protect current values for Idaho and to preclude federal designation.

State River Protection Designations

A comprehensive state water plan may designate waterways as "natural" or "recreational." As defined by the Idaho Code, a recreational or natural river is "a waterway which possesses outstanding fish and wildlife, recreation, geologic or aesthetic values" [Idaho Code 42-1731 (7) and (9)]. Natural rivers are free of substantial man-made development in the waterway, and the riparian area is largely undeveloped. Recreational rivers may include man-made development in the waterway or the riparian area.

The Idaho Water Resource Board considers the impacts of protected river designations on the social, economic and environmental livelihood of the region, and determines the value of preserving the outstanding waterways of the South Fork Snake River Basin with their current beneficial uses outweighs the value of further development at this time. The Board believes state protected river designations are preferable to federal protection, and are in the best interest of the residents of Idaho. Federal protection limits the flexibility of planning for the reach, and removes the option of amending the designation by action of the Idaho Water Resource Board and Idaho Legislature. Federal agencies are encouraged to manage lands to compliment the state protection designations.

To protect the public interest, current resource use, and the multiple-use character of the basin, the Board designates river/stream reaches as natural or recreational as indicated. The Board recognizes that no action using their comprehensive state water planning authorities can interfere with vested rights,

[1] Resource categories include navigation; power development; energy conservation; fish and wildlife; recreational opportunities; irrigation; flood control; water supply; timber; mining; livestock watering; scenic values; natural or cultural features; domestic, municipal, commercial, and industrial water uses; and other aspects of environmental or economic development [Idaho Code 42-1734A(3)] .

or the repair, replacement, or continued operation of existing facilities and works. Figure 1 shows the stream reaches with state protection designations.

Natural Rivers

The Board designates the stream reaches listed below as "natural."

Fish Creek (5.2 miles[2]): Headwaters to confluence with McCoy Creek

Big Elk Creek (4.5 miles): Idaho-Wyoming state line to 100 yards upstream of the Big Elk Creek trail head

Little Elk Creek (3.5 miles): Headwaters to confluence with Spring Run Canyon

Bear Creek and perennial tributaries (36.1 miles): Bear Creek from area where Skyline Road (Forest Road 077) no longer parallels the creek (located in T.2 S., R. 43 E., NE 1/4 of Section 20) downstream to Deadman Creek confluence, and the following perennial tributaries:

- South Fork Bear Creek: headwaters to mouth
- Deadman Creek: headwaters to mouth
- Chaparral Hollow: headwaters to mouth
- Warm Springs Creek: headwaters to mouth
- North Fork Bear Creek: headwaters to mouth
- Small Creek: headwaters to mouth
- Poison Creek: headwaters to mouth
- Currant Creek: headwaters to mouth
- Muddy Creek: headwaters to mouth

Palisades Creek and perennial tributaries (29.7 miles): Headwaters to junction with Forest Trail 099, and the following perennial tributaries:

- North Fork Palisades Creek: headwaters to mouth
- East Fork Palisades Creek: Idaho-Wyoming state line to mouth
- Corral Creek: Idaho-Wyoming state line to mouth
- Lost Spring Canyon: headwaters to mouth
- Dead Man Canyon: headwaters to mouth
- Little Dry Canyon: headwaters to mouth
- Dry Canyon: headwaters to mouth, including Upper Palisades Lake
- Water Fall Canyon: headwaters to confluence with Dry Canyon

Fall Creek and perennial tributaries (13.1 miles): Fall Creek from its headwaters to confluence with Trap Creek, and the following perennial tributaries:

- East Fork Fall Creek : headwaters to mouth
- Willow Springs Creek: headwaters to mouth

Pine Creek and perennial tributaries (2.8 miles): Pine Creek 100 yards downstream of power line crossing (located in T. 2 N., R. 43 E., Section 15) to confluence with South Fork Snake River

North Fork Pine Creek and perennial tributaries (15.0 miles): North Fork Pine Creek from its headwaters to confluence with Elk Flat Fork, and the following perennial tributaries:

- Elk Flat Fork: headwaters to mouth
- Holter Creek: headwaters to mouth
- Red Creek: headwaters to mouth
- Corral Creek: headwaters to mouth

West Pine Creek (5.2 miles): Headwaters, including unnamed headwater tributaries to 100 yards upstream of West Pine Girls Camp (located in T. 3 N., R. 44 E., NW 1/4 of Section 29)

Burns Creek and perennial tributaries (17.3 miles): Burns Creek from its headwaters (and including unnamed headwater tributaries) to the Burns Canyon trail head, and the following perennial tributaries:

- Beartrap Canyon: headwaters to mouth
- Little Burns Canyon: headwaters to mouth
- Jensen Creek: headwaters to mouth
- Hell Hole Canyon: headwaters to mouth

Recreational Rivers

The Board designates the following river/streams as "recreational":

South Fork Snake River (63.9 miles): Palisades Dam to confluence with Henrys Fork

Burns Creek (*tributary to reservoir*) (4.7 miles): Headwaters to Idaho-Wyoming state line

[2]Mileage was calculated with a geographic information system using hydrography at a scale of 1:100,000.

Trout Creek (4.6 miles): Headwaters, including all unnamed headwater tributaries, to confluence with Palisades Reservoir

McCoy Creek and perennial tributaries (62.9 miles): McCoy Creek from its headwaters to back waters of Palisades Reservoir, and the following perennial tributaries:

- Spring Creek: headwaters to mouth
- City Creek: headwaters to mouth
- Clear Creek: headwaters to mouth
- Camp Creek: headwaters to mouth
- Wolverine Creek: headwaters to mouth
- Miners Delight Creek: headwaters to mouth
- Kirk Creek: headwaters to mouth
- Iowa Creek: headwaters to mouth
- Box Canyon Creek: headwaters to mouth
- Hell Creek: headwaters to mouth
- Jensen Creek: headwaters to mouth
- Bitters Creek: headwaters to mouth

Indian Creek *(tributary to reservoir)* (1.8 miles): Idaho-Wyoming state line to Smith Canyon

Big Elk Creek (0.4 miles): One-hundred yards upstream of Big Elk Creek trail head to backwaters of Palisades Reservoir

Little Elk Creek (1.1 miles): Confluence with Spring Run Canyon to the backwaters of Palisades Reservoir

Bear Creek and perennial tributary (16.4 miles): Headwaters to point where Skyline Road (Forest Road 077) no longer parallels the creek (located in T.2 S., R. 43 E., NE 1/4 of Section 20), and from Deadman Creek confluence to backwaters of Palisades Reservoir, and the following perennial tributary:

- Elk Creek: headwaters to mouth

Sheep Creek (5.4 miles): Headwaters to confluence with South Fork Snake River

Palisades Creek (8.2 miles): Junction with Forest Trail 099 to confluence with South Fork Snake River

Indian Creek (*tributary to main stem*)(5.9 miles): Headwaters to confluence with South Fork Snake River

Fall Creek and perennial tributaries (39.3 miles): Confluence with Trap Creek to mouth, and the following perennial tributaries:

- Beaver Creek: headwaters to mouth
- Trap Creek: headwaters to mouth
- Haskin Creek: headwaters to mouth
- Camp Creek: headwaters to mouth
- Gibson Creek: headwaters to mouth
- Blacktail Creek: headwaters to mouth
- South Fork Fall Creek: headwaters to mouth
- Currant Hollow: headwaters to mouth

Rainey Creek and perennial tributaries (25.1 miles): Headwaters to confluence with South Fork Snake River, and the following perennial tributaries:

- North Fork Rainey Creek: headwaters to mouth
- South Fork Rainey Creek: headwaters to mouth

Pritchard Creek (6.5 miles): Headwaters to confluence with South Fork Snake River

Pine Creek and perennial tributaries (21.6 miles): Headwaters to 100 yards downstream of power line crossing (located in T. 2 N., R. 43 E., Section 15), and the following perennial tributaries:

- Tie Canyon: headwaters to mouth
- Poison Creek: headwaters to mouth
- West Pine Creek: one-hundred yards upstream of West Pine Girls Camp to mouth
- Mike Spencer Canyon: headwaters to mouth

North Pine Creek and perennial tributary (8.1 miles): Elk Flat Fork confluence to mouth, and the following perennial tributary:

- Lookingglass Creek: headwaters to mouth

Black Canyon (9.1 miles): Headwaters to confluence with South Fork Snake River

Warm Springs (0.2 miles): Source to confluence with South Fork Snake River

Burns Creek (0.6 miles): Burns Canyon trail head to confluence with South Fork Snake River

Wolverine Creek (3.4 miles): Headwaters to confluence with South Fork Snake River

Cress Creek (0.1 miles): Source to confluence with Sunnydell Canal

Pursuant to Idaho Code 42-1734A(6), the following activities are prohibited within the stream channel or below the highwater mark on the reaches designated a "natural" river:

- construction or expansion of dams or impoundments,
- construction of hydropower projects,
- construction of water diversion works,
- dredge or placer mining,
- alterations of the stream bed, and
- mineral or sand and gravel extraction within the stream bed.

Activities prohibited on "natural" rivers are also prohibited on "recreational" rivers in the South Fork Snake River Basin with the following exceptions.

- Alteration of the streambed necessary to keep the South Fork Snake River within its historical meander below Heise, or other similar activities necessary to fulfill the flood management responsibilities of Flood Control District No. 1 are allowed in the reach from Grassy Banks (one mile above Heise gage) to the confluence with the Henrys Fork. Such activities must comply with the Stream Channel Protection Act and the rules adopted to implement the act.

- Alteration of the stream bed for installation of fisheries enhancement structures is allowed on the following reaches designated recreational: Bear Creek, Big Elk Creek, Fall Creek, North Fork Pine Creek, Palisades Creek, Pine Creek, Pritchard Creek, and Rainey Creek. Alterations of the stream bed must comply with the Idaho Stream Channel Alterations Rules and Minimum Standards.

- Stream channel alterations are allowed for public agencies to reconstruct or realign recreation trails to prevent resource damage on the following reaches designated recreational: Cress Creek, Bear Creek, Trap Creek, South Fork Fall Creek, Palisades Creek, North Fork Pine Creek, and Rainey Creek. Alterations of the stream bed must comply with the Idaho Stream Channel Alterations Rules and Minimum Standards.

- Stream channel alterations are allowed for public agencies to reconstruct or construct new livestock bridges to prevent resource damage on the following reaches designated recreational: Bear Creek, South Fork Fall Creek, Lookingglass Creek and North Fork Pine Creek. Alterations of the stream bed must comply with the Idaho Stream Channel Alterations Rules and Minimum Standards.

- Stream channel alterations are allowed for temporary roads for vegetation management on Burns Creek (tributary to Palisades Reservoir). Alterations of the stream bed must comply with the Idaho Stream Channel Alterations Rules and Minimum Standards.

- Stream channel alterations for recreational dredge mining may continue on McCoy Creek from the headwaters to Fish Creek confluence, and on the following perennial tributaries: City Creek, Camp Creek, Miners Delight Creek and Iowa Creek. This activity is allowed as regulated by the Caribou National Forest through a Special Use Permit issued according to the guidelines established in the "Environmental Assessment for Small Placer Mining Operations in the Caribou Basin Area" (Record of Decision issued December 12, 1994), and with a Stream Channel Alteration Permit from the Idaho Department of Water Resources. Temporary diversions for the purposes of sluicing are allowed, but must obtain a Temporary Approval of Water Appropriation from the Idaho Department of Water Resources.

- Construction of boat ramps and docks may be allowed on the South Fork Snake River with Board and other regulatory agency approval for the reaches between Palisades Dam to Pine Creek confluence and Black Canyon to Henrys Fork confluence. Alterations of the stream bed must comply with the Idaho Stream Channel Alterations Rules and Regulations and Minimum Standards. This exemption does not apply to the reach between Pine Creek confluence to Black Canyon.

Prohibitions for natural or recreational designations do not interfere with activities necessary to maintain and improve existing utilities, roadways, managed stream access facilities, diversion works, and for the maintenance of private property. State designation does not change or infringe upon existing water rights or other vested property rights. It does not restrict the expansion or maintenance of existing uses.

A recreational designation for the South Fork Snake River is not intended to prevent a water user from cleaning, maintaining, or replacing an existing water diversion structure. A water user may remove obstructions from the stream channel such as gravel bars, if the obstructions interfere with the delivery or use of water under any existing water right.

Minimum Streamflows

It is the policy of Idaho that the Idaho Water Resource Board should seek to appropriate waters in the state for instream flow purposes when it is in the public interest. Idaho Code, Title 42, Chapter 15 provides the authority and spells out procedures for the Board to appropriate water for minimum streamflows. A minimum streamflow is a quantity of water, or lake level, required to protect fish and wildlife habitat, aquatic life, recreation, aesthetic beauty, navigation, transportation or water quality in the public interest. By law, a minimum streamflow is not an ideal flow, but the minimum necessary to achieve the objectives. The water right is held by the Board and is junior to all earlier water rights. It is not a guaranteed minimum flow, but is only achieved after senior water rights are fulfilled.

In order for the Board to acquire a minimum streamflow, a process separate from the development of a comprehensive state water plan must occur. Studies to determine the quantity and timing of the minimum streamflow will need to be conducted. The Director of the Idaho Department of Water Resources determines whether the minimum stream flow right is granted in accordance with Title 42, Chapter 15 of the Idaho Code. Legislative review of minimum stream flow rights granted by the IDWR is required.

To protect fisheries values, minimum streamflow studies to identify critical reaches have been recommended for several important cutthroat spawning tributaries and for kokanee habitat on Big Elk Creek. These include the following tributaries:

- Bear Creek
- Big Elk Creek
- Burns Creek
- Fall Creek
- Palisades Creek
- Pine Creek

Idaho Code requires specific data to support an application for a minimum streamflow. The Board currently does not have the data required by the Code to pursue minimum streamflows on the recommended streams. The Board recommends that the Idaho Department of Fish and Game (IDFG), in cooperation with the Bureau of Land Management (BLM) and the Forest Service, conduct studies to quantify flows and acquire other necessary information to process minimum streamflow applications for the above-mentioned streams within the next five years. If the appropriate information is available and indicates a minimum streamflow is warranted, the Board will take action.

Amendments to the Idaho State Water Plan

The *Idaho State Water Plan* contains a policy which provides for protection of potential reservoir sites from significant land use change, and lists sites to reserve within Idaho (IWRB, 1992). The Lynn Crandall site on the South Fork Snake River near the Burns Canyon confluence was one of the sites identified (IWRB, 1992). Information received at public meetings and recommendations from the South Fork Snake Advisory Group asked for removal of Lynn Crandall as a potential reservoir site in the *Idaho State Water Plan*. Some input was received supporting continued consideration of the site as a future storage site.

The public expressed concerns about impacts to the cutthroat fishery, wildlife, recreation and scenic values with construction of the Lynn Crandall project. The resource inventory and evaluation described in the plan document outstanding fish and wildlife, recreation and scenic values for this reach of the South Fork Snake River.

The Board was revising the *Idaho State Water Plan* simultaneous to preparing the South Fork

Snake Plan. Based on input received during public participation for the South Fork Snake Plan, and weighing the environmental and social values impacted by construction of Lynn Crandall, the Board removed Lynn Crandall as a potential reservoir site from the *1996 Idaho State Water Plan*. Additionally, the Board requests the U. S. Bureau of Reclamation (USBR) to relinquish land withdrawals reserved for the project site. The USBR filed a water right application for storage for the Lynn Crandall Project with IDWR having a 1969 priority date. No action has been taken to pursue a permit or license. The Board requests that the USBR withdraw this application.

RECOMMENDATIONS

The Board does not have the authority or funding to implement many of the recommendations contained in the Comprehensive State Water Plan. However, the Board does have the authority to establish water policy for the state, planning for the improvement, development and conservation of water resources. These plans are also submitted to the Idaho Legislature for review and ratification. The plan for the South Fork Snake River Basin was developed with significant input and participation by citizens and agencies. The Board requests the agencies and organizations referenced implement the recommendations contained in the plan, and state agencies "exercise their duties in a manner consistent with the comprehensive state water plan" [Idaho Code 42-1734B (4)]. Federal agencies are encouraged to manage their lands in a manner consistent with the recommendations contained in the plan.

Northwest Power Planning Council (NWPPC) Protected Area Designations

The Board has designated the rivers listed on pages 5 and 6, and shown in Figure 1 as state protected rivers. The Board recommends that NWPPC actions be in accordance with these designations.

Operation of Palisades Reservoir

Discussion at advisory group meetings regarding instream flows below Palisades Dam did not result in consensus with final recommendations forwarded to the Board. However, many suggestions and ideas were presented that merit further exploration.

Much of the discussion about releases at Palisades Dam indicate a need for all water interests to gather collectively and discuss their concerns. The Board believes this approach would benefit water interests in the South Fork Snake River Basin. The Board recommends that the U. S. Bureau of Reclamation work cooperatively and meet at least semiannually (before and after the irrigation season) with all water interests in a facilitated forum to exchange information and ideas about releases from the Upper Snake System (including Palisades Dam). A watershed council could be the ideal forum to facilitate these meetings. Semiannual meetings would provide a means for all water interests to talk to each other and understand others' concerns. Water interests would have an opportunity to collectively evaluate options for water resource management within legal, administrative and operating constraints to maximize benefits for all interests.

The USBR's Snake River Resource Review Project provides an outstanding opportunity to model different management scenarios for the Upper Snake System. The project will develop a decision support system helping managers to analyze different operation alternatives for the Snake System above Brownlee Reservoir. The Board supports the cooperative efforts of the Idaho Department of Water Resources and the USBR to develop an improved river management decision-making system for the Upper Snake. The Board encourages an analysis of the potential risks associated with filling the Upper Snake System reservoirs under various release scenarios at Palisades Dam, including winter flows for fishery maintenance.

Snake Plain Aquifer Recharge

The Snake Plain Aquifer provides an opportunity to store water for beneficial use. The Board makes use of water in the basin as part of the recharge program. To efficiently manage the state's water, a technically sound, hydrologic-based aquifer recharge plan needs to be prepared. The plan needs to establish clear objectives for the recharge program, determine locations and timing to apply recharge water to maximize recharge objectives, and determine consistency with conjunctive management

policies. As part of this effort, some of the constraints associated with winter water savings should be reexamined.

Wild and Scenic River System

The Forest Service and BLM have found the South Fork Snake River and other waterways in the basin eligible for further study as potential federal wild and scenic rivers. Because of the comprehensive scope of state water planning, the Board encourages the BLM and Forest Service to work within the state water planning process rather than pursuing federal protection of waters within Idaho. State water planning provides a means of ensuring coordinated water planning with federal and state governments. Additionally, the Board requests that the Forest Service and BLM manage lands in a manner compatible with state protection designations.

Land Development in the Basin

Issues and concerns associated with land development pressures in the basin frequently were mentioned during public meetings. Although a priority issue, the advisory group did not have an opportunity to work towards agreement on recommendations for this issue topic. The Board believes that maintenance of the outstanding resource values inventoried in the South Fork Snake River Basin is largely dependent on the direction and character of future development. Counties and local communities have the most influence over the future character of the basin through their planning and zoning decisions.

The Board supports the efforts of county commissioners, community officials and planning departments to work closely with the public when making decisions about land use development in the South Fork Snake River Basin. Formation of a watershed council with active participation by local government may improve communication further, and help identify local concerns and goals to achieve the future landscape setting and community desired by local citizens. The Board encourages the communities of Swan Valley and Irwin to work cooperatively in coordinating planning activities with each other and Bonneville County.

Cooperative agreements for watershed protection need to be established between developers, farmers, and land managers in the basin, to insure that the impending changes to the South Fork Snake River Basin do not have adverse consequences for the water quality and the biological communities. Increased urbanization, soil types and the hydrologic conditions of the basin indicate conventional septic systems will not be adequate. The Board recommends that counties investigate options for financing and constructing sewage systems in the Swan Valley, Conant Valley and Irwin areas to prevent pollution of ground and surface water.

It is recommended that authorities closely monitor permitting and installation of septic systems to ensure protection of the water quality of the South Fork Snake River and its tributaries. Site planning should consider the soil assimilative capacity in selecting lot sizes. Careful review and establishment of stringent guidelines by county officials and Health District VII personnel for implementation of sewage systems should continue. The IDWR and Health District should continue to coordinate installation and permitting of septic systems and wells to protect ground water in the basin.

Flood Management

As the basin sees an increase in population and development, potential impacts from flooding will increase. The counties and communities in the basin participate in the National Flood Insurance Program (NFIP). Participation has resulted in adoption of floodplain ordinances which outline land use measures to minimize flood damage. The Board encourages these entities to continue their participation in the NFIP so that risks from flooding can be minimized, and land owners have the opportunity to purchase flood insurance. The Board encourages the counties and communities to continue to take responsibility for monitoring development in the floodplain to ensure floodplain ordinances are followed, and development does not increase potential flood damage.

Flood control operations of Palisades Dam are guided by flood control rule curves with a flood stage flow of 24,500 cubic feet per second (cfs) (Beus, 1996). Flows in excess of 25,000 cfs at Heise have occurred on four occasions since construction of Palisades Dam (1957). The Board recommends development should not encroach into

the area inundated by these flows to minimize flood damage.

The levees below Heise were constructed to provide protection for 100-year flood events. Deposition in the South Fork Snake River channel has, and will continue, to decrease the effectiveness of these levees to contain flows of 30,000 cfs (the 100-year flood event). Sustained high velocity flows may erode levees and increase flooding risks. Major river channel shifts could impinge the levees in this reach. Currently levee maintenance by Flood Control District No.1 has consisted of riprap repairs. Current values of lands adjacent to the levees are not high enough to justify significant investments for maintenance of the levee system. However, future development may increase land values and require more expensive options. The counties are encouraged to manage lands adjacent to the levees so that land values do not require expensive flood control measures. The Board recommends that the U.S. Corps of Engineers conduct a study to identify appropriate and cost-effective flood management options to address the issue of deposition in the river channel.

Management of Recreation Resources

The demands on recreation resources in the South Fork Snake River Basin have increased significantly in the past five years. These demands are the result of the outstanding recreation opportunities available on the South Fork Snake River and the growing regional and local populations. The budgets of agencies responsible for managing recreation opportunities in the basin are not keeping pace with the demand, and many have experienced reduced budgets in recent years. In order to maintain the quality of the recreation experience and protect associated resources contributing to the experience, sufficient funding must be procured.

The Omnibus Consolidated Rescissions and Appropriation Act of 1996 provides authority for the BLM and Forest Service to manage recreation fee demonstration projects. The program would allow collection of fees, and return 100 percent of the revenues for the operation, maintenance, improvement and expansion of projects at the site of collection. The Board encourages the BLM and Forest Service, in cooperation with state and county recreation management agencies, to explore the option of collecting fees for facilities along the South Fork Snake River corridor under this program. Revenues should be used to help offset the cost of operations, maintenance and enforcement in the river corridor, and protect outstanding resource values identified in the South Fork Snake River Plan.

South Fork Snake River Basin Planning Boundaries

Public comment has identified some tributaries to the Salt River that would best be evaluated as part of the South Fork Snake River Basin. Adequate evaluation of these tributaries has not occurred as part of the Board's comprehensive state water planning process for the current effort. During the next review or revision to the South Fork Snake River Basin Comprehensive State Water Plan, the Idaho Water Resource Board will expand the planning basin boundaries to include tributaries to the Salt River originating in Idaho. The tributaries include: Jackknife Creek, Tincup Creek, Stump Creek, Tygee Creek, Crow Creek, Jack Creek and their tributaries.

Additional Recommendations

The following recommendations were generated during South Fork Snake Advisory Group meetings conducted in April, May and June 1996. The recommendations that follow reflect strategies that received support during group discussions at advisory group meetings. The Board adopts these recommendations as part of the Comprehensive State Water Plan for the South Fork Snake River Basin.

Water Quality

1. Agencies and property owners are encouraged to use appropriate best management practices (BMPs) for all land uses. Soil conservation districts can encourage implementation of BMPs to minimize soil erosion appropriate to farming and grazing operation and needs.

2. Local soil conservation districts are requested to seek funding and identify additional drainages that could benefit from the State Agricultural Water Quality Program, promoting voluntary participation and local decision-making.

3. Soil conservation districts are asked to review the Conservation Reserve Program (CRP) to identify additional incentives for farmers to reduce erosion.

4. Land management agencies are encouraged to increase education and enforcement to reduce erosion from off-road vehicle use.

5. The Division of Environmental Quality (DEQ) and Idaho Department of Fish and Game (IDFG) are encouraged to work to maintain or improve water quality in a condition suitable for the preservation of healthy populations of the native cutthroat trout.

6. DEQ and the Health District VII are encouraged to study the impacts of possible pollution from septic tank discharge in the South Fork Snake River Basin. This would include determining appropriate housing densities and sanitation technologies given soil types and other relevant factors.

7. BLM and Forest Service requirements to pack out human waste in the canyon section of the South Fork Snake River *should continue*.

8. The soil and water conservation districts, landowners and a watershed council are encouraged to work together to retain Conservation Reserve Program (CRP) lands in grass cover after contracts expire, or determine other feasible alternatives.

9. Agencies collecting water quality data, including DEQ, IDWR, U. S. Geological Survey (USGS), IDFG, and universities, are encouraged to develop a common database to allow sharing of information between agencies.

10. The Board supports citizen involvement in the formulation of water quality monitoring plans and reporting by DEQ and the Health District. These data should be reported regularly.

11. DEQ is encouraged to implement an appropriate water quality monitoring program to ensure that adverse water quality trends are detected in a timely manner.

12. The Idaho Department of Agriculture and canal companies are encouraged to educate people about the potential effects to downstream users of dumping into canals and other waterways.

13. DEQ, the Health District, and counties are encouraged to explore feasible options for counties in the basin to finance sewage systems for water quality protection.

14. Idaho Department of Agriculture is encouraged to educate pesticide users that any rinsing, dumping or spilling of pesticides into waterways is prohibited and can adversely impact water quality.

Fisheries

1. To safeguard against over harvest in the future while providing for increasing recreational demand, the Board supports IDFG efforts to continue focusing on trout habitat maintenance, and increasing overall habitat quality and quantity. If over harvest occurs, Idaho Department of Fish and Game is encouraged to develop more restrictive regulations.

2. IDFG is encouraged to continue working with other land management agencies and land owners to increase spawning habitat by protecting spawning *tributaries and screening tributary diversions.*

3. The Board recommends the Natural Resource Conservation Service (NRCS), IDFG and Trout Unlimited initiate further planning and evaluation of the Rainey-Palisades Creek irrigation project to determine if other alternatives are available to improve irrigation efficiency and fish passage. These entities should also explore cooperative funding options.

Riparian Management

1. Land management agencies are encouraged to educate the community about the importance of cottonwood regeneration.

2. The Board recommends the Legislature pass legislation to allow tax incentives for leaving riparian areas undeveloped, or improving riparian habitat and badly eroded areas.

3. Control noxious weeds through use of biological control by encouraging and supporting continued efforts by the South Fork Biological Weed Control Committee.

4. Recommend state and federal agencies, and local governments work cooperatively to identify options to preserve and enhance the cottonwood forest.

Options to consider include fencing high use areas on the main stem or tributaries, beaver control, or creative land zoning.

5. The BLM, Forest Service and IDFG are encouraged to investigate the feasibility and expense of planting cottonwoods.

6. A cooperative study involving state and federal agencies investigating the feasibility of using flood flows to help promote cottonwood regeneration is recommended. Determine the most plausible flows that will not significantly impact property. Determine other beneficial and adverse impacts that would occur with these flows.

Wildlife

1. Encourage BLM, Forest Service, U.S. Fish and Wildlife Service and/or IDFG to install posters at boat put-ins to warn people about disturbing or harassing birds (especially bald eagles) and other wildlife.

2. The IDFG is encouraged to work cooperatively with USBR regarding releases to ensure Canada geese nesting success.

3. Organization by IDFG of an annual volunteer effort for regular maintenance of goose nesting boxes is recommended.

Recreation

1. Idaho Department of Parks and Recreation, county sheriffs, and boating organizations are requested to encourage, educate and promote proper boating etiquette on the South Fork Snake River. This could involve implementation of a program to help various recreation users resolve conflicts and learn to respect each other.

2. Legislation is needed allowing the Idaho Outfitters and Guides Licensing Board to issue larger fines to ensure strict enforcement of outfitter and guide regulations. Legislation should allow confiscation of property, in addition to monetary fines, for individuals who illegally practice outfitting.

3. The Board supports establishing a Memorandum of Understanding (MOU) between the Idaho Department of Fish and Game, Idaho Outfitters and Guides Licensing Board, U. S. Forest Service, Bureau of Land Management, and Bonneville County to coordinate efforts to enforce regulations for the outfitting and guiding industry and recreational activities on the South Fork Snake.

Agency Management

1. Concerned citizens are encouraged to establish a watershed council for the South Fork Snake River Basin to help coordinate management agencies' and local officials' activities and ensure that citizens' concerns are accommodated in the decisions. Membership and participation should be broad-based, including all interest groups and agencies.

Use the watershed council as a forum to:

- Establish agreements in cooperation with landowners along the river to protect water quality.
- Coordinate with landowners and agencies to resolve conflicts.
- Educate homeowners about the sources of pollution harmful to aquatic life, i.e., lawn chemicals, septic tank discharge, automotive and household fluids, and siltation.
- Educate landowners about the opportunity to obtain loans and grants from the Soil and Water Conservation Districts (through the Idaho Soil Conservation Commission) for range and riparian improvements.

2. The watershed council should explore funding opportunities to support council activities, including the availability of mitigation monies from the Bonneville Power Administration.

Water Allocation

1. Agencies and organizations desiring instream flows, such as IDFG and Trout Unlimited, are encouraged to explore ways to secure these flows. Options to consider might include buying reservoir storage space, purchasing from the water bank, and/or working with irrigators to identify minimum flows in the river.

Operation of Palisades Project

1. If possible within operating constraints, the USBR is encouraged to release water early enough from Palisades and Jackson dams with the goal of maintaining flows less than 18,000 cfs during July to enhance recreation.

2. Wildlife agencies and organizations are encouraged to work with irrigators and the USBR on any compromises to achieve flow rates to better balance wildlife needs.

3. The USBR is requested to establish ramping rate protocols for Palisades Dam that can be accommodated in the constraints of the system.

4. The USBR is encouraged to manage releases from the Upper Snake projects to integrate flows needed for fisheries, recreation, wildlife and riparian habitat, *in addition to irrigation and flood* control objectives

Irrigation

1. The IDWR is encouraged to quantify how improved efficiency effects aquifer recharge and water levels at wells and springs.

2. The watermaster and canal companies are encouraged to investigate options for improving voice messaging and posting messages over the weekend to Water District One to improve efficiency in managing water.

Flood Management

1. A study to address the high water table and flooding concerns in Ririe and surrounding areas is recommended.

2. Flood Control District No. 1 should maintain existing dikes/levees/riprap for property currently protected. Do not allow expansion of dikes/levees/riprap to make additional land available for development.

3. The counties are encouraged to discourage building in the floodplain.

4. The counties are encouraged to restrict development adjacent to the South Fork Snake River corridor that would infringe upon the U.S. Bureau of Reclamation's ability to release flood stage flows of 24,500 cfs from Palisades Dam.

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Beus, M., Lead Hydrologic Engineer, U. S. Bureau of Reclamation. 1996. Personal Communication.

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IDAHO COMPREHENSIVE STATE WATER PLAN

South Fork Snake River Basin

Idaho Water Resource Board

Clarence A. Parr, Chairman
F. Dave Rydalch, Vice-Chairman
J. David Erickson, Secretary
Robert Graham
Joseph L. Jordan
Erval Rainey
Jerry R. Rigby
Terry T. Uhling

December 1996

BEFORE THE WATER RESOURCE BOARD
OF THE STATE OF IDAHO

IN THE MATTER OF THE SOUTH FORK SNAKE RIVER BASIN COMPONENT OF THE COMPREHENSIVE STATE WATER PLAN	))))	A RESOLUTION

WHEREAS, the Board, pursuant to its planning authorities in 42-1734A and 42-1734B, Idaho Code, has developed a Comprehensive State Water Plan for the South Fork Snake River Basin; and

WHEREAS, the Board is directed to identify goals and objectives, as well as make recommendations for improving, developing or conserving the water resources of the planning area; and

WHEREAS, the Board as part of its planning process is authorized to designate protected river reaches as "natural" or "recreational" and to prohibit certain activities within the stream bed; and

WHEREAS, the Board has sought and received substantial public participation throughout the planning process for the South Fork Snake River Basin component of the Comprehensive State Water Plan.

NOW, THEREFORE, BE IT RESOLVED that, having considered the draft plan and the public comment received, the Board hereby adopts the attached Comprehensive State Water Plan - South Fork Snake River Basin.

PASSED AND APPROVED this 13th day of December, 1996.

Clarence Parr
CLARENCE PARR, Chairman

ATTEST:

J David Erickson
J. DAVID ERICKSON, Secretary

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INTRODUCTION

The Idaho Water Resource Board (Board) is a constitutional agency responsible for developing a plan for the State's water resources (Article XV, Section 7 of the Idaho Constitution). Legislation in 1988 provided for the development of a "comprehensive state water plan" based upon river basins or other geographic considerations. Each basin or waterway plan becomes a component of the State Water Plan.

The South Fork Snake River Basin Plan examines existing and planned resource uses in the basin, and discusses the Board's goals, objectives, recommendations and actions for improving, developing, and conserving water resources in the public interest. The area covered is the watershed draining into the Snake River from the Idaho-Wyoming state line to the Henrys Fork confluence. This reach of the Snake River is commonly called the South Fork Snake.

The 1988 legislation authorized the Idaho Water Resource Board to prepare comprehensive state water plans for conservation, development, management and optimum use of all unappropriated water resources and waterways in the state. As part of that plan, some highly-valued waterways may be designated as state protected rivers. If the Board decides that the values of preserving a waterway in its existing condition outweigh the values of future development, it can, subject to legislative approval, designate that waterway either a "natural" or a "recreational" river to protect existing values and resources.

Because public concerns, values, and demands change over time, the Board will review and reevaluate each component of the Comprehensive State Water Plan at least every five years [Idaho Code 42-1734B(7)]. Private parties and public agencies may propose plan amendments. The Board will decide whether to amend the plan based on an evaluation of the impact of such change on the protection and preservation of the state's waterways, its economic impact on the State as a whole, whether it affects existing water rights, whether it is necessary to provide adequate and safe water for human consumption, and whether it is necessary to protect life. All amendments to the Comprehensive State Water Plan are submitted for review to the Idaho Legislature as required by law.

Planning Process

The planning process encompassed six steps which are described below. Not all steps occurred in the order presented. Some occurred throughout the planning process and/or simultaneously with others.

1) ***Inventory of resource attributes*** - The resource attribute inventory is summarized in the *Basin Description* section of the South Fork Snake River Basin Plan. Resource information, figures, and statistics for this plan were obtained through literature review, field reconnaissance, contact with agency personnel, and citizen input. Maps of resource data were prepared at a scale of 1:24,000 or 1:100,000 using a geographic information system (GIS). Resource data were reviewed for accuracy by government agencies, a local citizens advisory group, and interested public.

2) ***Identify local issues, concerns, and goals*** - Issues, concerns and goals related to water use help frame the scope of the South Fork Snake River Basin Plan. These were identified through meetings with the public, formation of a local citizens advisory group, and meetings with management agencies and local officials. Issues, concerns and goals for the South Fork Snake River Basin Plan are described in the *Issues, Considerations and Plan Objectives* portion of the plan, and summarized in Appendix B.

3) ***Assess current and potential water uses and constraints*** - An assessment of current and potential water uses and constraints is contained in the Water Resources portion of the *Basin Description* section and the *Institutional Constraints and Opportunities* section of the South Fork Snake River Basin Plan. This information was obtained by review of water right files, pertinent literature, regulations and law, and discussion with agency personnel.

4) ***Assess and identify river segments with outstanding resource values*** - Waterways possessing outstanding fish and wildlife, recreation, scenic or geologic values are eligible for state designation as natural or recreational waterways (Idaho Code, Sec. 42-1731). Outstanding resources are indicated by 1) unique or rare features regionally or nationally, 2) significant public concern voiced for protection, and/or 3) legal protection or special agency management designation to protect important resource values. Specific criteria for defining outstanding fish and wildlife, recreation and scenic resources are described in the *Resource Evaluation* section of the South Fork Snake River Basin Plan.

5) ***Generate strategies*** - Strategies may be actions, recommendations or policies to respond to issues and concerns identified, and achieve the selected goals. They represent alternatives considered by the Board. The strategies considered for the South Fork Snake River Basin are listed in Appendix C.

6) ***Develop actions and recommendations*** - After considering alternatives and the public interest, actions and recommendations relative to improving, developing, and conserving water resources are proposed by the Board. Many actions and recommendations were the result of consensus achieved at local citizens advisory group meetings, and are described in the *Actions and Recommendations* section of the South Fork Snake River Basin Plan.

Public Involvement

Public involvement is an important part of the planning process. Input from local citizens is necessary in assessing viewpoints and conditions in the basin. Information meetings, agency coordination meetings, and local advisory group meetings provided opportunity for public critique and suggestions on the South Fork Snake River Basin Plan. In February and March 1995, public information meetings were conducted in Irwin, Victor, Ririe and Idaho Falls to inform the public about preparation of a South Fork Snake River Basin Plan, and to ask the public to identify issues and concerns.

In April 1995, the Board selected a seventeen member advisory group comprised of local citizens. The South Fork Snake Advisory Group (SFSAG) informed the Board and its staff of local concerns, reviewed information used in the development of the plan, and provided feedback and suggestions for the Board's consideration (Rule 30.01.b, Comprehensive State Water Plan Rules, Idaho Water Resource Board, 1992). Members represented local government, water-users, conservation groups, industry, land owners, recreationists and private citizens. The group met nine times over a period of a year. All advisory group meetings were advertised and open to the public. A list of the South Fork Snake Advisory Group members and a summary of advisory group meetings is furnished in Appendix A. Newsletters were circulated to more than 200 individuals summarizing the development of the South Fork Snake River Basin Plan, notifying of advisory group meetings, and requesting comment on key pieces of information.

The Idaho Water Resource Board circulated a Draft Comprehensive State Water Plan for the South Fork Snake River Basin on October 11, 1996. Information meetings and hearings were scheduled in Ririe, Rexburg, Boise, Twin Falls and Idaho Falls in October and November 1996 to discuss and receive comment on the draft plan.

Twenty people testified at public hearings and 69 written comments were received by the Board prior to the close of the comment period on December 10, 1996.

After considering the record, the Board revised the draft plan. The Board adopted the final plan in 1996. The South Fork Snake River Basin Plan was presented to the Idaho Legislature for its consideration as required by Section 42-1734B, Idaho Code. The Legislature ratified the plan in 1997. The South Fork Snake River Basin Plan is a component of the comprehensive State Water Plan of the Board.

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BASIN DESCRIPTION

Area Overview

The South Fork Snake River Basin encompasses all land draining into the South Fork Snake River from the Idaho-Wyoming state line to the confluence with the Henrys Fork (Figure 1). Technically the South Fork Snake River is not a fork, but the main stem of the Snake River as indicated on U.S. Geological Survey maps. The South Fork Snake is the name commonly used by many people and is used in this plan. The South Fork Snake River originates in Yellowstone National Park. The headwater tributaries originate in the Teton, Gros Ventre, and Salt River mountains located in Wyoming.

Water flow of the South Fork Snake River is regulated by Palisades and Jackson Lake dams. Jackson Lake is in Grand Teton National Park, Wyoming. The portion of Palisades Reservoir located in Idaho defines the upstream boundary of the Board's South Fork Snake River Basin. Storage and releases from Jackson and Palisades reservoirs are coordinated with operation of five other Snake River storage reservoirs located above Milner Dam. The Upper Snake River Reservoir System is operated as a unit by the U.S. Bureau of Reclamation (USBR). Water rights are under the administrative control of the Director of the Idaho Department of Water Resources (IDWR) through the watermaster of Water District 01. Water is stored and distributed according to the water right priorities that have been established for Snake River water. While there are water rights on many of the tributary streams, most of the tributaries in the basin do not have storage impoundments.

Agriculture is a predominant industry in the basin. Dryland and irrigated farming are practiced in the area. Agricultural products include winter wheat, rapeseed, spring barley, potatoes, and alfalfa. Dryland farming mainly occurs upstream of Heise on benches above the river. The most significant diversions from the river for irrigation occur below Heise.

The basin possesses many outstanding natural resource values. The South Fork Snake River is a nationally renowned trout fishery supporting two varieties of cutthroat trout and brown trout. The cottonwood riparian complex bordering the river is considered one of "the most extensive and highest quality" in Idaho (U. S. Department of Interior, Fish and Wildlife Service, 1980). The river corridor is also critical bald eagle habitat supporting 37 percent of Idaho's nesting population, and half of the state's production (U. S. Department of Interior, Bureau of Land Management and U. S. Department of Agriculture, Forest Service [BLM and Forest Service], 1991). Outstanding scenery, a quality fishery, and wildlife values provide diverse recreation opportunities.

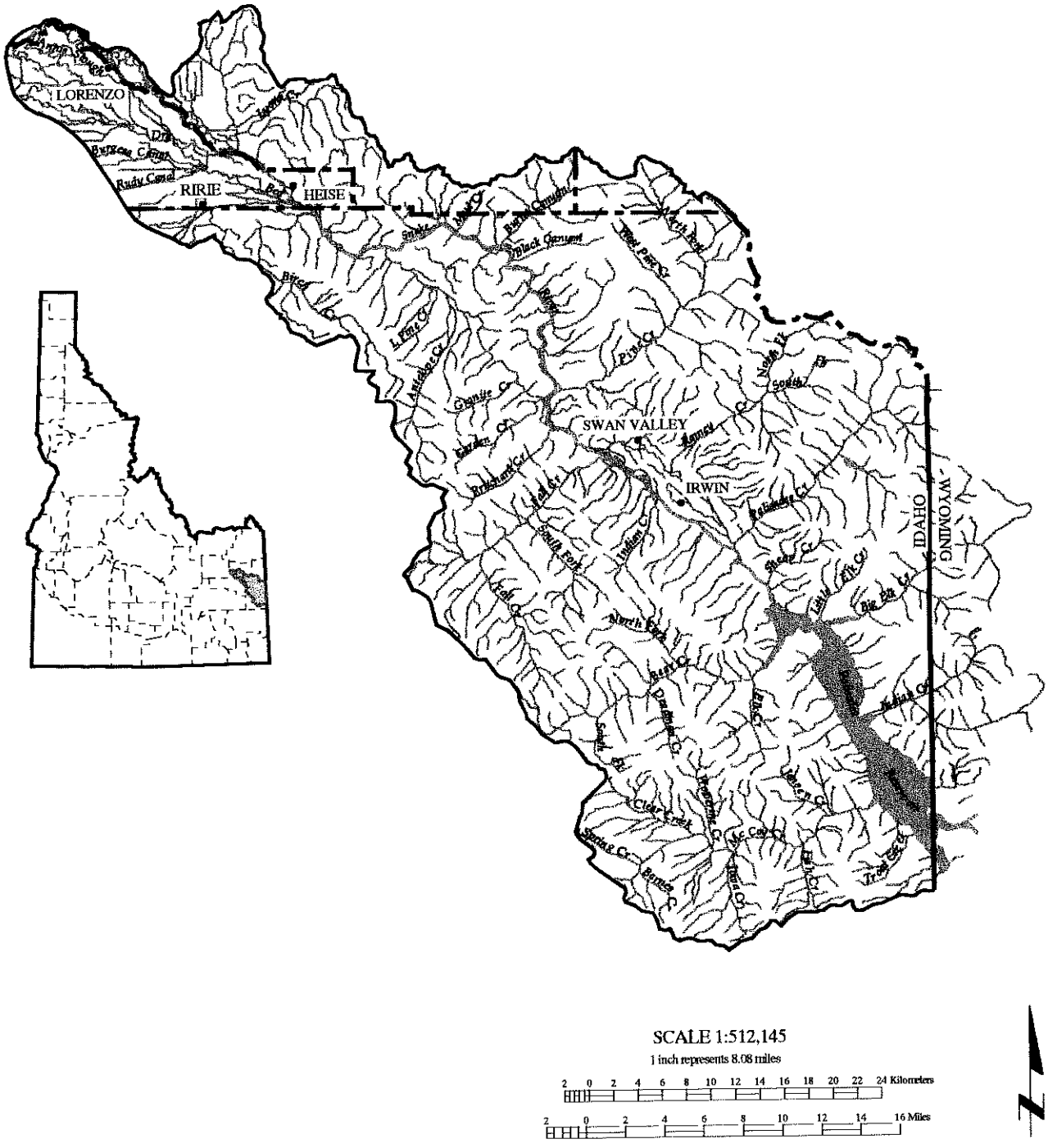
GEOLOGY AND SOILS

The basin straddles two physiographic provinces. The eastern portion encompasses the Middle Rocky Mountain province and the western half contains the eastern edge of the Snake River Plain province. The Middle Rocky Mountain province is characterized by the heavily forested Yellowstone Plateau of volcanic origin, and complexly folded and faulted ranges.

The Snake River, Big Hole and Caribou mountain ranges in the basin illustrate the folding and faulting processes that formed the Rocky Mountains. Rocks of Paleozoic and Mesozoic sedimentary formations moved along the thrust faults in Cretaceous time about 70 to 90 million years ago (Alt and Hyndman, 1989). The Caribou Range is composed of rocks from Mesozoic formations deposited during Triassic and Jurassic time. The Snake River range is an older formation deposited during Paleozoic time. The Big Hole range contains formations from Mesozoic and Paleozoic eras.

Figure 1

Water Resources



The ranges along the Idaho-Wyoming border are commonly referred to as the Idaho-Wyoming thrust belt. The belt is a part of the North American Cordillera, a chain composed of numerous mountain ranges extending from Alaska into Mexico. Faults were formed by the compression of the earth's shallow crust from west to east, causing the sheets to override each other. The older western plate overlies the younger rocks, deviating from expected sequences. Streams later cut valleys through the thrust plates. The eastern edge of the Basin and Range faults are beginning to alter the mountains in the overthrust belt (Alt and Hyndman, 1989). The Grand and Swan valleys are in a dropped Basin and Range fault block carved into the overthrust belt.

The eastern edge of the Snake River Plain physiographic province flanks the Caribou and Snake River ranges on the west. The Snake River Plain is a lava-filled basin formed by the eruption of rhyolite volcanoes that became extinct as the hot spot moved northeastward, currently located at Yellowstone (Alt and Hyndman, 1989). Stretching of the earth's crust followed along the Basin and Range faults, causing basalt to flow and cover the rhyolite.

Menan Buttes, located at the confluence of the South Fork Snake River and Henrys Fork, is at the edge of the Rexburg caldera. The buttes are composed of basaltic glass, formed by quick chilling of the magma as it erupted in the saturated alluvium of the Snake River Valley. The glassy tuff cones are found in only a few places in the world, leading to designation as a National Natural Landmark. National Natural Landmarks are "sites determined to be one of the best examples of a natural region's characteristic biotic or geologic features" (U. S. Department of Interior, National Park Service, 1987).

Soils located in the South Fork Snake River floodplain above Heise comprise the Hobacker-Badgerton Variant-Typic Cryaquolls unit (USDA Soil Conservation Service [SCS], 1981a). Soils are very deep from 30-32 inches, located on nearly level to moderately steep slopes, and well-drained to poorly drained. Hobacker series soils are formed in alluvium derived material, mainly sedimentary rock and quartzite. Badgerton Variant soils are found on river terraces and alluvial fans, forming in mixed alluvium. Typic Cryaquolls have high water tables (at a depth of 12 to 24 inches) during the growing season.

Soils on the Pine Bench and on loess foothills and mountainsides in the Swan Valley area consist of the Tetonia-Rin-Ririe unit (SCS, 1981a). These soils are very deep and well-drained. The soils are classified as silt loams.

Below Heise, soils adjacent to the South Fork Snake River include the Hayeston-Heiseton-Blackfoot units on the south, and the Labenzo-Blackfoot and Bannock-Bockston-Wardboro on the north (SCS, 1979 and 1981b). Hayeston-Heiseton-Blackfoot units are located on river terraces and lake beds. They are characterized by moderately, well-drained to well-drained soils (SCS, 1979). Labenzo-Blackfoot soils are found on river terraces and floodplains, and are somewhat poorly to moderately, well-drained (SCS, 1981b). Bannock-Bockston-Wardboro soils are well-drained and sometimes excessively drained, and located on river terraces. (Excessively drained soils remove water from the soil rapidly.)

CLIMATE

The climate in the basin is influenced by air masses from the Pacific Northwest, Gulf of Mexico and Central Canada. The basin has a semiarid climate with cool, moist winters, and warm, dry summers. The average annual precipitation ranges from 12-15 inches on the Snake River Plain, 20 inches in the Swan Valley area, to over 26 inches in higher elevations (Molnau, 1993). Variations are caused primarily by topographic relief. Snowpacks of 60 to 70 inches are common in the mountains. Mean annual air temperature is 42 degrees F. Frost free days range from 60-70 in the eastern portion of the basin to 105 days in the western portion (SCS, 1979; 1981a; and 1981b).

LAND OWNERSHIP AND USE

Over 67 percent of the basin is managed by several federal agencies including the Targhee and Caribou national forests, Idaho Falls District Bureau of Land Management (BLM) and the U.S. Bureau of Reclamation (USBR). Approximately 1 percent are state endowment lands, and the remaining 28 percent is privately owned. Table 1 lists acreage by ownership. Figure 2 illustrates land ownership patterns. Mixed land ownership occurs along the river, consisting mainly of land managed by the BLM and Targhee National Forest, with private and some state lands.

The South Fork Snake River reach is characterized by four landscape settings. The upper reach contains Palisades Reservoir. The reservoir was constructed to provide irrigation storage, flood protection, hydropower production, and fish and wildlife benefits. Developed recreation facilities are located around the perimeter (Figure 17, page 57). Residences occur on private land parcels located on the north side tributaries to the reservoir.

Foothills and forested mountains enclose the river valley from Palisades Dam to Conant Valley. National Forest lands and associated recreation development border the south side of the river, and some homes are being developed on the private land. Private lands and a few parcels managed by the BLM occur on the north. Farmlands and pastures occur in the valley and on benches above the river. Limited commercial activity occurs at Swan Valley, located at the intersections of Highway 26 and 31, and in Irwin along Highway 26. Residential and second home development is increasing.

From Conant Valley to above Heise the river flows through a deep rhyolite canyon. The upper portion of the canyon is unroaded. The lower portion is paralleled by an unpaved road on the east. Land ownership is predominately Forest Service and BLM with a few private parcels. The lands above the canyon are privately owned and used for dryland farming. Some of these lands have been platted for subdivisions. A few of the private parcels along the river have residential development.

Table 1. Ownership Within the South Fork Snake River Basin, Idaho.

	Acres
U.S. Forest Service	413,963
U.S. Bureau of Land Management	10,548
U.S. Bureau of Reclamation (withdrawals)	11,242
Idaho Department of Lands	7,930
Private	183,220
Water	18,072
TOTAL	644,975

Below Heise the river enters a broad, open floodplain and is characterized by extensive braiding. Land ownership consists of private and BLM lands. Irrigated farming and grazing are the principal land uses. Figure 3 depicts the land uses in the basin.

BASIN HISTORY

Prehistory

Human occupation has been documented for the past 9,000-10,000 years in the basin (McDonald, 1983; BLM and Forest Service, 1991). The earliest inhabitants were from the pre-Shoshonean period (Willingham, 1993). Early inhabitants were thought to be small, highly mobile bands which hunted big game (Butler, 1986).

As the climate became more arid, many species of big game disappeared (Butler, 1986; McDonald, 1983). Native societies shifted from specialized big game hunting to a more generalized hunting and gathering way of life. These societies developed seasonal, migratory routes to camas fields, fishing waters and other food gathering areas, utilizing natural routes along rivers and mountain passes. The Conant Pass was used to travel to winter camps to the west. In the spring the Fall Creek drainage was used to travel to Jackson Hole (McDonald, 1983).

Figure 2

Land Ownership

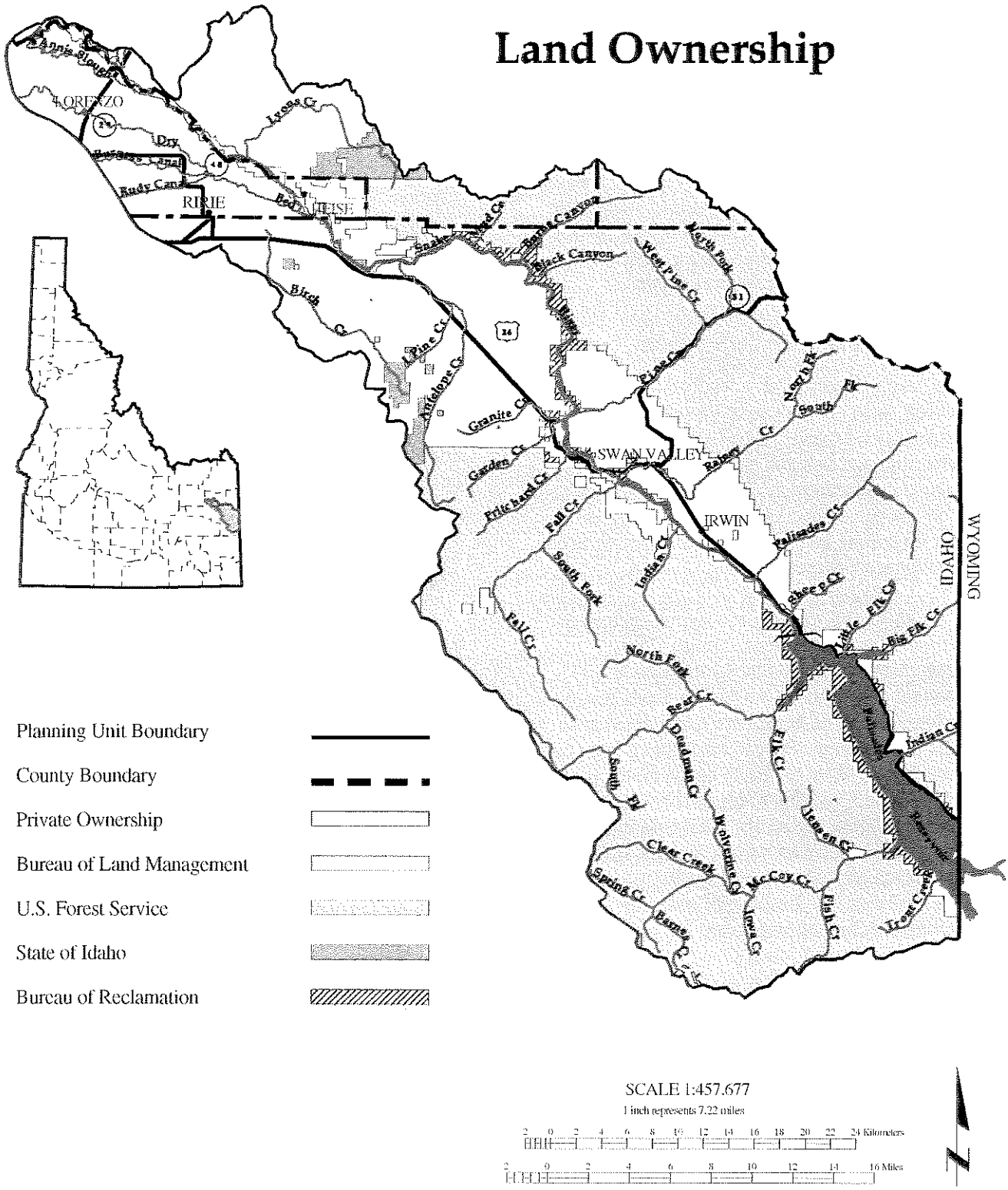
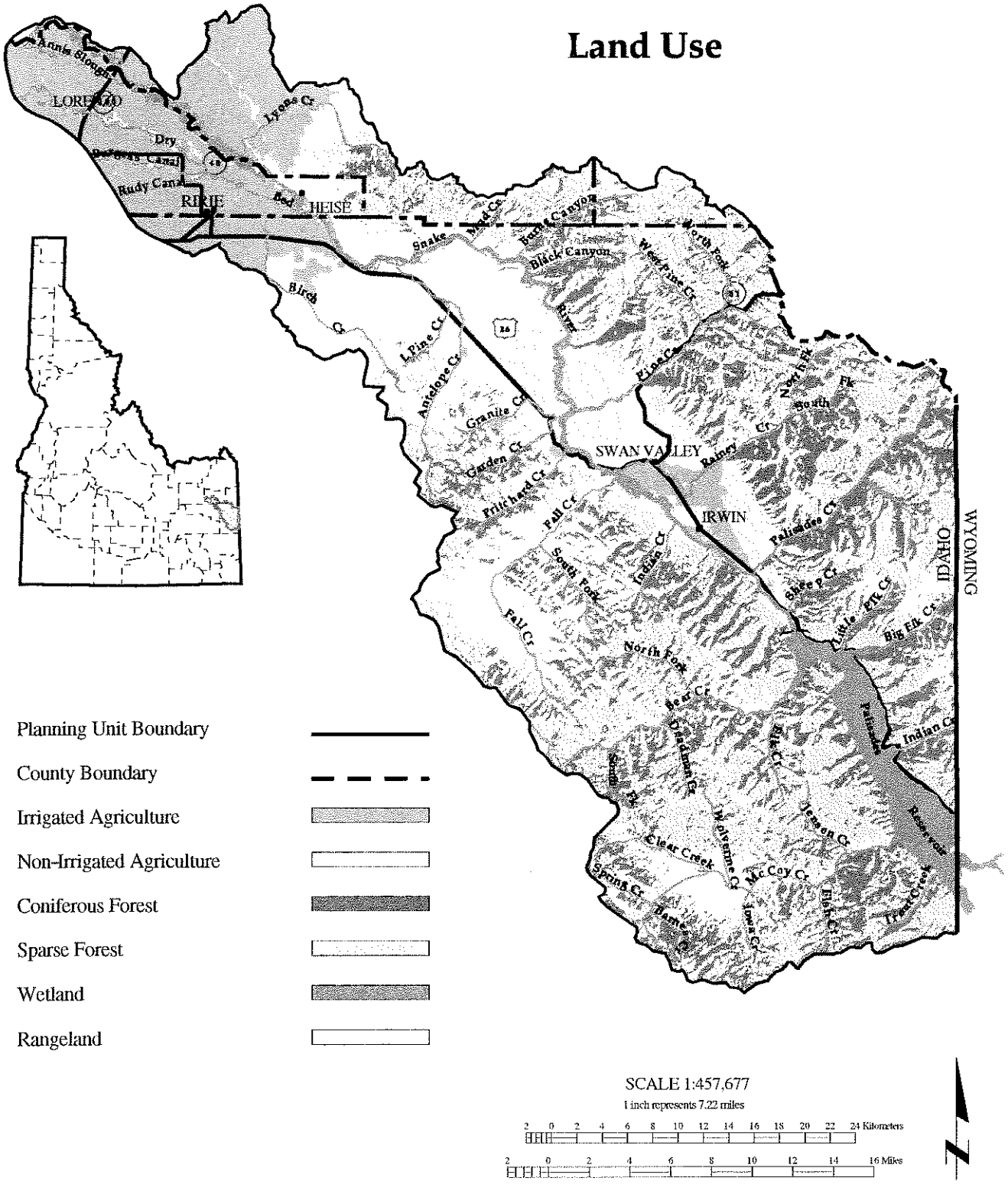


Figure 3

Land Use



The Shoshone are known to have occupied the area for the past 650 years (BLM and Forest Service, 1991). The Shoshone people expanded into the area from the Great Basin, outcompeting and displacing the indigenous population (McDonald, 1983). The Bannocks arrived afterwards, migrating from the Idaho-Oregon border following their acquisition of the horse (sometime in the early-1700's) (McDonald, 1983). By the nineteenth century, the Bannock and Shoshone were culturally identical (Liljeblad, 1957).

The horse changed the Shoshone-Bannock culture, allowing increased mobility to pursue bison and other food sources. In the winter, the people resided in the lower elevations along rivers. In the spring, they would hunt game in the mountains and gather plant materials. Fall hunting parties traveled from Camas Prairie to Jackson Hole and Yellowstone along the South Fork Snake River to pursue elk (McDonald, 1983). These parties traveled above the South Fork Snake canyon (Butler, 1958).

The South Fork Snake River Basin is part of the traditional home territory of the Shoshone-Bannock Tribes. The basin and surrounding lands have spiritual significance to the Tribes, and historically have been used for hunting, fishing and gathering activities. The Fort Bridger Treaty of 1868 secures the right of the Tribes to hunt and fish ". . .on the unoccupied lands of the United States." This includes lands under the jurisdiction of the Forest Service, BLM and USBR in the South Fork Snake River Basin. The American Indian Religious Freedom Act of 1978 and other federal laws preserve the right to believe, express and exercise traditional religions. This would include access to sites in the basin, possession of sacred objects, and practice of traditional rites and ceremonies.

History

An abundance of fur bearing animals along the Snake River and tributaries attracted trappers, the first Euro-American men, in the early 1800's. Major Indian tribes in the basin at the time included the Shoshone, Bannock, Blackfoot, and Crow (BLM and Forest Service, 1991). The basin and surrounding lands were the site of much activity from 1810 to 1840 as various fur trade companies competed for domination in the area. Rendezvouses occurred every year with trappers and Indians to celebrate and trade. One gathering spot, Pierce's Hole, located just north of the basin between Victor and Driggs is remembered for a battle that occurred between the trappers and Blackfeet Tribe in 1832 (Clements, 1974). Pine Creek drainage was one of the travel routes to Pierce's Hole (Willingham, 1993). While a few independent trappers remained, by the late 1830's and 1840's the fur companies were no longer prevalent in the territory because the price for beaver furs had dropped and the animal populations were sparse.

Settlement of the area by Euro-Americans began in the 1870's attracted by farming, ranching, logging and mining opportunities. White emigration with the discovery of gold and agricultural settlement led to conflicts with the Shoshone and Bannock peoples. Wintering grounds were occupied by the settlements, and fish and game were depleted by the miners, disrupting significant components of the Shoshone and Bannock cultures. Several conflicts occurred resulting in the establishment of the Fort Hall Indian Reservation in 1867 and the signing of the Fort Bridger Treaty of 1868 (McDonald, 1983).

Gold was discovered in the Caribou Mountains (called Mount Pisgah at the time) in 1870. Fifteen years of placer mining followed. Lode claims were discovered in 1874 and pursued for more than a decade. During this gold rush, two settlements were established -- Keenan City and Caribou City. Keenan City was the first town in Bonneville County, having a population of 500 and a Chinese community of several hundred (Sparling, 1974). In 1885 Caribou City was populated by 1500 people. The town burned that year and was never rebuilt (Sparling, 1974).

Many people migrated from Utah and the eastern United States to settle in the basin and adjoining Snake River Valley from a period of mid-1870's through the early 1900's. Much of

the colonization was the result of organized efforts by Mormon colonists from Utah (Beal, 1942). During this period, many pioneers organized irrigation companies to divert water from the South Fork Snake River. One of the oldest settlements in the Snake River country is present day Menan, originally named Poole's Island. While employed with Utah Northern Railroad, John Poole of Ogden explored the area and decided to homestead (Carter, 1955). Poole developed one of the first irrigation canals, the Long Island Canal, in 1880 to bring South Fork Snake River water from the Dry Bed to the island.

Numerous canals were constructed during this period by local, cooperative irrigation companies. Many of the projects diverted water from a branch of the river commonly referred to as the Dry Bed. The South Fork Snake River was constantly changing, leaving inadequate flow in the Dry Bed to meet the demand. To rectify the situation, the canal companies dependent on this channel of the river organized to construct the Great Feeder. The canal was completed in 1895 (Carter, 1955).

The Reclamation Act of 1902 provided an opportunity to get federal assistance in storing water for late season irrigation and controlling floods. Several federal projects on the Upper Snake River were constructed upstream and downstream of the South Fork Snake River Basin. The Reclamation Project Act of 1939 resulted in authorization of Palisades Dam with re-authorization in 1950. The project was completed in 1957.

POPULATION AND ECONOMICS

Population

Estimated population for the South Fork Snake River Basin and surrounding rural area (including Rigby) is about 7,205 based on 1990 U.S. Census data. Most of the basin is located within Bonneville County with small portions of Jefferson and Madison counties. The projected population growth for these counties is shown in Table 2.

Population information is available for a few of the communities within the basin. The communities of Ririe and Swan Valley experienced a population increase while Irwin experienced a decrease between 1980 and 1990 (Table 3). By comparison, Bonneville County experienced a 9.4 percent growth, Jefferson County an 8.1 percent increase, and Madison County a 21.5 percent increase (Table 4).

Table 2. Population and Projections for Bonneville, Jefferson and Madison Counties.

Population	1980	1990	1995	2000	2005	2010	2015
Bonneville	65,980	72,207	81,112	88,720	93,510	99,380	105,490
Jefferson	15,304	16,543	18,869	21,110	22,700	24,420	26,150
Madison	19,480	23,674	24,312	29,570	32,180	34,690	37,160

Source: Idaho Power Company, 1994; Idaho Department of Commerce, 1994; Idaho Department of Employment, 1995a.

Table 3. Population for Some Communities in the South Fork Snake River Basin.

Community	1980	1990	Percent Change
Irwin	113	108	-4.4
Ririe	555	596	7.4
Swan Valley	135	141	4.4

Source: U. S. Census, 1990.

Table 4. Percent Population Change in Bonneville, Jefferson and Madison Counties.

County	1970-1980	1980-1990	1990-1995	Annual Average 1990-1995	Annual Average 1995-2015
Bonneville	25.8	9.4	12.3	2.4	1.3
Jefferson	30.4	8.1	14.1	2.7	1.6
Madison	44.8	21.5	2.7	0.5	2.1
State of Idaho	32.4	6.6	15.2	2.9	
United States	11.1	9.7	5.1	1.0	

Source: Idaho Department of Commerce, 1994; Idaho Department of Employment, 1995a; Idaho Power Company, 1994; U.S. Bureau of the Census, 1993.

From 1990 to 1995 the population has increased at an annual average rate of 2.4 percent in Bonneville County, 2.7 percent in Jefferson County, and 0.5 percent in Madison County.

The population in southeastern Idaho is projected to continue increasing at an annual average rate of 1.3 to 2.1 percent for the next 20 years. The population of Bonneville County is projected to increase 30 percent by the year 2015 (Table 2). All communities in the basin are expected to see increases in population and dwellings in the future as development pressures continue. A portion of this development is expected to include second homes. The 1990 census identified 429 second homes in the Swan Valley division. These projections foretell increased residential growth, resulting in increased demands for the resources of the South Fork Snake River Basin including public services and outdoor recreation opportunities.

Employment and Income

Agriculture represents one of the primary industries in the three county area, with manufacturing, atomic energy research, and recreational travel also significant contributors. Much of the manufacturing is the processing and production of potato and dairy products, cement products, farm equipment, and foundry products (Idaho Department of Employment, 1995b). Employment and personal income by industry for the three counties in the South Fork Snake River Basin are listed in Tables 5 and 6. Employment by industry for the South Fork Snake River Basin is shown in Table 7 based on 1990 U. S. Census data.

Bonneville County relies heavily on the service sector for its economic base with the Idaho National Engineering and Environmental Laboratory employing the largest portion of the service sector. Retail trade accounts for the second largest group of workers. Jefferson County, like other counties in the area, has many people employed in the agriculture and food processing industries. Madison County, although rural, functions as a diversified trade and service center due to the influence of Ricks College. For the basin and surrounding area, retail and educational services are the largest employers for area residents (Table 7).

As in any economy, employment growth is not uniform. Some industries have experienced strong growth, some remain unchanged, and some have experienced declines in employment (Table 5). Farm employment has declined in all three counties from 1980 to 1992 -- 36 percent in Bonneville, 27 percent in Jefferson, and 30 percent in Madison, resulting in a loss of 1451 jobs. Productivity gains through the use of more efficient machinery contributed to the loss of jobs. Many agricultural producers have cited the cost of labor and an overall shortage of labor as a factor in their decision to move to automated technologies (Idaho Power Company, 1994). While farm employment has experienced declines, employment in agricultural services, forestry and fisheries has doubled.

Table 5. Employment Statistics for Bonneville, Jefferson and Madison Counties.

Employment by Industry	1980	1984	1988	1992	% Change
BONNEVILLE COUNTY					
Farm	1,971	1,767	1,385	1,252	-36.48
Ag. Serv., Forest, Fish.	261	362	589	547	109.58
Manufacturing	1,847	1,903	1,776	2,404	30.16
Mining	59	93	79	27	-54.24
Construction	2,626	2,360	2,347	2,914	10.97
Transport. Com.& Util.	1,214	1,042	1,040	1,199	-1.24
Wholesale Trade	2,534	2,621	2,659	3,160	24.70
Retail Trade	5,442	6,304	7,681	8,852	62.66
Finance, Ins. & Real Estate	1,925	1,885	2,353	2,380	23.64
Services	9,506	9,757	10,889	13,866	45.87
Federal Civilian	819	743	704	924	12.82
Federal Military	539	415	533	504	-6.49
State & Local Government	2,918	2,877	3,307	3,925	34.51
Total Employment	31,661	32,129	35,378	41,954	32.51
JEFFERSON COUNTY					
Farm	1,573	1,543	1,263	1,145	-27.21
Ag. Serv., Forest, Fish.	--	248	588	633	155.24
Manufacturing	718	554	691	704	-1.95
Mining	< 10	13	13	15	15.38
Construction	271	313	317	489	80.44
Transport. Com. & Util.	209	253	186	210	0.50
Wholesale Trade	565	538	361	378	-33.10
Retail Trade	534	593	596	778	45.69
Finance, Ins. & Real Est.	237	198	179	190	-19.83
Services	--	559	545	847	51.52
Federal Civilian	58	54	65	48	-17.24
Federal Military	101	84	112	106	4.95
State & Local Govern.	730	767	853	942	29.04
Total Employment	5,701	5,717	5,769	6,485	13.75
MADISON COUNTY					
Farm	1,044	1,052	822	740	-29.12
Ag. Serv., Forest, Fish.	131	154	265	--	102.29
Manufacturing	756	1,123	1,211	1,170	54.76
Mining	< 10	< 10	< 10	--	--
Construction	585	377	320	390	-33.33
Transport. Com. & Util.	234	211	248	234	0
Wholesale Trade	687	832	717	784	14.12
Retail Trade	1,095	1,105	1,521	1,937	76.89
Finance, Ins. & Real Est	409	297	346	409	0
Services	2,479	3,063	3,056	3,485	40.58
Federal Civilian	53	47	48	56	5.66
Federal Military	129	115	159	154	19.37
State & Local Govern.	796	883	1,023	1,242	56.03
Total Employment	8,399	9,260	9,379	10,897	29.74

Source: Idaho Department of Commerce, 1994.

Table 6. Personal Income by Major Source and Earnings by Industry for Counties, 1994 (in thousands of dollars).

Item	COUNTIES Bonneville	Jefferson	Madison	State of Idaho	% of State Total
Income by place of residence					
Total personal income	1,499,763	251,552	263,213	20,703,335	9.73%
Nonfarm personal income	1,462,044	232,002	245,014	19,901,009	9.74%
Farm income	37,719	19,550	18,199	802,326	9.41%
Per capita personal income	18.9	13.6	11.1	18.3	--
Earnings by industry					
Agriculture services, forestry, fish & other	10,934	10,108	3,612*	221,950	11.11%
Mining	324	2,633	0*	217,683	1.36%
Construction	97,994	10,882	10,475	1,283,915	9.30%
Manufacturing	79,831	19,981	28,461	3,128,673	4.10%
Transportation & public utilities	37,364	6,004	9,034	865,584	6.05%
Wholesale trade	88,502	6,877	11,687	806,055	13.28%
Retail trade	128,573	9,075	27,131	1,662,953	9.91%
Finance, insurance, & real estate	34,287	2,021	4,559	855,452	4.78%
Services	426,992	7,432	71,137	3,123,179	16.19%
Government & gov. enterprises	149,395	22,107	29,151	2,498,986	8.03%
Population	79,200	18,400	23,700	1,133,100	10.71%

* **Note:** 1994 data for Agriculture and Mining categories for Madison County were not available. 3,612 and 0 are 1991 data.
Source: U. S. Department of Commerce, Bureau of Economic Analysis, 1996.

Table 7. Employment by Industry in the South Fork Snake River Basin and Surrounding Area (including Rigby).

Industry	Number Employed	% of the Total Employed
Agriculture, forestry, and fisheries	166	5.9
Mining	8	0.3
Construction	276	9.8
Manufacturing	275	9.8
Transportation	151	5.4
Communications & other public utilities	48	1.7
Wholesale trade	200	7.1
Retail trade	564	20.1
Finance, insurance & real estate	9	3.5
Business & repair services	102	3.6
Personal services	50	1.8
Entertainment & recreation services	24	0.9
Health services	89	3.2
Educational services	356	12.7
Other professional & related services	268	9.5
Public administration	136	4.8

Source: U.S. Census, 1990.

Although layoffs at the Idaho National Engineering and Environmental Laboratory have resulted in a reduction in service jobs, other sectors of the economy have continued to grow. Between 1988 and 1992, the service sector has generated the largest number of new jobs, almost 3,708 jobs in Bonneville, Jefferson and Madison counties (Table 5). Growth areas for all three counties include retail trade and state and local government. In the three counties, unemployment has remained below or near the state average since 1993 (Table 8).

The median family income in Bonneville, Jefferson and Madison counties is lower than the national median of $39,700 per year (Table 9). In Jefferson and Madison counties, median family incomes are lower than the state median of $32,900 per year. Between 1990 and 1995 personal income grew in all three counties at an annual average rate of 7.2 percent for Bonneville County, 6.8 percent for Jefferson and 9.8 percent for Madison (Table 10).

Table 8. Unemployment Rates for Bonneville, Jefferson and Madison Counties from 1991 - 1995.

	1991	1992	1993	1994	1995
Bonneville	4.5	5.0	4.7	4.4	5.0
Jefferson	6.4	6.8	5.8	5.6	5.9
Madison	5.2	4.5	4.4	4.1	4.3
Idaho	6.1	6.4	6.2	6.2	5.9

Source: Idaho Department of Employment 1994 and 1995a.

Table 9. 1995 Median Family Income in Bonneville, Jefferson and Madison Counties.

	Median Family Income
Bonneville	$39,600
Jefferson	$31,500
Madison	$30,800
Idaho	$32,900
United States	$39,700

Source: Idaho Department of Employment, 1995a.

Table 10. Personal Income for Bonneville, Jefferson and Madison Counties (current dollars).

Income	1980	1990	1992	1994	1995	% Annual Ave.
Bonneville County						
Personal income (millions)	587.2	1,191.0	1,369.0	1,577.7	1,686.0	7.2
Personal income per capita	8,850	16,400	17,700	19,400	20,300	4.4
Jefferson County						
Personal income (millions)	101.3	204.0	226.0	263.9	283.7	6.8
Personal income per capita	6,600	12,300	12,950	14,100	14,750	3.3
Madison County						
Personal income (millions)	125.2	230.0	245.0	341.4	367.5	9.8
Personal income per capita	6,350	9,700	10,250	13,200	13,800	7.3

Source: Idaho Power Company, 1994.

ENERGY SUPPLY AND CONSERVATION

Large quantities of electrical energy are produced within Idaho. Hydropower has traditionally been the principal source of electricity. Idahoans use more electricity per capita than the national average, which reflects the energy requirements of the agricultural industry and use of electrical energy for space heating. The electrical demand in Idaho continues to rise, and may be attributed to the growing population.

Electrical power service in the basin is provided by the Pacificorp-Utah Power and Light Division, and Lower Valley Power and Light and Fall River rural electric cooperatives. The Ririe, Heise and Lorenzo areas are served by Pacificorp and Fall River Electric. The Swan Valley and Conant Valley areas are served by Lower Valley Power and Light.

Pacificorp's electric generating facilities are located outside the basin, and include two hydroelectric projects on the Henrys Fork and six hydroelectric facilities elsewhere in southeast Idaho (Idaho Department of Water Resources [IDWR], 1995b). Although energy demands are increasing in the area, the corporation has existing capacity to meet future demands in the next five years (Barker, 1996). Fall River Electric also has seen an increase in energy demands in the basin (Jones, 1996). This cooperative purchases power from Bonneville Power Administration (BPA) and operates a hydroelectric facility at the Island Park Reservoir on the Henrys Fork. They also own the Felt project, located on the Upper Teton River, which is leased to Pacificorp.

Lower Valley Power and Light services the portion of the basin upstream of Heise with about 1000 residential accounts (Robinson, 1996). The cooperative primarily purchases power from the BPA, but also owns a 1.5 megawatt (MW) hydropower generating facility located in Wyoming on Strawberry Creek (U. S. Department of Interior, Bureau of Reclamation [USBR], 1996). Between 1979 and 1992, Lower Valley Power and Light had a 594 percent increase in electricity sales in Idaho (Idaho Department of Water Resources, 1994). Much of this increase is attributed to growth in the Teton Valley. Demands in the basin have increased about 2 percent a year since 1990, but are expected to increase at a greater rate in the near future (Robinson, 1996; Case, 1996). Within the next five years the cooperative plans to upgrade existing transmission lines to Teton Valley and along the Pine Creek drainage to address increased energy demands.

Currently liquefied gas is available in the Afton and Jackson areas as an alternative energy source. A pipeline is planned for construction into Swan Valley in the next five years (Case, 1996). This may shift some electric energy demands to natural gas.

Energy conservation is the more efficient use of energy by using less energy to produce a given service at a given amenity level. Conservation is widely regarded as a key method of meeting future energy demand. However, it is difficult to estimate how much energy will be gained through conservation measures, because it is dependent on the degree of implementation. Implementation depends largely upon the actions of individual homeowners, irrigators, and commercial entities, and therefore can vary widely.

Available conservation programs designed to increase energy use efficiencies play a major role in meeting part of the current and future increases in energy requirements. The Northwest Energy Code, locally-adopted building codes, and the Super Good Cents program support modern conservation standards for new residential and other construction. Other conservation advancements are also becoming increasingly feasible.

The Idaho Department of Water Resources' Energy Division provides information, technical assistance and financial support to promote cost-effective conservation, and utilization of energy efficient resources. One program works with manufactured home builders to construct energy-efficient homes. Since 1992, twenty-two manufactured homes have been built in the South

Fork Snake River Basin which exceed the U. S. Department of Housing and Urban Development and state energy standards. Energy-efficient homes built in the basin have resulted in a savings of about 117,300 kilowatt hours (kwh) annually, or $5,865 each year (at $.05 kwh). Compared to a site-built home constructed to the Idaho Residential Energy Standards, these same energy-efficient manufactured homes also represent a savings of 268,712 kwh per year, or $13,435 a year (Reece, 1996).

Existing facilities are eligible for energy conservation upgrading through several programs sponsored by state and federal agencies, and utility industries. These programs promote space and water heating conservation upgrades by providing low-interest loans to fund the installation costs of the measures. Existing public nonprofit schools and hospitals are eligible for energy conservation grants under the Institutional Conservation Program, funded by the U.S. Department of Energy and administered by the Energy Division of the Idaho Department of Water Resources.

While not part of any established conservation program, conversions to alternative sources of energy have been proposed to reduce dependence on over-committed sources. The increasing conversion from electrical space and water heating to natural gas is one example which is finding public favor. The proposed natural gas line into Swan Valley will provide this opportunity in the basin. Other alternative energy sources suggested include use of Idaho's geothermal, and renewable wood, solar, and wind resources. Geothermal energy is used in the form of hot water or steam produced within the earth for space heating in some local areas. Geothermal is used at Heise Hot Springs Resort to heat water in the pools. Use of wood for space heating has been popular in some areas, but potential problems with air pollution make it less attractive.

Water Resources

A standardized set of watershed boundaries were established for Idaho through a cooperative effort of several federal, state and private entities. These watershed boundaries allow consistency in referencing, data collection and reporting. These hydrologic units are indexed using the eight digit USGS Hydrologic Unit Code (HUC) and a two-digit extension. The South Fork Snake River Basin boundaries were delineated before watershed boundaries were finalized for the state. Consequently, the South Fork Snake Basin boundary does not perfectly match the watershed coverage established for the state. The Basin includes watersheds within hydrologic unit 17040104 and portions of watersheds within hydrologic unit 17040201. Future revision to the South Fork Snake River Basin Water Plan will include adjustment of basin boundaries to correspond to established watershed boundaries.

WATER QUANTITY

Surface Water

The South Fork Snake River basin comprises 1,000 square miles in eastern Idaho between the Idaho-Wyoming state line and the confluence with the Henrys Fork. Above Heise, the basin is mountainous and extensively forested; Palisades Reservoir and its tributaries delineate the upstream bounds. Below Heise, the South Fork Snake River traverses an alluvial fan opening on the Snake River Plain. Palisades, Rainey, Fall, and Pine creeks are the primary tributaries to the South Fork Snake River between Palisades Dam and the Henrys Fork confluence. The Snake River basin upstream of Palisades Dam drains an area of 5,208 square miles primarily in Wyoming.

USGS maintains four stream gaging stations within the basin by contract with State Water District 01 and USBR (Figure 4 and Table 11), and one reservoir gage at Palisades Reservoir. Forty-one additional gages measure diversions from the South Fork Snake River and Dry Bed. The historic data for these gages indicate that the average annual runoff at the Heise gage is approximately five million acre-feet (AF). Eighty-two percent of the Heise discharge is attributed to the Snake River drainage upstream of Palisades Reservoir in Wyoming. Annual reach gains from tributaries within the planning

Figure 4

Stream Gaging Stations

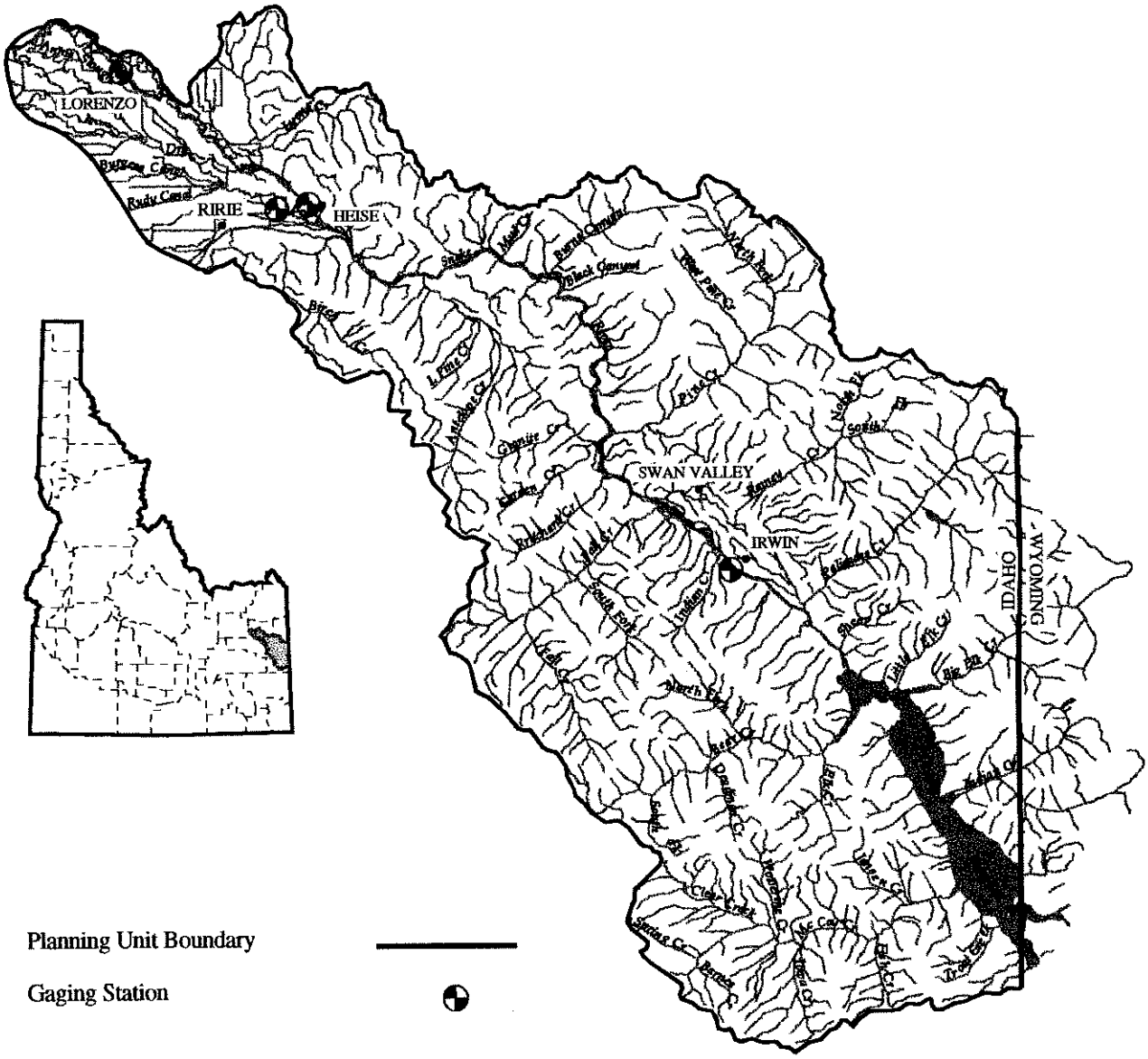


Table 11. Key Gaging Stations - South Fork Snake River.

Station	Gage	Period of Record	Drainage Area (sq. mi.)	Average Runoff Volume (ac-ft/yr)	Period of Record (acre-feet) Max.	Min.
#13032500 South Fork Snake River at Irwin	River	1949 to Present	5,225	4,814,200	6,707,500	2,621,900
#13037500 South Fork Snake River at Heise	River	1911 to Present	5,750	5,252,500	7,276,400	2,980,000
#13038500 South Fork Snake River at Lorenzo	River	1978 to Present	5,810	3,043,600	5,209,500	1,760,000
#130380 Dry Bed	Canal	1977 to Present	NA	1,169,500	1,287,200	1,069,300

basin average 400,000 AF to Palisades Reservoir, and 500,000 AF below Palisades Dam.

Although precipitation records for Swan Valley show that 56 percent of total annual precipitation falls during the growing season (April through September), the South Fork Snake River and its tributaries are fed largely by snowmelt (Molnau, 1993). About 50 percent of the basin runoff occurs in the May-July period. Snow water content at Lewis Lake Divide (elevation 7,860 feet), located in Yellowstone National Park Wyoming, averages 34.4 inches by May 1 (Ondrechen, 1996).

South Fork Snake River flows are regulated by releases at Jackson Lake (Wyoming) and Palisades Reservoir. During the summer irrigation period releases from these reservoirs are made to meet irrigation demand, flood control requirements and to balance stored water between the reservoirs. Factors influencing operation are described in the *Snake River Regulation* section of the Institutional Constraints and Opportunities chapter.

Winter releases from Palisades Dam are dictated by storage carried over the end of the irrigation season. In the driest years, releases in the late fall and winter have been less than 1,000 cubic feet per second (cfs). Flows at Heise are in the range of 1,300 to 1,500 cfs (Figure 5). When carry over allows, typical low flows are in the range of 2,500 to 3,000 cfs through the winter.

Floods of the South Fork Snake River and its tributaries result primarily from snowmelt and occur during late May, June, and early July in years when above normal snow packs have accumulated. Jackson Lake and Palisades Reservoir are operated as a system to control flows at Heise to 20,000 cfs or less during the spring snowmelt. The year of greatest runoff on record was 1986, when the computed natural discharge at Heise was over 7.6 million acre-feet, or 149 percent of normal. Precipitation and temperatures that occur during the flood runoff season, and Palisades Reservoir storage space determine the concentration of high flows and peak magnitudes.

The lowest natural runoff year of record was 1977. Runoff was 52 percent of normal at the Heise gage. The 1931-36 drought was the most severe in the basin's recorded history. Flows were 80 percent of the historical average over that period. The drought period of 1987-92 nearly eclipsed the earlier period for the low flow record (Idaho Department of Water Resources, 1996).

Flows on tributary streams are not regulated. The lowest flows occur in late summer, fall and winter seasons. Flows are usually at their highest during the spring snowmelt. Elevation of the creeks plays an important part in the timing of peak flows. Flows occasionally increase during the summer due to thunderstorms. Storm events may contribute unusually large proportions of the total flow of the South Fork Snake River for short periods of time.

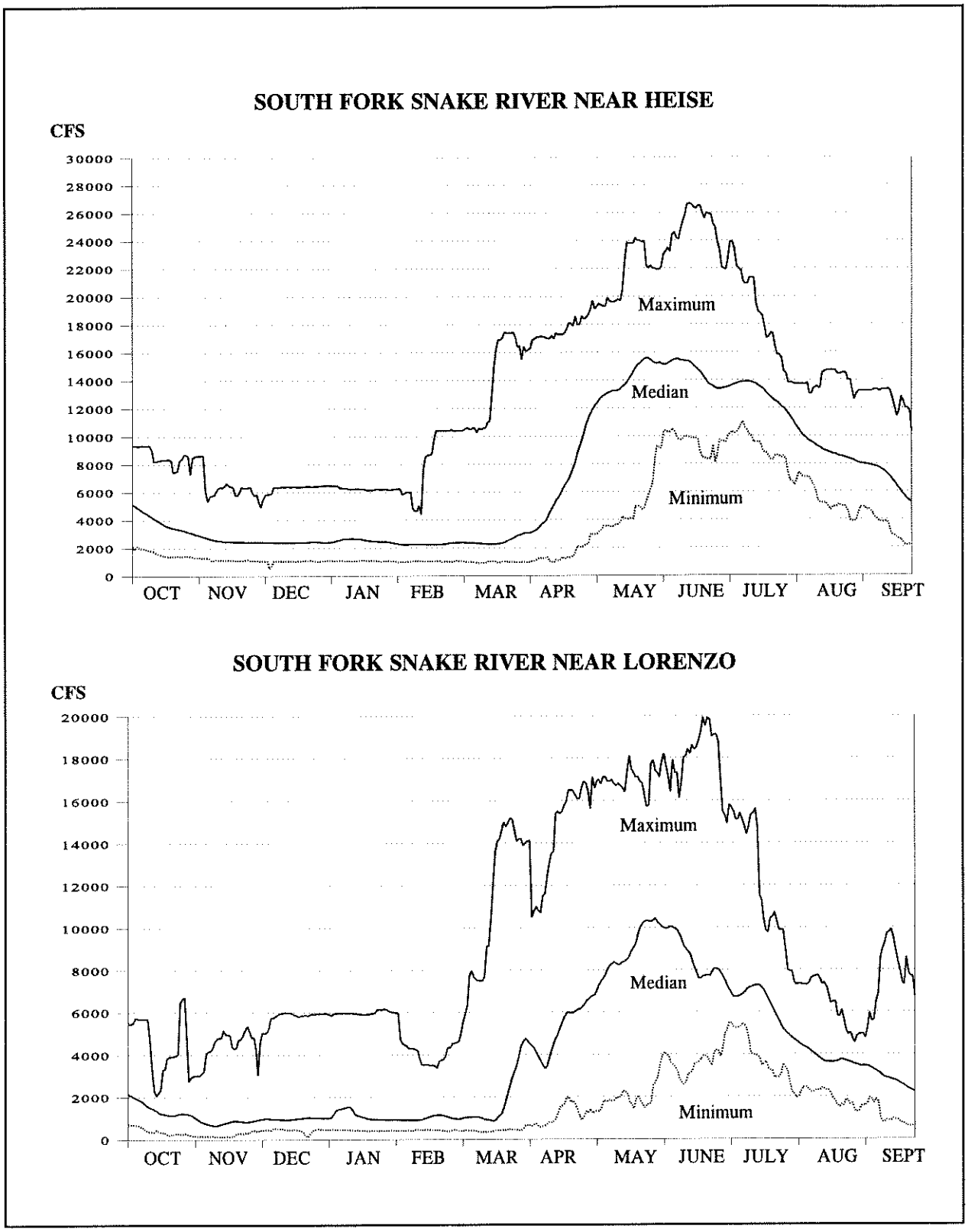


Figure 5. Averaged Daily Flows at Heise 1958-1992 and Lorenzo 1978-1992.

Ground Water

Alluvium along the South Fork Snake River and fractures in the basaltic and granitic rocks of the uplands and mountains provide ground water in the South Fork Snake River Basin. Alluvium in the upper valleys and on the Rigby Fan yield fairly large quantities of water to wells (Figure 6). Depth to ground water in the gravels is generally less than 70 feet with yields estimated at 500 to 2000 gallons per minute (1 to 4 cfs).

Alluvial aquifers are recharged by infiltration from the river and seepage from irrigated tracts. In the reach between Heise to Lorenzo, the South Fork Snake River loses approximately 250,000 AF per annum to ground water. Because of the porous nature of the soils in the basin most of the diverted water in the basin percolates into the alluvial materials of the Rigby Fan and then flows westward. Areas of the fan west of Ririe experience high water table problems as a result of the large amounts of recharge from irrigation. During the summer, ground-water levels rise as much as 30 feet and in some locations approach the land surface (Brockway and de Sonneville, 1973).

The water table occurs in the basaltic and silicic lava beneath the benchlands of the basin. The aquifers beneath the benchlands receive recharge from precipitation and by infiltration from the channels of streams that cross these benchlands. The geological formations in the area have sufficient porosity to accept fairly large volumes of water which reappear as stream flows during the late summer, fall, and winter. Recharge to ground water from precipitation on the northwest facing slopes of the highlands adjacent to the Snake River Plain is estimated to be on the order of 40,000 to 75,000 AF yearly (Mundorff, et al., 1960). With the exception of spring occurrences, depth to groundwater on the benchlands is generally a minimum of 100 feet, and can be tapped at 500 feet on the average with yields generally less than 50 gallons per minute. In the Swan Valley area, wells drawing water from stratum beneath the valley alluvium produce from 30-40 gallons per minute.

WATER ALLOCATION AND USE

The constitution and statutes of the State of Idaho declare all the waters of the state, when flowing in their natural channels, including ground waters, and the waters of all natural springs and lakes within the boundaries of the state, to be public waters. The constitution and statutes also guarantee the right to appropriate the public waters of the State of Idaho, and it is the state's duty to supervise that appropriation and allotment [Idaho Code 42-101]. Water rights are allocated by the state based on date of appropriation for specific quantities, diversion points, places of use, and purposes. Water rights are satisfied in order of priority based on date of appropriation. Changes in water rights such as diversion point or use require an application and approval by the IDWR. If a change exceeds 50 cfs or 5,000 AF, the change must be approved by the Idaho Legislature.

The natural flow of the Snake River above Milner Dam is fully appropriated, except in high water years. Most of the natural flow rights were decreed by the Rexburg Decree in 1910. Water supplies have been augmented by federally financed dams and reservoirs in the Upper Snake. The storage rights in Palisades Reservoir were established through the statutory state permit and licensing process. All of the canals below Heise have contracts for use of stored water from Jackson Lake, Palisades Reservoir, and by exchange, American Falls Reservoir.

The watermaster for Water District 01 administers the water rights above Milner Dam, including the South Fork Snake Basin, under supervision of the IDWR. On a daily basis the watermaster calculates the amount of natural flow available, total diversions, and the amount of stored water used by each space holder. Water accounting is accomplished using data from an automated system operated by USBR (known as the HYDROMET) which monitors important river gages and the majority of canal diversions. Data not available through the automated system is obtained through telephone. Each year over seven million AF of water for irrigation is distributed within Water District 01. The

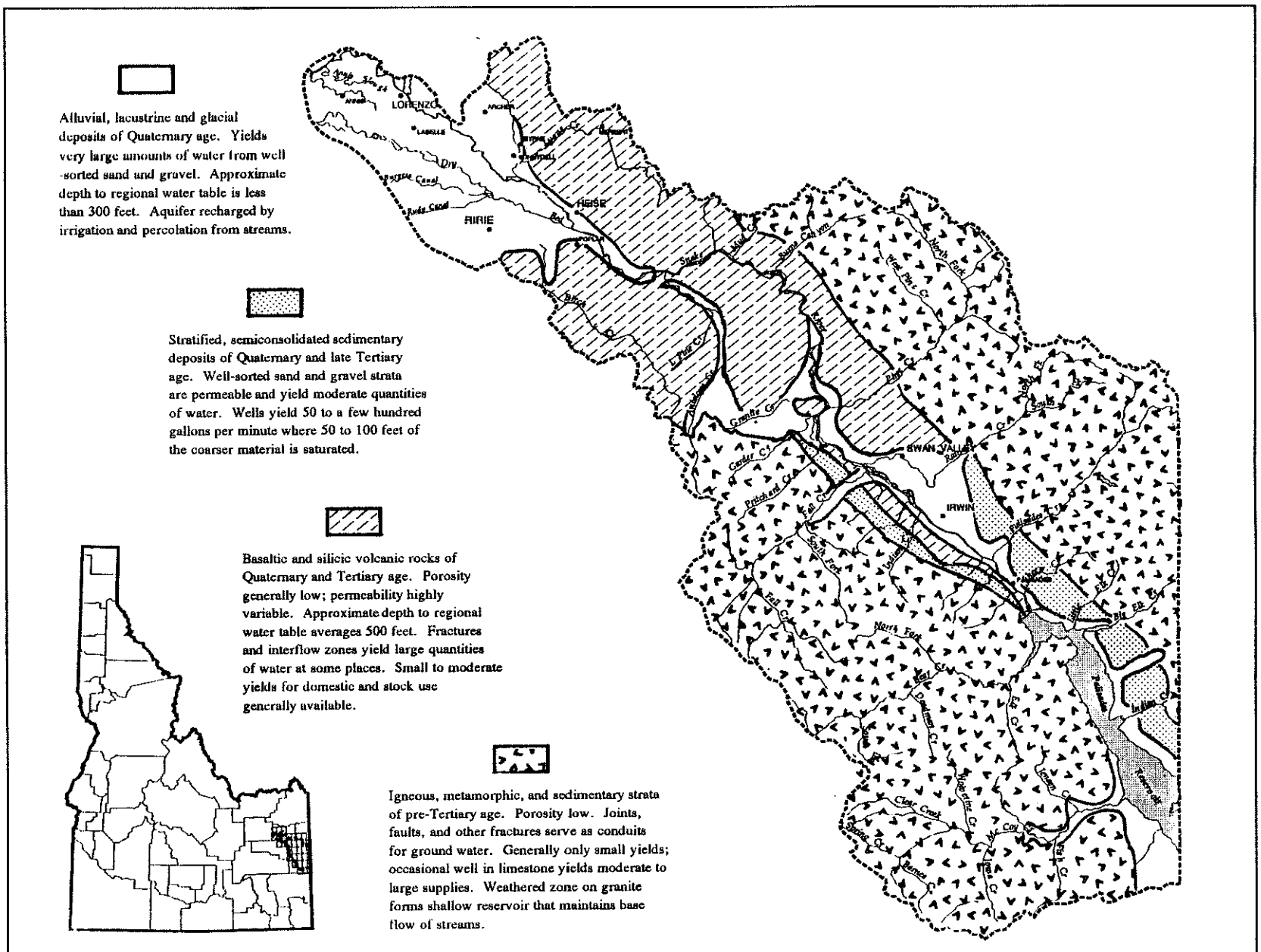


Figure 6. Aquifer Units (Pacific Northwest River Basins Commission, 1970).

watermaster also administers the District 01 Rental Pool (described on page 79) for the Committee of Nine.

The Committee of Nine consists of elected representatives of canal companies and irrigation districts in Water District 01. The Committee functions as a forum for discussion, consultation and advice on operation and administration of the Upper Snake Reservoir System. The Water District 01 watermaster and USBR Snake River Area Manager act as advisors to the Committee. The Committee proposes rules and rates for operation of the District 01 Water Rental Pool subject to Idaho Water Resource Board approval.

Figure 7 summarizes water use for the South Fork Snake Basin. Water appropriations in the basin total approximately two million AF annually (IDWR, 1996a). Water resources of the South Fork Snake Basin have been developed extensively for irrigation. However, other offstream and instream uses are significant and important to the area's economy. Hydroelectric power generation, fish, wildlife and the recreation/tourism industry are dependent on river flows. Power generation at Palisades Dam annually utilizes about 2 million AF of water that is released for irrigation and flood control purposes. Though small relative to other uses, domestic, commercial, industrial, and stock water use are essential to residents of the basin.

The Snake River is the source for the largest number and greatest volume of appropriations. Surface water supplies in the basin are primarily natural flow water rights and are the principal water source for irrigation. Storage provides, on average, only 15 percent of the water diverted above Lorenzo. Ground water comprises only three percent of the area's appropriated water, but it is relied on almost exclusively for domestic supplies. Thermal waters in the basin are scant. Heise Hot Springs is the only development using thermal water in the basin. Table 12 lists water use by stream reach.

Surface water appropriations in the basin are approximately 40 percent of the average annual discharge of the South Fork Snake River at Heise. From 1980 through 1990, irrigation diversions between Heise and Lorenzo ranged from 30 to 70 percent of the average South Fork Snake River flow at Heise during the irrigation season. Figure 8 shows the average monthly flow, recorded minimum monthly flow, and maximum diversion rate between Heise and Lorenzo. Minimum flows and maximum diversion rates are paired to illustrate potential water supply and river flow problems.

The high percolation losses through the canal systems may result in total diversion rates on the Rigby Fan of 10 AFA (acre feet per acre). About 70 percent of the water diverted for

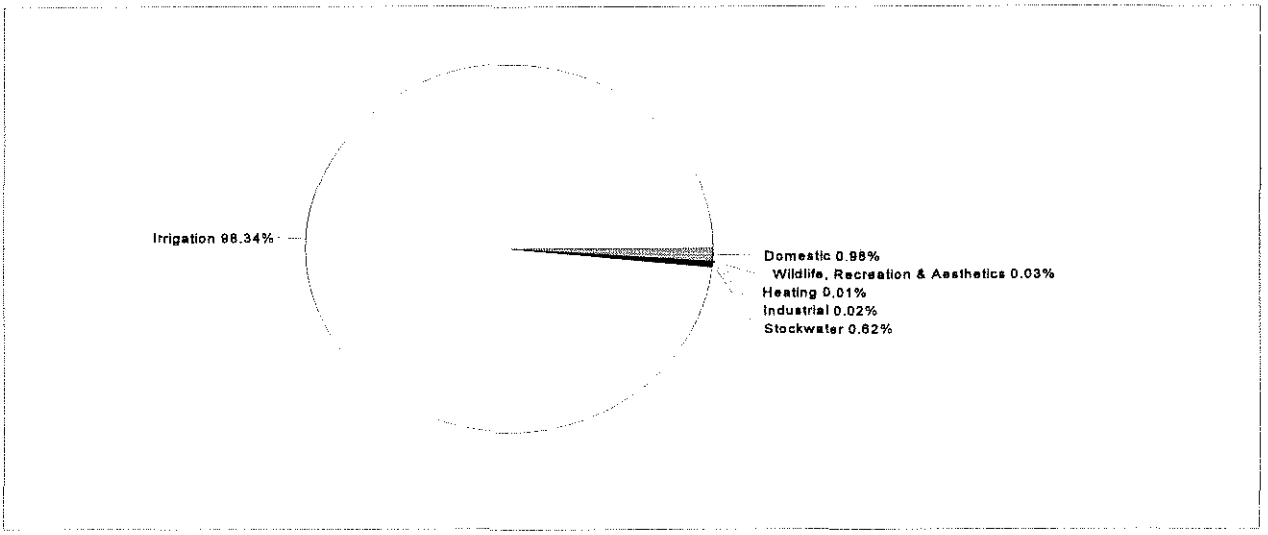


Figure 7. Water Use in the South Fork Snake Basin Based on Water Appropriations and Claims (IDWR, 1995).

Table 12. Water Use by Source for the South Fork Snake Basin.

Water Source	Number of Developments, Filings, or Claims	Total CFS of Diversions or Claims
Groundwater	2,120	450.00
Snake River	365	18,531.62
Springs	396	31.37
Antelope Creek	11	70.61
Big Elk Creek	3	5.04
Granite Creek	1	6.00
Indian Creek	9	13.14
Palisades Creek	37	252.19
Pritchard	5	8.19
Rainey Creek	44	80.96
Warm Springs	1	25.12
All Other Creeks: development < 5 cfs	289	102.72

Source: IDWR water right and adjudication database, 1995

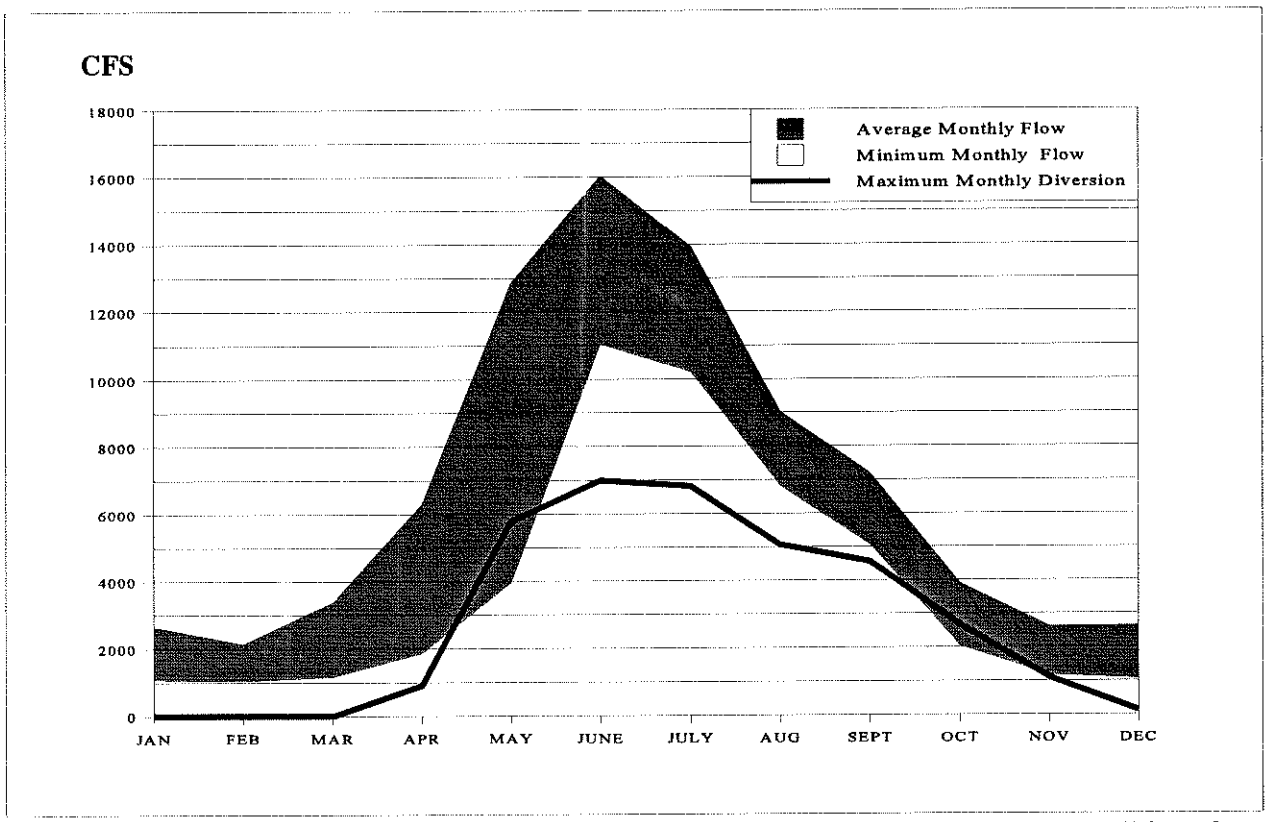


Figure 8. **South Fork Snake River Monthly Average Flows at Heise Gage and Diversions Between Heise and Lorenzo for 1980-1993.**

irrigation in the basin is not consumptively used. This was calculated assuming alfalfa planting (the highest water consumption rate at 3.5 AFA) for the 151,260 acres served by diversions between Heise and Lorenzo. Based on these assumptions, the calculated consumptive need for irrigation water in the basin approximates 529,410 AF (151,260 acres x 3.5 AFA). Canal distribution losses claim an estimated twenty-five percent of diverted irrigation water (SCS, 1977). On-farm distribution and irrigation application/seepage losses account for the remaining 45 percent.

Despite high application rates, total surface water diversions between Heise and Lorenzo have declined since the late 1970's. Currently, irrigators are diverting about 400,000 AF less from the basin than they did in 1974 (Figure 9). By comparison, the total annual diversions in Water District 01 have declined by over 800,000 AF since 1977. The change in diversion volume reflects improved water application efficiencies and administrative procedures implemented by Water District 01. Diversions from the South Fork between Heise and Lorenzo have decreased an average of 21,000 acre-feet per year over the last 19 years.

Agricultural Water Uses

Agriculture utilizes approximately 430,000 acres within the South Fork Snake River Basin. Upstream of Heise, about 55,000 acres of non-irrigated cropland covers the basin's uplands and benches, and livestock grazing is prevalent on forest and range lands. Beef and dairy cattle are dominant in the agriculture of the Swan Valley area. The bulk of irrigated land lies downstream of Heise on the Rigby Fan, where the river leaves the canyon and enters the Snake River Plain (Figure 10).

Thirty-four canals and 44 pumps annually divert and deliver about 1.7 million AF of water from the South Fork Snake River to irrigate farmsteads in the region (IDWR, 1995). Canals

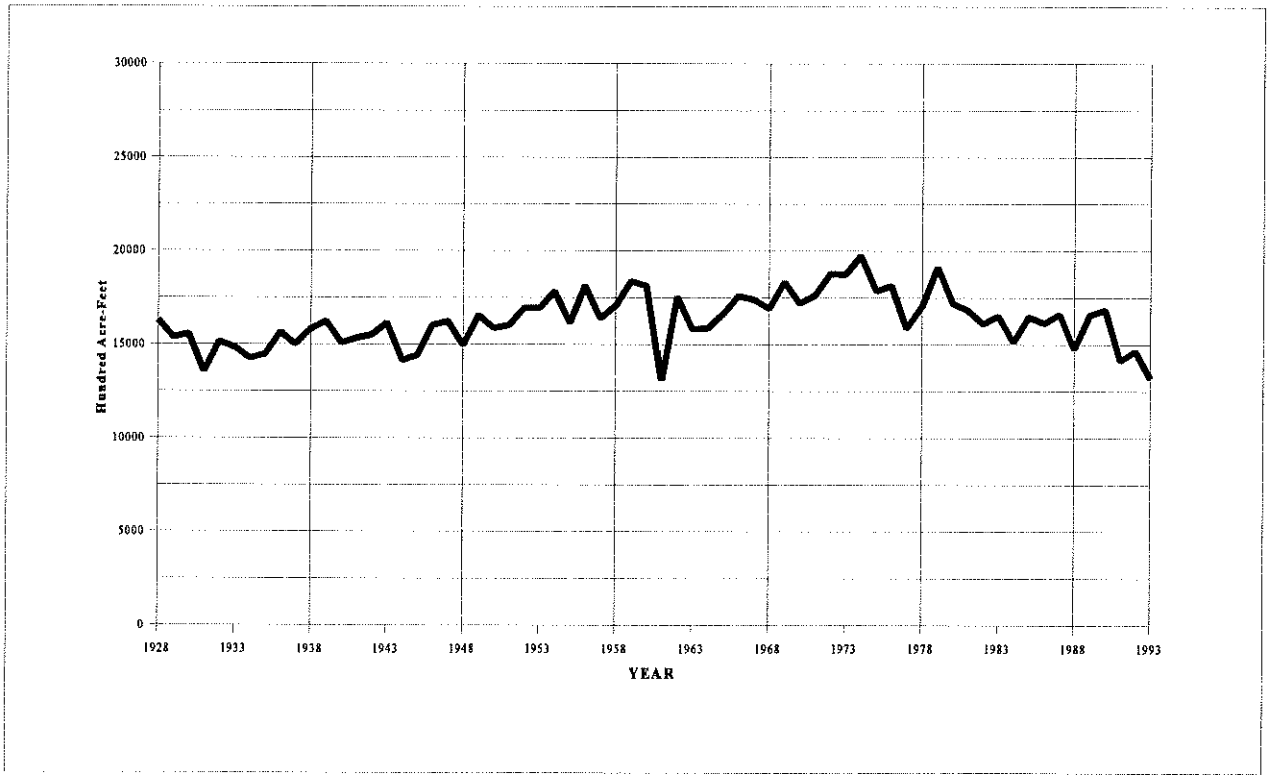
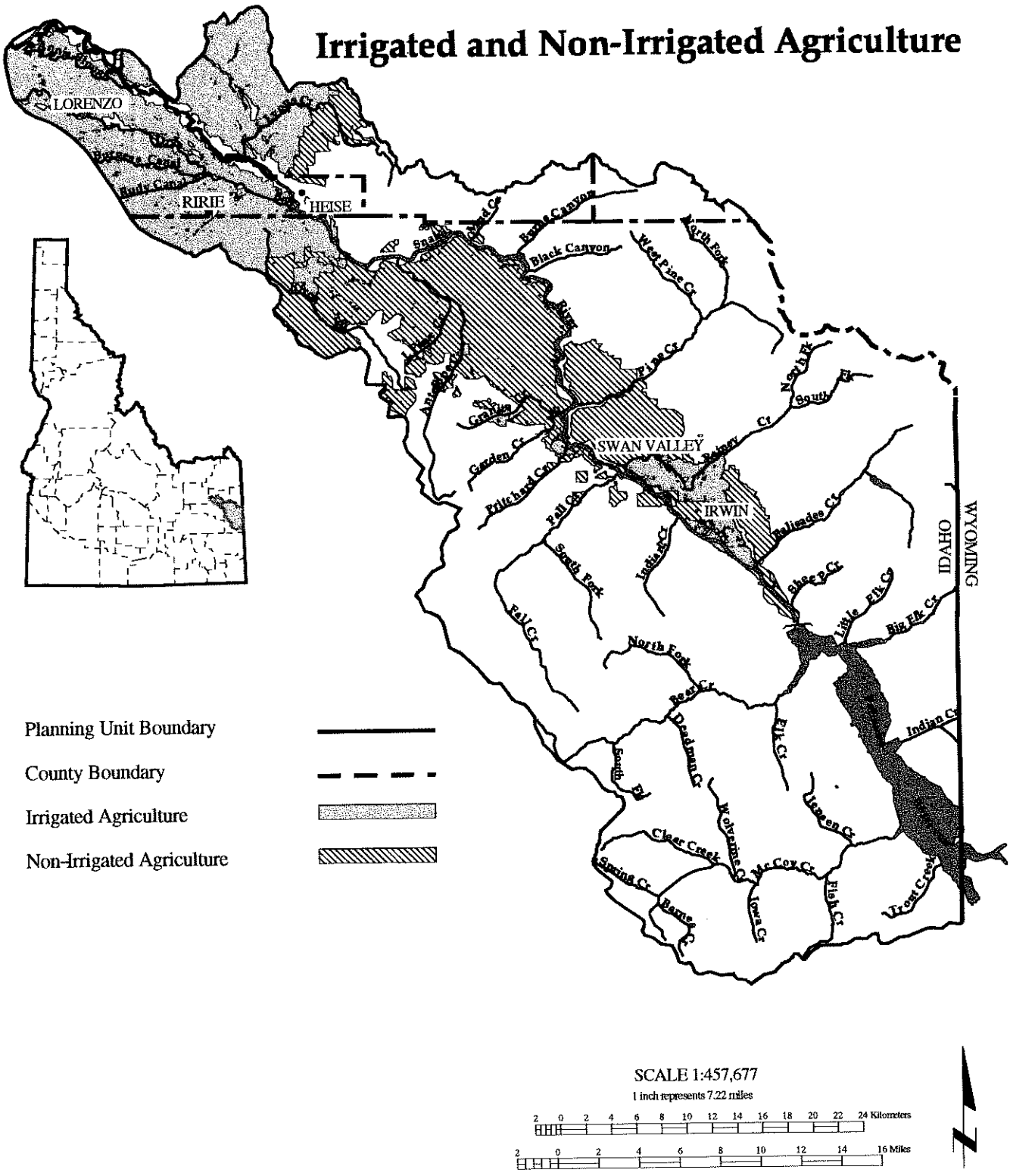


Figure 9. Sum of South Fork Snake River Irrigation Diversions Between Heise and Lorenzo 1928 to 1993.

Figure 10

Irrigated and Non-Irrigated Agriculture



divert an average of 1.5 million AF annually to irrigate the Rigby Fan; roughly 80 percent of this total is diverted via the Dry Bed. Right-bank gravity diversions average 230,000 AF. Pumping stations between Heise and Lorenzo divert approximately 3,500 AF annually. Several pumping stations of 500 horsepower or more lift water about 700 feet to uplands north of the river (Goodell, 1988). Watermaster reports show that water from storage comprises only 10-15 percent of total annual diversions between Heise and Lorenzo. About 75,000 AF of water are diverted for irrigation in the upper basin above Heise.

Sprinkler irrigation has steadily grown in the region with ground water development and drought precipitating water conservation measures. Today, approximately 40 percent of irrigated acreage in the South Fork Snake River Basin is watered by sprinklers compared with 17 percent in 1977. Figure 11 shows the distribution of sprinkler application in 1992.

The climate limits the crops that can be grown in the basin. The combination of soils and climate are suitable for potatoes, small grains, hay, pasture, feed corn and dry peas. In the high irrigated valleys, forage crops predominate and irrigated lands provide a winter feed base for livestock. Dryland crops constitute wheat and other small grains. Exotic grasses and wildflowers are grown on the Pine Bench.

Approximately two-thirds of the acreage irrigated by water diverted in the South Fork Snake Basin between Heise and Lorenzo is used to irrigate lands outside the basin in the Idaho Falls-Rexburg region. About 50,000 acres are irrigated within the basin with South Fork Snake diversions. Farmers irrigate an estimated 25,000 acres in the basin with ground water. Roughly 9,000 acres in the Antelope Flat and Swan Valley areas are irrigated from South Fork Snake River tributaries. Irrigation companies in the basin are listed in Table 13.

Irrigation with ground water began in the basin around the mid-1950's. Approximately 90,000 acre-feet of ground water is pumped annually for irrigation in the basin. Ground water is accessible with pumping lifts generally less than 70 feet. Most ground-water development has been conducted privately by individual farm operations, primarily in those areas not included in the initial surface water irrigation tracts because of their excessive elevation. Sprinkler irrigation is the most common irrigation method used with ground-water pumping. Within areas served by surface water diversion, individual farm operations have developed ground water as a supplemental water source and to increase the flexibility of on-farm irrigation methods and scheduling.

Beef cattle graze on public and private rangeland as well as irrigated pasture. Irrigated lands support much of the area's livestock industry. Animals grazed on nonirrigated public and private rangelands are wintered and fattened for market on feed grown on irrigated land. Most of the basin's sagebrush and forest range is public land administered by the BLM and the U.S. Forest Service. Active cattle and sheep grazing of these allotments account for an estimated 40,000 animal-unit months (AUMs) annually (Watson, 1993; Forest Service, 1993).

Livestock water use includes water for both stock watering and other on-farm needs. The quantity of water used by livestock in the South Fork Snake River Basin is estimated at 100 AF based on livestock numbers in the basin and average water use per head. On the range and in the mountains, livestock usually water freely at streams or springs unless a pump and watering station have been developed.

Domestic, Commercial, Municipal, and Industrial (DCMI) Water Uses

Domestic, commercial, municipal and industrial (DCMI) water use is small in the South Fork Snake River Basin, but essential to human life and economic development. Ground water supplies the domestic, commercial, municipal, and industrial needs in the basin.

Domestic and commercial water uses include drinking, food preparation, washing, and lawn

Figure 11

Irrigation Method (as of 1992)

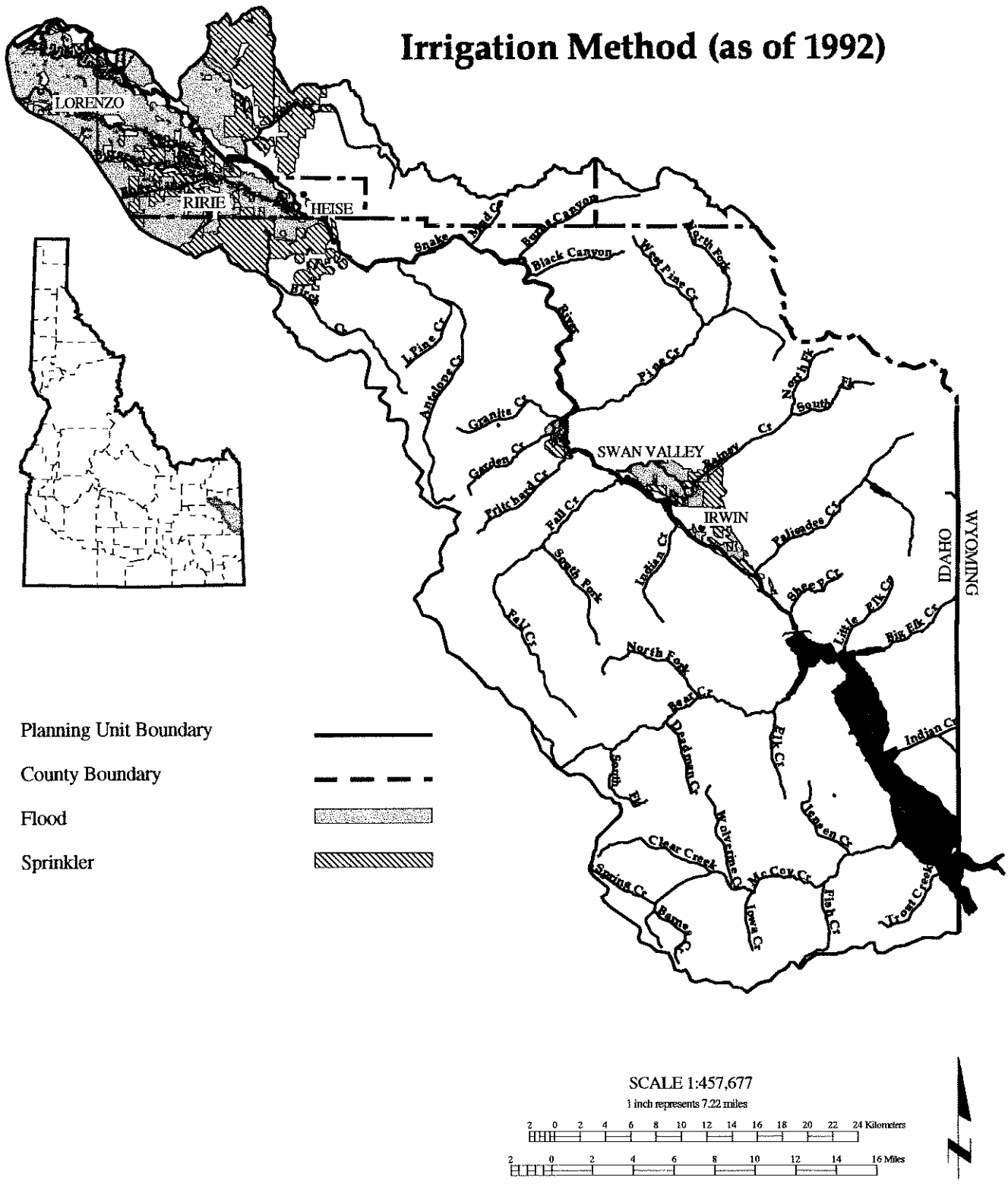


Table 13. Irrigated Cropland Acreages.

	Acres in Basin
Source	
Ground-water	25,500
Surface Water	
South Fork Snake River	43,590
South Fork Snake River Tributaries	8,465
Combined South Fork Snake River and Tributaries	300
Combined Ground Water and Surface Water Diversions	3,030
TOTAL	**80,885**
Irrigation Company or District	**Acres in Basin**
Bannock Feeder Canal Company	30
Burgess Canal and Irrigation Company	1,945
Butler Island Canal Company	1,830
Clark and Edwards Canal Company	2,260
Dilts Irrigation Company	670
Enterprise Canal Company	2,830
Farmers Friend Irrigation Company	2,000
Harrison Canal and Irrigation Company	70
Hill-Petinger Ditch	215
Island Irrigation Company	3,840
La Belle Irrigation Company	2,225
Combined West La Belle and Long Island Canal Company	6,550
Lenroot Canal Company	1,900
Liberty Park Irrigation Canal Company	100
Lowder Slough Canal Company	1,800
Nelson-Corey Ditch	450
North Rigby Irrigation and Canal Company	1,415
Parks & Lewisville Irrigation Company	700
Poplar Irrigation District	970
Progressive Irrigation District	520
The Reid Canal	180
Rigby Canal and Irrigation Company	1,000
Rudy Irrigation and Canal Company	3,100
Sunnydell Irrigation District	3,390
Private Birch Creek	815
Palisades Creek Water Users	2,615
Lower Rainey Creek	1,245
Upper Rainey Creek	2,190
Combined Organized Surface and Ground Water	1,930
Private Developments	
Ground Water	25,500
South Fork Snake River Diversions	3,600
South Fork Snake River Tributary Diversions	1,600
Combined South Fork Snake River and Tributary Diversions	300
Combined South Fork Snake River and Ground Water	1,100
TOTAL	**80,885**

Source: IDWR, 1978.

and garden watering. Residents of Irwin, Swan Valley, and Lorenzo obtain their domestic water from privately owned, relatively shallow, wells. In Irwin, water stands at about 32 feet below the ground surface, and the wells in general are in the neighborhood of 50 feet deep. Subsurface water in the Swan Valley area is about 8 feet below ground surface. Wells at varying depths tap this shallow subsurface water; some are drilled to greater depths for protection against contamination. Increased urbanization in this area represents a significant threat to ground water quality.

Community and municipal water systems provide approximately 30 percent of the water used for domestic and commercial purposes within the South Fork Snake River Basin. Community water systems service six subdivisions or developments in the Palisades area, and are managed by homeowner groups, the developer, or another private entity (DEQ, 1994). The only municipal water system in the basin is in the town of Ririe. The municipality supplies water to homes, commercial establishments, schools, the fire department, and a municipal park. The Ririe water system consists of three wells at depths of 120, 180, and 300 feet, and two elevated storage tanks that can hold over 120,000 gallons. The supply and distribution system for Ririe is considered adequate for current needs (Hall, 1996).

Industrial water use incorporates manufacturing processes, cooling, and employee sanitation. Food processing is the sole industrial use of water in the basin. The industry withdraws water for potato preparation and preservation. Water withdrawals for potato processing are highest from September through March. The largest water right for industrial use in the basin is 1.2 cfs from ground water.

At present, the total domestic, commercial, municipal, and industrial water use in the basin is an estimated 350 AF per year. Domestic use is calculated from population in the basin and average water use per day (Solley, 1993). Commercial, municipal, and industrial water demand is estimated from the water rights.

WATER DEVELOPMENT

Irrigation

The irrigated lands in the lower part of the basin are served by an extensive canal system that includes the Farmer's Friend, Burgess, Rudy, Harrison, Anderson, and Sunnydell canals. This system diverts water out of the South Fork Snake River through an extensive system of headworks and diversion dams. The Dry Bed, referred to as the "Great Feeder", was the main river channel before the South Fork Snake River moved to its present course in 1902. The Dry Bed is now operated as a feeder canal, utilizing head works to control the flow. In the Swan Valley-Irwin area, the Palisades Creek Canal diverts water out of Palisades Creek to irrigate lands near Irwin, while diversions are made out of Rainey Creek to irrigate lands along Rainey Creek and to the east of Swan Valley.

Enough reservoir storage space is available to augment natural flows and to supply the full requirements of lands diverting from the South Fork Snake River under most runoff conditions. A recurrence of extremely dry conditions such as occurred in 1987-92 would cause shortages throughout the basin. The reliability of water supplies on the smaller tributary streams contrast sharply with the reliability of supply on the South Fork Snake River because of lack of storage. For example, by late summer in years of below normal runoff the flow of Rainey Creek drops to less than one-half of the decreed amount. Lands receiving either all or part of their water supply from ground water are generally adequately supplied.

A preliminary investigation was conducted by the Natural Resource Conservation Service (formerly the Soil Conservation Service) at the request of the East Side Soil and Water Conservation District to determine if water efficiency could be improved on Rainey and Palisades creeks (SCS, 1994). Currently water is diverted from Rainey Creek by irrigators using individual delivery ditches. Losses in the present delivery system and water application methods limits the availability of full-season irrigation.

Some reaches of Rainey Creek are often de-watered during critical periods for fish passage. Most years the flow in Rainey Creek is not sufficient by late June to honor all irrigation water rights (SCS, 1994). The study also examined ways to improve delivery and on-farm application of irrigation water on land served by Palisades Creek.

The evaluated alternative entails constructing a gravity-pressurized pipeline to deliver 24.4 cfs from Rainey Creek for sprinkler irrigation. The proposal would result in essentially no delivery losses and could deliver enough water to consistently irrigate the 2000 acres with water rights instead of the 1600 acres that are now consistently irrigated. Increased efficiency would also provide water in the stream for fish migration. The preliminary cost for this project was estimated at $1,025,000 or $513 per irrigated acre (SCS, 1994). The preliminary study recommended further planning for this alternative, because the on-site and off-site benefits were significant.

The study also looked at improving the efficiency of Palisades Canal. Improvements to the Palisades Creek irrigation system, or a combination of improvements to Rainey and Palisades systems, were not considered feasible. The lack of adequate elevation within a reasonable distance made a gravity-pressurized irrigation system economically infeasible (SCS, 1994).

Practically all lands to which surface water can be applied have been developed for many years. Potentially irrigable land remains undeveloped because potential financial returns are not great enough to attract necessary capital, land is in federal ownership, and/or water available for new irrigation is limited. There are several thousand acres of good quality lands, currently dry farmed, on the benches above the South Fork Snake River between Heise and Swan Valley; 1,500 acres of potentially irrigable lands in the Swan Valley area are on the high uplands bordering the present irrigation development on the valley floor, and Antelope Flat has 12,700 acres. Most of this land lies at relatively high elevations, the growing season is comparatively short, and pump lifts to obtain water are high. For these reasons, only scattered areas of relatively small acreage are expected to be developed in the future.

Past studies have identified potential irrigation storage sites. Lynn Crandall/Burns Creek reservoir site has been studied in the past by the USBR as a storage reservoir. The site was reserved as a potential storage reservoir in the Idaho Water Resource Board's 1992 State Water Plan. The proposed location is near the mouth of Burns Creek at river mile 872.5 (Figure 12). Two configurations of the project have been examined. A 1961 proposal by the USBR would have a total capacity of 234,000 AF of water impounded by a 176-foot high dam. Approximately 9.5 miles of the river valley would have been inundated, providing 100,000 AF of supplemental irrigation water (USBR and Army Corp of Engineers [CoE], 1961).

A second development proposal in 1967 would provide irrigation storage replacement for Jackson Lake with a total capacity of 1.46 million AF. A 290-foot high dam would create a reservoir backing water near the existing Palisades Dam (USBR, 1967). In each proposal the reservoir served as a re-regulating reservoir for hydropower discharges at Palisades Dam, allowing an increase in the amount of power produced at the Palisades Powerplant.

Many other dam and reservoir sites in the basin have been studied by the USBR, CoE, USGS, and IDWR. A number of off-stream reservoir sites have been identified, although never seriously considered for development. Dam and reservoir sites studied are listed in Table 14.

Hydropower

Two hydropower generating facilities operate in the basin -- the Palisades Powerplant and Big Elk Creek (Figure 12). The Palisades Powerplant is a USBR facility located at the Palisades Dam.

Figure 12

Water Development

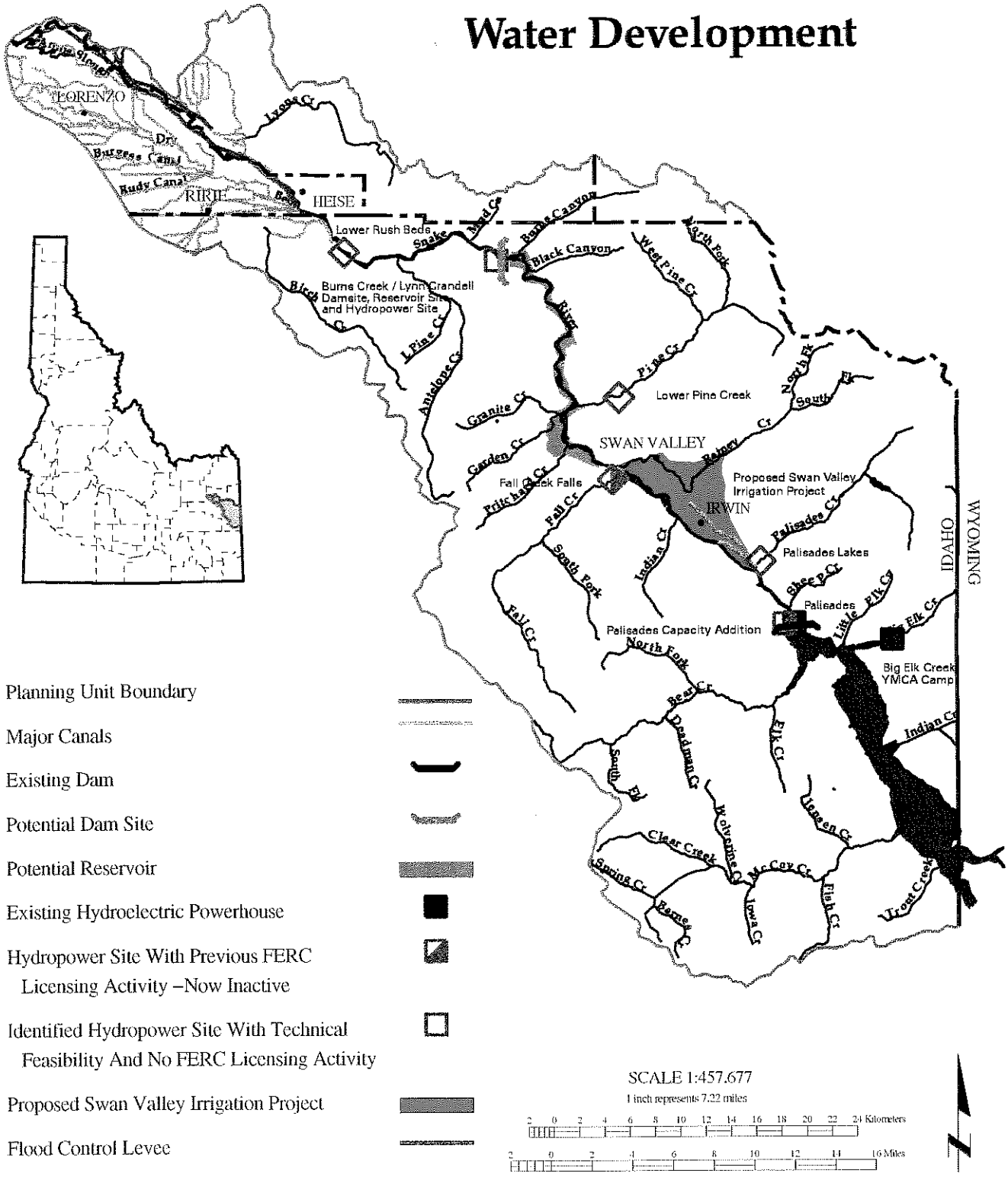


Table 14. Dam and Reservoir Sites Investigated in the South Fork Snake Basin.

Site	Location	Storage	Comment
Lynn Crandall/Burns Creek	South Fork Snake T3N, R42E, Sec. 14	234,000 AF 1,460,000 AF	Two alternatives studied
Rainey Creek Dam & Reservoir	Rainey Creek T1N, R44E, Sec. 33	8,000 A-F	High cost per irrigated acre
Swan Valley Dam & Reservoir	South Fork Snake T1N, R44E, Sec. 33	500,000 A-F	Dam site would be inundated by Lynn Crandall. Geology questionable.
Conant Valley Dam & Reservoir	South Fork Snake T2N, R43E, Sec. 20	750,000 A-F	Dam site would be inundated by Lynn Crandall. Geology questionable.
Dry Creek Dam & Reservoir	South Fork Snake T3N, R43E, Sec. 30	950,000 A-F	Dam site would be inundated by Lynn Crandall. Geology questionable.
Black Canyon Dam & Reservoir	South Fork Snake T3N, R42E, Sec. 13	1,200,000 A-F	Dam site would be inundated by Lynn Crandall. Geology questionable.
Wolverine Creek Dam & Reservoir	South Fork Snake T3N, R42E, Sec. 5	1,500,000 A-F	Lynn Crandall preferred.
Table Rock Dam & Reservoir	South Fork Snake T3N, R41E, Sec. 12	1,500,000 A-F	Lynn Crandall preferred.
Clark Ranch	South Fork Snake T3N, R41E, Sec. 15	1,500,000 A-F	Lynn Crandall preferred.
Birch Creek Dam & Reservoir	Birch Creek T3N, R40E, Sec. 23	6,000 A-F	High cost per irrigated acre.
Offstream Sites			
Gibson Creek-Fall Creek	T1N, R42E, Sec. 34	262,000 A-F	
Swan Valley-Indian Creek	T1N, R44E, Sec. 30	32,000 A-F	
Indian Creek #2	T1N, R43E, Sec. 29	35,000 A-F	
Fall Creek	T1N, R43E, Sec. 8	58,000 A-F	
Fall Creek #2	T1N, R43E, Sec. 8	68,000 A-F	
Fall Creek Falls	T1N, R43E, Sec. 3	94,000 A-F	
Birch Creek	T3N, R43E, Sec. 33	45,000 A-F	
Rainey Creek	T2N, R44E, Sec. 33	250,000 A-F	
Palisades Creek	T1N, R44E, Sec. 35	41,000 A-F	

Sources: USBR and CoE, 1961; USGS, 1965; Idaho Water Resource Board, 1968; CoE, 1995; and Idaho Water Resource Research Institute, 1979.

This facility began power production in 1957. The four original generators each had a nameplate capacity of 28.5 megawatts (MW), for a total installed capacity of 114 MW. During the period of 1992 to 1994, the powerplant capacity was upgraded as part of the USBR's ongoing program of increasing the capacity at existing powerplants. The powerplant now consists of four generators, each with a nameplate capacity of 44.1 MW, for a total installed capacity of 176.6 MW.

The Big Elk Creek Powerplant was licensed as Federal Energy Regulatory Commission (FERC) license #6636. The facility, located on Big Elk Creek, has an installed capacity of 7.5 kw. The power produced by this facility is not marketed commercially, but is used at the Idaho Falls Family YMCA Camp located at Big Elk Creek. This facility was granted a FERC exemption in 1982, and has been operational since 1987 (IDWR, 1995b).

Several hydropower development opportunities have been identified in the basin by past studies. These are summarized in Table 15 and shown in Figure 12. None of the sites appear to be economically feasible under current electric rate schedules. The FERC oversees the licensing of privately operated projects. Three hydroprojects pursued FERC licensing in the past, but are currently inactive.

Flood Management

Flood control is one of the authorized benefits of the Palisades Project, and the USBR is required to follow the established flood control curves for the project. Jackson Lake and Palisade Reservoir provide major flood control in the South Fork Snake Basin. Jackson Lake provides incidental reduction of flood peaks averaging 5,500 cfs, reducing flows by 0 to 8,500 cfs (Wirkus, 1996). Palisades Reservoir provides reduction of flood peaks averaging about 16,800 cfs, reducing flows from 0 to 30,000 cfs. The estimated discharge on the South Fork Snake River at Heise for a 100-year flood event without considering existing flood control dams is 58,300 cfs (Federal Emergency Management Agency, 1981). The estimated flow with the existing flood control dams is 30,000 cfs.

Reservoir releases for flood management are dependent on the amount of storage that must be evacuated with respect to runoff forecasts. Under a plan formulated by the USBR, CoE, and other interested groups, all but the larger floods are regulated to about 20,000 cfs or less near Heise. The extreme flood will be reduced to the maximum practical extent (CoE, 1988). Since the completion of Palisades Dam in 1957, flood peaks in excess of 25,000 cfs at the Heise gage have occurred on four occasions, with a maximum flow of 27,000 cfs on June 18, 1986. Regulation of the South Fork Snake River with the dams in place is illustrated in Table 16.

Below Palisades Dam the safe channel capacity of the South Fork Snake River varies from 15,000 cfs to 35,000 cfs (CoE, 1988). At river flows between 15,000 and 20,000 cfs, small areas along the river, usually covered with pasture grass and annually subject to main river

Table 15. Hydropower Sites Identified in South Fork Snake River Basin.

Site	Potential Capacity	Location
Burns Creek / Lynn Crandall	320,628 kw	South Fork Snake River at Burns Canyon
Palisades Dam	90,000 kw	South Fork Snake River at existing Palisades Dam
Palisades Capacity Addition	90,000 kw	South Fork Snake River at existing Palisades Dam
Fall Creek Falls	468 kw	Fall Creek above the Falls
Palisade Lakes	6948 kw	Palisades Creek
Lower Pine Creek	2730 kw	Pine Creek
Lower Rush Beds	39,000 kw	South Fork Snake River above the Riley Ditch

Sources: USBR and CoE, 1961; USBR, 1967; IWRB, 1968; CoE, 1981; and CoE, 1995.

Table 16. Flood Control Regulation on the South Fork Snake River.

Date	Natural Discharge *(if uncontrolled by upstream projects)*	Regulated Discharge
June 7, 1963	28,000 cfs	25,400 cfs
June 30, 1970	33,800 cfs	25,500 cfs
June 26, 1974	48,100 cfs	26,200 cfs
June 18, 1986	56,900 cfs	27,000 cfs
July 14, 1995	34,300 cfs	22,400 cfs
June 18, 1996	48,300 cfs	24,100 cfs

Source: USBR HYDROMET database.

overflow, are inundated. Bank cutting may be appreciable in some locations at these flows. Channel capacity of the South Fork Snake River at Swan Valley is about 25,000 cfs.

Downstream from Heise, stream bed materials, low banks and gradient induce river meanders. The normal river channel capacity in the Heise to Henrys Fork reach is approximately 20,000 cfs. Between the Great Feeder intake near Heise and the Henrys Fork, an offset levee system was constructed in the early 1960's by the CoE to pass floods up to a magnitude of 30,000 cfs, enough to accommodate the regulated 100-year flood. However, major channel shifts could unpredictably impinge the levees in this reach. Sustained high velocity flows may erode levees and increase flooding risks.

A flood control district, established pursuant to Idaho Code, was organized on the South Fork Snake River in Jefferson and Madison counties in 1946. Flood Control District No.1 maintains the levee system between Heise and Roberts, Idaho. District No. 1 goals are (1) to discourage development in the floodplain, (2) seek to protect and maintain present flood works, and (3) contain flood flows within the present river channel. To this end the District's objectives include identifying and publicizing flood prone areas, assisting in the adoption of a Flood Plain Management Plan, and supporting additional upstream storage projects. The District retains a person for weekly inspection of flood works during spring flows, and has also acquired quarry sites to provide riprap material for flood dike maintenance (Kremer, 1993).

Bonneville, Jefferson, and Madison counties, and the communities of Swan Valley and Irwin participate in the National Flood Insurance Program (NFIP). The program was established in 1968 by the National Flood Insurance Act making flood insurance, previously unavailable from private insurers, available through a federally subsidized program. To participate, communities or counties must adopt a floodplain ordinance specifying land use measures in flood prone areas to avoid or reduce future flood damage. The Federal Emergency Management Agency (FEMA) that administers the NFIP program has established minimum standards for participating agencies.

Floodplain ordinance requirements include elevating the lowest floor of a structure constructed in the 100-year floodplain at or above the base elevation of the 100-year flood. (The 100-year floodplain includes lands subject to a 1 percent or greater chance of flooding in any given year.) Sanitary systems and water supply systems located in the 100-year floodplain must be designed to minimize or eliminate infiltration of flood waters. Development must not encroach into the floodway and must not increase flood levels. (The floodway is an area immediately adjacent to a river or stream channel which becomes the enlarged stream or river channel during flooding.) The participating county or community is responsible for enforcing flood plain ordinance requirements, and determining that other required federal, state and local permits have been obtained before issuing a development permit.

Participation in the NFIP makes flood insurance available to property owners. Any mortgage, loan, grant, or other funding provided, insured or regulated by a Federal agency for a structure located in the floodplain must purchase flood insurance by law. Many lenders may also require flood insurance for conventional loans.

FEMA conducts studies and prepares maps depicting flood hazard information. These maps identify boundaries of the 100-year floodplain and the floodways. Floodplain mapping was completed in 1981 for Bonneville County, 1988 for Jefferson County, 1991 for Madison County, and 1980 for Swan Valley.

WATER QUALITY

The South Fork Snake River from the Wyoming state line to Heise (segment USB-10) and from Heise to Roberts (below the confluence with Henrys Fork; segment USB-20) are designated by the Division of Environmental Quality (DEQ) as Special Resource Waters (Figure 13). Special Resource Waters are specific segments or bodies of water recognized as needing intensive protection to preserve outstanding or unique characteristics, or maintain current beneficial uses. The South Fork Snake River is currently designated by DEQ for the following beneficial uses: domestic water supply, agriculture water supply, coldwater biota, salmonid spawning, and primary and secondary contact recreation (Drewes, 1991). The *Idaho Water Quality Status Report Nonpoint Assessment* rates water quality for the South Fork Snake River as good overall (Idaho Department of Health and Welfare, DEQ, 1992; Drewes, 1991).

In 1994, the Environmental Protection Agency (EPA), under authority of the Federal Clean Water Act, released a 303d list which identified 962 water quality limited waterways in Idaho. A water quality limited segment is a reach which does not fully support all designated beneficial uses. A beneficial use is defined as, "The reasonable and appropriate use of water for a purpose consistent with Idaho state laws and the best interest of the people" (DEQ, 1992). The South Fork Snake River from Palisades Dam to Heise is listed as a water quality limited segment because of flow alteration (EPA, 1996; Figure 13). Listed tributaries in the basin include Antelope and McCoy creeks. Antelope Creek was listed for sediment problems. No specific pollutant is identified for McCoy Creek in the 303d list. All of these reaches are listed as low priority, indicating that designated uses are not fully supported, but risks to human health, aquatic life, recreation, economic, or aesthetics of the water body are minimal.

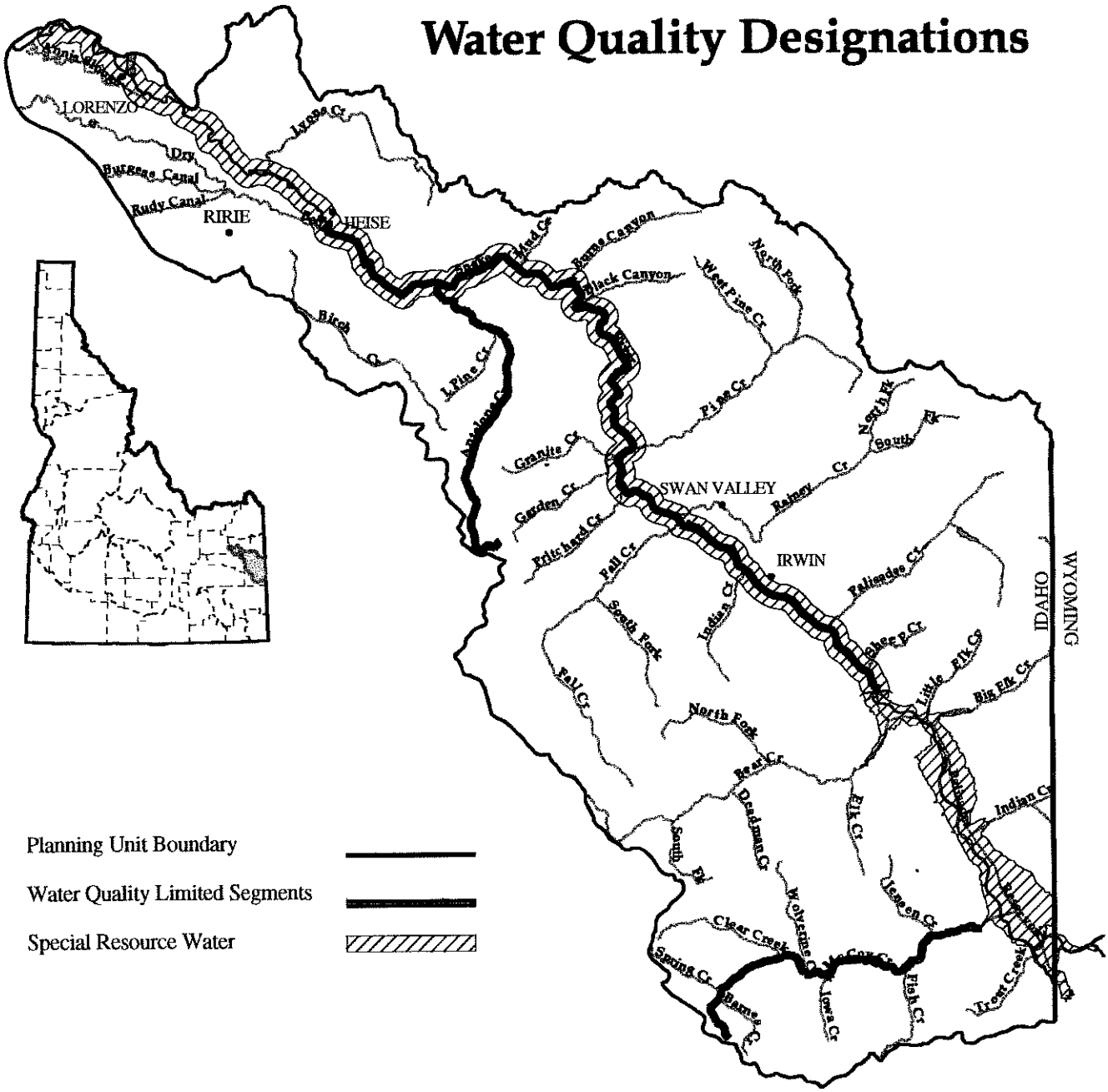
A water quality limited designation by EPA requires development of total maximum daily load (TMDL) standards. A total maximum daily load is the sum of all source and nonsource contributions for a pollutant in a waterway. Pollutant levels established through the TMDL process must be at or below the level established for the waterway to abide by water quality standards. TMDLs were developed as a tool for allocating acceptable contaminant loads from different sources to meet state water quality standards.

The Idaho Legislature passed legislation in 1995 (S.B. 1284) which requires establishment of community-based citizen advisory groups to make recommendations to DEQ and other resource agencies about proper management of impaired waters to comply with state water quality standards. This legislation required DEQ to establish Basin Advisory Groups (BAGs) and Watershed Advisory Groups (WAGs) for each major basin and their watersheds, to make recommendations concerning monitoring, standards revisions, prioritization, and the development of TMDLs and pollution control strategies.

On September 26, 1996, the U. S. District Court for the Western Division of Washington ordered EPA to submit a schedule for completing TMDLs, or their functional equivalent, for all Idaho waters on the 303d list by March 26, 1996. All waters, including those with low priority, are to have TMDLs developed within five years. EPA is legally required to approve Idaho's TMDL plans and to approve a TMDL. EPA requires that a TMDL include reasonable

Figure 13

Water Quality Designations



assurances or monitoring to show that nonpoint source improvements are actually achieved.

The state is required to use the TMDL process to protect beneficial uses of the South Fork Snake River. Flow alteration is listed as a pollutant for the South Fork Snake, because altered flow conditions could threaten or prevent full attainment of beneficial uses such as salmonid spawning and cold water biota (EPA, 1994). End-of-pipe point source pollution (such as treated municipal sewage) is not currently a significant source of pollution for the South Fork Snake River. State water quality standards do not specifically address flow. Since EPA considers flow alteration a form of nonpoint source pollution, the appropriate remedy may be in the form of flow management through the operation of Palisades Dam. However, flow regimes on the South Fork Snake River are controlled by contractual reservoir storage rights and water rights to divert for agricultural and other uses. Flow management must occur in accordance with Idaho law and other constraints.

Water quality data collected by the U.S. Geological Survey (USGS) is available for several stations on the South Fork Snake River. Data availability, time frames and parameters measured vary at each gage. USGS water quality analyses conducted at Heise from 1911 to 1994, and at Lorenzo from 1924 to 1994, for several selected constituents are summarized in Table 17.

Suspended Solids

Suspended solids are good indicators of nonpoint source agricultural pollution (Drewes, 1991). Soil particles are typically entrained in the water column from about three inches above the bottom to the top of the column. Suspended sediment concentrations in the South Fork Snake Basin are influenced by three factors: channel washing, direct input, and dilution (Drewes, 1991). (Channel washing is the flushing of soil and debris that builds up during low flows. Direct input is material washed directly into streams from surrounding lands. Dilution is the result of input of relatively "cleaner" waters into the system.)

The DEQ prepared a State Agricultural Water Quality Plan (SAWQP) for the Antelope-Pine creeks area. The study collected samples for a period from October 1987 to May 1989 from Palisades Dam to Heise, and on several tributaries of the main stem -- Antelope, East Birch, Granite, Pine and Rainey creeks (Drewes, 1991).

The SAWQP determined agricultural impacts on the South Fork Snake River were minimal (Drewes, 1991). Suspended solid measurements below Palisades Dam never exceeded the EPA Water Quality Index guidelines for no impact during the 1987-1989 SAWQP study. At the Heise gage sediment loads exceeded EPA guidelines for a moderately polluted river twice (Drewes, 1991).

Intermittent streams contribute the highest concentrations of suspended sediments into the South Fork Snake River. This is the result of three characteristics: 1) close proximity to farmland; 2) lack of water and exposure of stream bottoms leading to greater washing during spring runoff; and 3) lack of a bedrock stream bottom allowing greater contact with soils and mass wasting (Drewes, 1991). By comparison perennial streams tend to have well-developed riparian areas, stream beds and banks, preventing erosion of upland soils during high flows and filtering pollutants from adjacent farmlands. The greatest contributor of suspended solids (also inorganic nitrogen and phosphorus) to the main stem are East Birch, Antelope, and Granite creeks (Drewes, 1991).

Sources of sediment, in addition to agricultural practices (farming and grazing), include wildlife grazing, recreation, residential development, mining, timber harvest, road and trail construction, and forest and range fires (BLM and Forest Service, 1991). Roads, specifically those within riparian areas, generally contribute 85-90 percent of sediment reaching streams in disturbed forest land (Targhee National Forest, 1996a). Another source of sediment is stream bank erosion due to compaction, stream bank trampling, and channel movement.

Table 17. Water Quality Constituent Statistics for Two Sample Locations on the South Fork Snake River.

		Temp. (deg. C)	Flow * (cfs)	pH (Std)	Dissolved Oxygen (mg/l)	Fecal Coliform (colonies/ 100 ml)	Dissolved Solids (tons/ day)	Nutrients (mg/l)			
								Nitrogen Total (as N)	Nitrogen Nitrite + Nitrate (dissolved as N)	Ortho-phosphate (dissolved as P)	Phosphorus Total (as P)
Station: **Heise** (13037500)	Sample Size or Period of Record	270	1911 - 1994	632	130	94	575	75	151	49	161
	Mean	7.25	6930	7.9	10.4	20.4	4020	.68	.31	.05	.04
	Range	0 -23.0	460 - 51,600	6.5 - 8.8	7.8 - 13.6	1 - 150	868 - 17,700	.05 - 4.70	<0.1 - 6.4	.01 - .98	<.01 - .40
Station: **Lorenzo** (13038500)	Sample Size or Period of Record	112	1924 - 1994	9	9	9			6	9	9
	Mean	8.29	4050	8.5	10.6	15.4			0.1	.01	.03
	Range	0 - 17.5	110 - 19,900	8.1 - 8.7	9 - 12.7	1 - 63			0.1 - 0.2	<.01 - .01	.01 - .05

* Flow (cfs) = mean annual; high and low mean daily values given for range

Source: USGS, 1996; and Milligan et al., 1983.

Agricultural practices resulting in sedimentation in streams are expected to be reduced through cost sharing programs organized under the auspices of the Soil and Water Conservation District. Best management practices (BMPs) are proposed on 47,000 cultivated acres located on tributaries to the South Fork Snake River. The goal is to reduce erosion to 5 tons/acre/year. Projects are occurring on Antelope and Pine Creek drainages (BLM and Forest Service, 1991).

Nutrients

Nutrients typically include compounds of nitrogen and phosphorus. Those monitored in the SAWQP study included total Kjeldahl nitrogen, nitrate, nitrite and ammonia nitrogen, ortho-phosphate phosphorus, and total phosphorus (Drewes, 1991). Organic nitrogen was calculated by subtracting the ammonia value from the Kjeldahl nitrogen value. The recommended inorganic limit for total nitrogen to prevent development of aquatic nuisance vegetation is 0.3 milligram/liter (mg/l) (Mackenthun, 1973). Total nitrogen levels exceeded the recommended levels in 11 of 77 samples taken at Heise in the SAWQP study (Drewes, 1991). Inorganic nitrogen levels exceeded recommended levels on the tributaries to the following extent: East Birch Creek (18 of 18), Antelope (4 of 18), Granite (4 of 18), Pine (1 of 18), and Rainey (0 of 18). Nitrogen sources appeared to be from agricultural practices, particularly in areas where tributaries flowed through pastures (Drewes, 1991).

Phosphorus can be tightly bound with soil particles. Consequently, phosphorus is normally transported with sediment and may increase with suspended solid concentrations. Phosphorus occurs naturally throughout the basin. High enough levels occur in basin soils that it is rarely applied in agricultural practice.

The results from the SAWQP study indicate that total phosphorus levels in the intermittent streams exceeded the 0.1 mg/l recommended limit in 67 percent of the samples (Drewes, 1991). The established, perennial streams exceeded the recommended limit 23 percent of the time. The dissolved ortho-phosphate phosphorus level exceeded the 0.025 mg/l recommended limit in 18 percent of the intermittent stream samples and in 5 percent of the perennial tributary samples. Phosphorus concentrations were not detectable below Palisades Dam. It is assumed that phosphorus upstream settles out with sediments in the reservoir (Drewes, 1991). Farming practices are the principle man-caused source of total phosphorus below Palisades Dam. It was not known whether the majority of ortho-phosphate phosphorus came from agricultural or residential sources or both, but occurrence followed the same pattern as the total phosphorus (Drewes, 1991).

Bacteria

Bacteria standards for the South Fork Snake River are determined by the designated uses established (DEQ, 1992). The main stem is protected for primary contact recreation, which is the most limiting standard. No records for bacteria at Heise exceeded the recommended standard of 500 colonies/100 ml (Drewes, 1991). In 198,1 fecal coliform counts were significantly higher at the Menan gage (outside the basin and below the confluence with the Henrys Fork) than at Heise (USGS STORET data). Rainey and Granite creeks exceeded the recommended bacteria levels at least once (Drewes, 1991). Both Rainey and Granite creeks run through livestock pastures, and fecal coliform-streptococcus ratios indicate that livestock are the main contributor (Drewes, 1991). Samples for Rainey Creek showed human fecal coliform contamination as well.

Other Water Quality Parameters

Additional water quality parameters measured included temperature, dissolved oxygen, and pH. At Heise, the temperature requirements for salmonid spawning (13° C or less) were met during the spawning season. The temperature reached 14-15° C in July and September (Table 17). The minimum standard for dissolved oxygen for salmonid spawning (6 mg/l) has been met at Heise since 1911 (lowest is 7.8 mg/l).

The pH range of 6.5 - 9.5, established for surface water aquatic life, was not exceeded at Heise. The pH level has remained relatively steady within the range established for surface water standards.

A preliminary study done by DEQ in 1994 during an unusually low volume in Palisades Reservoir, indicated that river water temperatures (taken 750 meters below dam) did exceed the overall maximum (13° C) and average daily maximum (9° C) temperatures for salmonid spawning a majority of the sampling days (DEQ, 1995). These temperatures could postpone spawning or force the selection of less desirable redd location. Water temperature was not influenced by the amount of water discharged but rather the ambient air temperatures during low flows.

Information on other tributaries in the basin were acquired from the Targhee National Forest (Table 18). The Draft Forest Plan Revision and Environmental Impact Statement reported water quality in Big and Little Elk creeks was good in the 1970's, as was Rainey and Palisades creeks in a later 1994 study. The Forest Service also found Fall, Pritchard, Bear, Indian, and McCoy creeks had a good to fair rating in channel stability, but that Big Elk, Palisades, Rainey, Burns, and Pine creeks ranged from good to poor channel stability (Targhee National Forest, 1996a; Table 18). Impacts came mainly from recreational use, particularly in areas of dispersed camping, and from cattle grazing and roads. The lowest rated tributaries were Fall, Bear, and Antelope creeks (all of Fall Creek and lower half of Bear Creek). Fall Creek problems were attributed to cattle grazing, power line clearing, riparian roads and heavy recreational use, resulting in a fair rating for channel stability. On Antelope Creek, both the private and Forest Service lands were heavily impacted by roads, recreation, and cattle trampling.

Lakes and Reservoirs

Palisades Reservoir (elevation 5,620 ft.) is located on the Wyoming - Idaho border with most of the impoundment in Idaho. The shorelines are gravel and rock with mud flats in the upper reaches. The near shoreline slopes are primarily forested with meadows at the upper end. Despite summer drawdowns, the littoral zone of the reservoir is very narrow due to steep underwater slopes. This aspect tends to limit productivity and increase the capacity to absorb nutrient loading (Milligan, et al., 1983).

In a 1983 study of 85 lakes and reservoirs, Palisades was classified as mesotrophic with a Trophic Status Index (TSI) value of 16.8, indicating moderately rich in nutrients (Milligan, et al., 1983). (The TSI ranged from oligotrophic Redfish Lake with a TSI value of 7.6 to eutrophic Lake Lowell, near Caldwell, at 34.0; mesotrophic water bodies ranged from 16.5 to 18.1). The TSI took into consideration 11 parameters, including Chlorophyll a, organic content, total suspended solids, color, Secchi disc, turbidity, total phosphorus, total nitrogen, conductivity, alkalinity, and pH. Palisades Reservoir had a maximum depth of 32.3 meters, a Secchi disc depth reading of 3.5 meters, and a euphotic zone depth of 9.5 meters. The one-time sampling yielded a pH value of 8.0, hypolimnion dissolved oxygen level of 5.2 mg/l, fecal coliform count of 20 colonies/100 ml, total nitrogen of 0.19 mg/l, and total phosphorus of 0.04 mg/l. These values are all well within normal range and recommended limits.

Drewes (1991) reported that there is no indication Palisades Reservoir has any trophic or nutrient problems, but during runoff the waters received from the tributaries and released downstream do contain elevated levels of inorganic nitrogen. The reservoir is included in the Special Resource Water designation for the South Fork Snake River. Even though total phosphorus values were high in reservoir tributaries, as they were in the groundwater sampled near the reservoir (see following Ground Water discussion), it settled out or was utilized by reservoir plankton.

The 1985 Western Lakes Survey concluded that Upper Palisades Lake was in very good condition. This is typical for high elevation wilderness lakes which receive little impact other than seasonal recreation (Targhee National Forest, 1996a).

Table 18. Summary of South Fork Snake River Tributary Stream Conditions.

Tributaries	Intermittent or Permanent	Well-developed Riparian Communities (farming/grazing not close to stream)	Channel Stability (condition of stream beds and banks)	General Level of Water Quality *	Comments
McCoy Creek	Permanent		Good		
Bear Creek	Permanent	No	Fair		Half of creek has poor channel stability
Big Elk Creek	Permanent		Poor to Good	Water quality measured in 1970s good at that time	
Palisades Creek	Permanent		Poor to Good	Water quality measured by U.S. Forest Service in 1994 was good	
Indian Creek (river tributary)	Permanent		Good		
Fall Creek	Permanent		Fair		Entire creek has poor channel stability
Rainey Creek	Permanent	Yes	Good	2 (water quality measured by U.S. Forest Service in 1994 was good)	Problems with cattle & wildlife grazing impacts
Pritchard Creek	Permanent		Good		
Granite Creek	Intermittent	No	Poor	3	
Pine Creek	Permanent	Yes	Good	1	
Burns Creek	Permanent		Poor to Good		
East Birch Creek	Intermittent	No	Poor	5	
Antelope Creek	Intermittent	No	Poor	4	Private & U.S. Forest Service land impacted by roads, recreation, cattle trampling
West Birch Creek	Intermittent		Poor	6	

* The six tributaries evaluated in the Antelope - Pine SAWQP study were ranked (1 = least polluted; 6 = most polluted)

Source: Drewes, 1991; Targhee National Forest, 1996a.

Ground Water

Data available to date indicate ground water quality is good. The shallowness of the alluvial aquifer, geology, soils along the South Fork Snake River, and development pressures currently occurring in the basin have resulted in considerable concern about the quality of the ground water. The USGS National Water Quality Assessment Program reported that several wells tested along the main stem, from Palisades to the Henrys Fork confluence, had nitrate levels that were still < 2 mg/l (the federal drinking water standard is 10 mg/l) (Rupert, 1994). Samples taken from wells in the basin between 1992 to 1995 as part of the Idaho Statewide Ground Water Quality Monitoring Program found wells in Swan Valley had the highest nitrate levels of those sampled. However, they averaged 1.5 mg/l, well below the standard (Crockett, 1996).

With current and anticipated population growth in the Swan and Conant valleys, there is serious concern about the potential for pollution of the shallow alluvial aquifer, and ultimately the river, from septic systems installed at new developments (Dunn, 1996). Soil surveys done in Ririe, Conant Valley and Swan Valley identify severe limitations for absorption of pollutants from septic tanks and sewage lagoons (SCS, 1979 and 1981a).

Other Resource Values

TIMBER

Most timber harvest in the basin occurs under the direction of the Forest Service with the majority of forest lands under the jurisdiction of the Targhee National Forest. A small portion of the Caribou National Forest, encompassing the McCoy Creek watershed, is in the southern portion of the basin. About 101,000 acres, or 15 percent of the basin, are considered tentatively suitable for timber harvest. This comprises less than 1 percent of the total suitable timber found on the Targhee National Forest and Caribou National Forest. Suitable timber is determined by identifying lands that produce or are capable of producing crops of industrial wood by reviewing information on land coverage, slope, soil types, and aspect. Other criteria considered include: whether lands are withdrawn from entry by Congress, the Secretary of Agriculture or the Forest Service Chief; if current technology and knowledge indicates harvest can occur without irreversible impacts to soils and the watershed, and the site will revegetate within five years of harvest; and information exists to determine responses to timber management activities (Targhee National Forest, 1996b).

The Forest Plan Revision for the Targhee National Forest proposes timber harvest for some lands in the South Fork Snake Basin. Forest management would occur to improve forest health by reducing risk of insect and disease, and improving big game habitat. Small sales are proposed in the Elk Creek, Moody Creek, Burns-Pat creeks, McCoy-Jensen creeks, Fall Creek, and Brockman Creek watersheds over the next ten years. Less than 1,000 total acres are estimated for harvest with a total volume of 3,000 thousand board-feet in the basin (Targhee National Forest, 1996b). The Land & Resource Management Plan for the Caribou National Forest proposes harvest of 1.19 million board-feet for the time period 2001-2010 (Caribou National Forest, 1985). However, the Land & Resource Management Plan is currently being revised which may result in some changes (Moe, 1996).

MINES AND PROSPECTS

Currently very little mining activity occurs in the basin. Of eight mining claims, one is actively being pursued. The area has experienced periods of intense development and exploration for different minerals in the past. Gold exploration occurred from the 1870's to the late 1920's. In the mid-1980's the eastern half of the basin contained many oil and gas leases. Over the years exploration for other minerals has occurred.

Travertine - Eight mining claims in the basin are for travertine deposits located east of the Fall Creek drainage. One involves an active mine in the process of being patented. Although the

deposit is small (296.5 acres), it is a quality product and marketed internationally (Horsburgh, 1995). Travertine is a marble-like building material used in landscaping and adorning the exterior of buildings.

Phosphate - Deposits of the Meade Peak Phosphatic Shale Member of the Permian Phosphoria Formation occur within the basin. Although Idaho provides a small percentage of the world's phosphate, it is a major mineral commodity in the state, contributing about $80 million dollars annually to the economy. The phosphate industry is one of the top three in eastern Idaho. Phosphate is used to produce fertilizers and phosphoric acid.

Rich deposits are located in the Caribou Range Known Phosphate Leasing Area west of Swan Valley (Figure 14). Four phosphate leases for the area date from 1929 with an estimated 10-20 year supply (Horsburgh, 1995). The last reported activity occurred in the 1960's as part of exploration (Forest Service, 1996a). Economic conditions have not resulted in mining of these deposits, and will likely not occur until deposits in the Soda Springs area are exhausted approximately 50-70 years from now (Horsburgh, 1995). Other phosphate deposits have been identified throughout the basin and are depicted in Figure 14 (Idaho Bureau of Mining and Geology, 1981).

Oil and Gas - An inventory of oil and gas potential completed in 1992 indicates the possibility of discovering oil or gas is high within portions of the basin (Horsburgh, 1992). The basin lies in what is known as the overthrust belt, a thick sequence of sedimentary rocks which were folded and faulted. The thrust sheets have overridden each other in a west to east direction.

The area north of the South Fork Snake River from Pine Creek east has a high potential. The geologic setting of this area is similar to producing fields found in adjacent Utah and Wyoming characterized by asymmetric folds in the leading edges of major thrust plates. The area north of the South Fork Snake River and west of Pine Creek has a moderate potential. The remainder of the basin has little or no potential (Horsburgh, 1992). See Figure 14.

Exploratory wells were drilled in Mike Spencer Canyon, Swan Valley, Bald Mountain and Black Mountain in the mid-1980's, but were not successful. Commercial market conditions have resulted in no recent oil and gas exploration. Oil industry representatives have indicated that exploration in Idaho will likely not occur until the value of oil remains above $30 a barrel (Horsburgh, 1992).

Gold - Historically, commercial gold mining occurred on Caribou Mountain in the McCoy Creek drainage from the 1870's to 1920's (Jones, 1996). The area is covered by lode and placer claims for gold. Today recreational gold dredging, sluicing and panning occur.

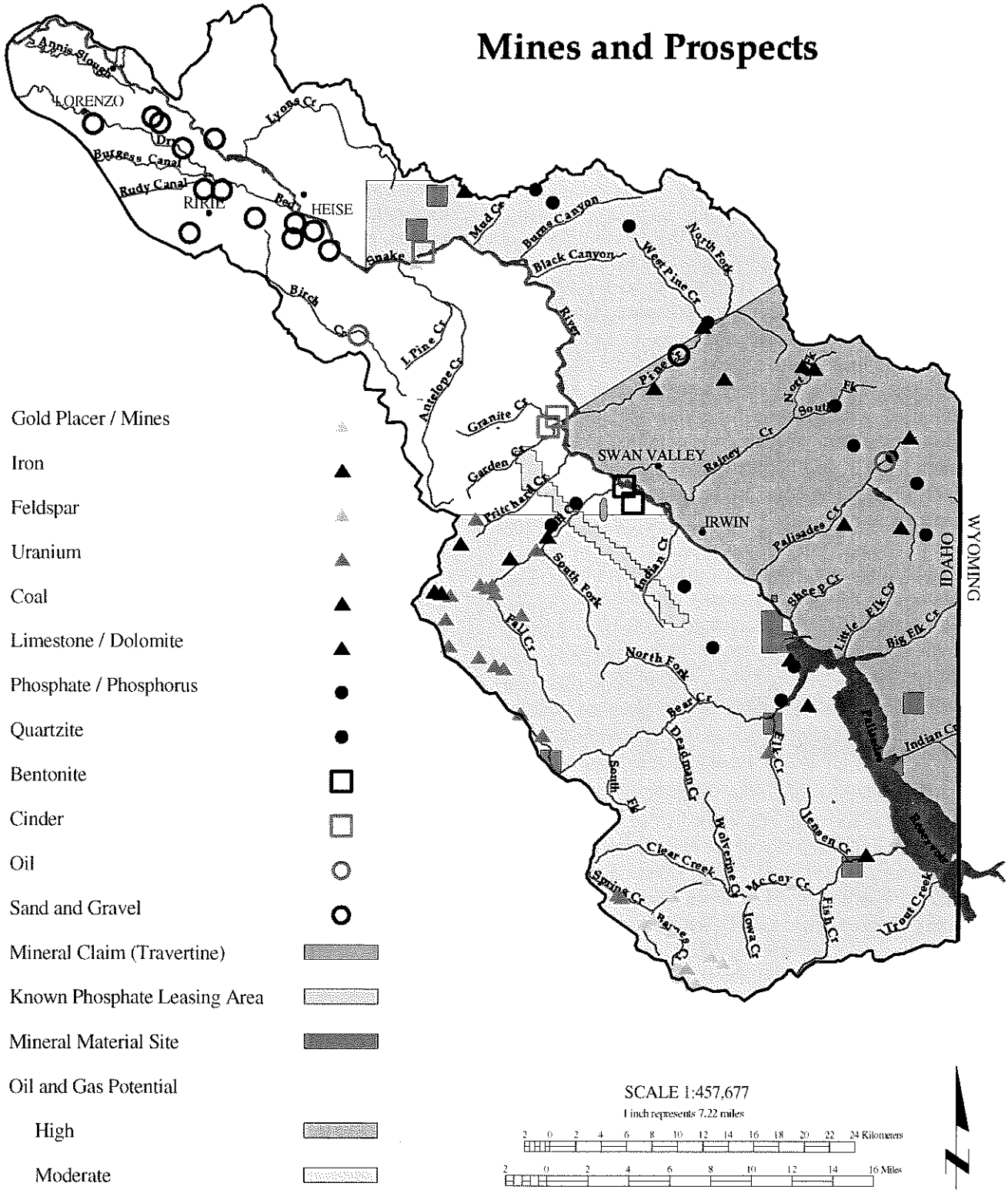
Impacts from recreational dredging were significant enough to require closing McCoy Creek to use under a simple one stop permit system. Individuals must now apply for a stream channel alteration permit from the Idaho Department of Water Resources and a special use permit from the Forest Service (Verner, 1995). Activity is limited to five individuals a year and is closed to all activity from May 1 to September 1 to protect spawning cutthroat (Jones, 1996).

Mineral Material Sites - Ten mineral material sites are located in the basin. These are sites with mineral deposits of economic value that may be used for agriculture, building material, cleaning and abrasive materials, construction, decorative arts, and landscaping. The materials may be removed by securing a permit from the Forest Service or BLM. Sites within the basin contain sand, gravel and cinders. Materials from these sites are mainly used by local government entities for road maintenance and construction (Horsburgh, 1995).

Exploration in the basin has identified several other mineral prospects including uranium and

Figure 14

Mines and Prospects



iron in the headwaters of the Fall Creek drainage, and limestone and dolomite deposits throughout the basin (Idaho Bureau of Mining and Geology, 1981). Low grade coal deposits occur throughout the basin, but are not economically viable (Gillerman, 1995) Feldspar, quartzite and bentonite have also been identified. Figure 14 depicts the general locations of these deposits.

NAVIGATION

There is no commercial navigation. defined as moving commodities by water, on the South Fork Snake River reach from the Idaho-Wyoming state line to the Henrys Fork confluence. Under the Idaho Admissions Act and Idaho Constitution, the State claims title to all bodies of water that are navigable. Under this claim a stream must have been used as a "highway for commerce" on the date that the State of Idaho was admitted to the Union (July 3, 1890). State title applies to the South Fork Snake River in the basin (Idaho Department of Lands, 1986).

Outfitters use the South Fork Snake River for commercial floating and fishing expeditions. To date, eight outfitters are licensed to operate on the South Fork Snake River by the Idaho Outfitters and Guides Licensing Board. This activity is discussed in the *Recreation* section.

FISH AND WILDLIFE

In 1980, the South Fork Snake River was identified as the most important fish and wildlife habitat in Idaho and one of the most significant in the western United States (U.S. Department of Interior, Fish and Wildlife Service [USFWS], 1986). There are several key features that make the river so biologically important and unique. Throughout the length of the free-flowing section, the river flows though the most extensive and highest quality cottonwood forest in Idaho (Riggin and Hansen, 1992). Secondly, fish productivity in the South Fork Snake River is high, and supports one of the few remaining native cutthroat trout fisheries (Thurow, et al., 1988). These features, plus the resident bald eagle population and breeding bird diversity, set the river and its basin apart from many others in western North America.

Ecosystems

The biodiversity in the basin is high, in large part because of the uniqueness of the South Fork Snake River narrowleaf cottonwood community (Saab, 1991). (Biodiversity defines biological species diversity measured by determining the total number of species in a community and the relative abundance of the species.) The South Fork Snake River narrowleaf cottonwood forest is the most productive habitat type in the basin for species diversity (BLM and Forest Service, 1991). The construction of Palisades Reservoir resulted in the loss of significant riverine and riparian habitat for aquatic mammals (mink, otter), elk, mule deer, breeding waterfowl, ruffed grouse, bald eagle, and nongame birds. The osprey is the only terrestrial vertebrate known to have benefitted from the reservoir (Meuleman, Martin and Hansen, 1992).

Riparian communities are the most important habitats in North America for solitary nesting birds, and critical for migrating birds (Schroeder and Allen, 1992). Data collected by the Targhee National Forest found three of the twelve communities on the forest had the majority of species occurring in or adjacent to the riparian community (Targhee National Forest, 1993). This included 62 of 85 mammals, 262 of 301 birds, and 13 of 17 amphibians and reptiles. Another study found sixty-seven percent of the 126 total riparian species utilizing the river riparian corridor were neotropical bird migrants (Meuleman, et. al., 1986).

The tributaries to the South Fork Snake River provide important foraging and nesting habitat, and refugia for wildlife in the basin. While the tributary riparian communities do not possess the extensive mature narrowleaf cottonwood gallery forest, and therefore, within-community heterogeneity that the main stem does, they often present mosaics of greater between-community heterogeneity. Tributary habitat will become more critical as human use and activity on the main stem increases.

The South Fork Snake River below Palisades Dam represents the largest continuous stand of narrowleaf cottonwood *(Populus angustifolia)* forest in the state and entire intermountain region (Saab, 1991; Riggin and Hansen, 1992). However, forest age composition of the South Fork Snake River corridor indicates insufficient numbers of young cottonwood to replace mature cottonwood (BLM and Forest Service, 1991). Inventories conducted in 1982 and 1988 determined 84 percent of the cottonwood population was mature or older trees (41 years or older), and the remaining 14 percent were young trees (Aslett, 1982; BLM and Forest Service, 1991). The establishment of immature trees on gravel bars and disturbed areas is not sufficient because flow releases have reduced the amount of sediment scouring, channel shifting and deposition. Total recruitment on gravel bars and sucker growth in mature stands will probably decline in area and vigor over the years (Merigliano, 1996).

Merigliano studied cottonwood stands from Palisades Dam to Heise to examine changes to the forest structure and composition from the 1950's to the present (Merigliano, 1994). His study found that as the stream channel became entrenched, it confined the cottonwoods to a denser, but narrower band. Merigliano concluded the pre-settlement/pre-dam cottonwood ecosystem is similar today in composition and structure, but stands are significantly smaller. The last major episode of cottonwood recruitment occurred in the mid-1940's before Palisades Dam was constructed. Cottonwood regeneration is dependent on occasional flooding, possibly of the magnitude and frequency of 36,000 cfs every 10-15 years (Merigliano, 1996). Planting is considered the least desirable option because of expense, access, rocky soils, irrigation, and beaver depredation.

In addition to the narrowleaf cottonwood dominance, the South Fork Snake River streamside riparian community also includes water birch, red-osier dogwood, silverberry, sandbar willow, yellow willow, and bentgrass (Merigliano, 1994). Narrowleaf cottonwood dominates the canopy, but the red-stemmed dogwood has the highest understory density (Saab, 1992). Other species included in the riparian community of the South Fork Snake River and its tributaries are Douglas fir, lodgepole pine, wild rose, and western serviceberry.

The east side tributaries (Indian, Big Elk, Palisades, Rainey, Pine, and Burns creeks) tend to be lusher and less xeric than the west side tributaries (McCoy, Bear, Indian, Fall, Pritchard, and Antelope creeks), in part because of the geology and topography of the canyons (tight and narrow on the east side, wider and more open on the west side). The Bear Creek riparian community, typifying the west side tributaries, is dominated by sandbar willow, alder, dogwood, and Douglas fir, with more open sagebrush-aspen complexes along the stream at higher elevations.

Burns Creek canyon, an east side riparian community in excellent, near pristine condition, has certain vegetation types which are uncommon for this part of Idaho (Layser, 1994). The community types exhibit exceptional diversity of species and structure. The upper Burns Creek canyon consists of shrub and tree dominated communities of white alder, water birch, red-osier dogwood, alder, and sandbar willow with Rocky Mountain maple, ninebark, and bigtooth maple common in places. Also found are Hudson Bay currant, black hawthorn, chokecherry, Douglas fir, subalpine fir, horsetail, Engelmann spruce, and narrowleaf cottonwood scattered throughout. The lower reach is dominated by stands of large narrowleaf cottonwood with a multi-layered, structurally diverse, deciduous tree and shrub understory of western birch, red-osier dogwood, and bluegrass. It is unusual for species such as water birch, bigtooth maple, ninebark, and hawthorn to extend as far up a tributary as they do in Burns Canyon, providing a connection between the South Fork Snake River and its uplands. The 490-acre Burns Canyon Research Natural Area was recently designated by the Intermountain Regional Forester indicating the significance of this community.

Cress Creek is unique among the tributaries, because it is a spring-fed riparian system

(Kotansky, 1996). Originating on the northern bench of the lower South Fork Snake River downstream from Heise, the stream has excellent water clarity and quality for all parameters, except fecal coliform bacteria (Kotansky, 1996). The high water quality supports a healthy, highly-structured riparian ecosystem with a number of different hydrophytic marsh species such as narrowleaf cottonwood, water birch, water cress, cattail, and monkeyflower within a few feet of semi-arid upland species of predominantly juniper, bluebunch wheatgrass, big sagebrush, slender wheatgrass, arrowleaf balsamroot, and antelope bitterbrush.

A plant listed as threatened under the Endangered Species Act occurs in the basin. A species of orchid, Ute ladies' tresses (*Spiranthes diluvialis* - which means "of the floods") was found in the fall of 1996 in four active riparian zones, or flood channels, of the South Fork Snake River (Moseley, 1996). The four populations were found between Fall Creek Campground and Kelly Island Campground, a distance of about 40 river miles. The orchid is also distributed in Colorado, Montana, Wyoming, Utah and Nebraska on the fringes of flood channels, but well within the riparian community.

The uplands above the riparian community are dominated by Douglas fir, quaking aspen, juniper, and sagebrush. Douglas fir and quaking aspen dominate the north-facing slopes; juniper and sagebrush dominate the south-facing slopes (BLM and Forest Service, 1991).

Numerous invasive plant species occur in the basin, including several knapweeds (*Centaurea* spp.), common tansy (*Tanacetum vulgare*), Canada thistle (*Cirsium vulgare*), purple loosestrife (*Lythrum salicaria*), leafy spurge (*Euphorbia esula*), and musk thistle (*Carduus nutans*) (U. S. Department of Energy, Bonneville Power Administration [BPA], 1995). Riparian ecosystems in the west are seriously threatened by these exotic invasions, caused by soil and habitat disturbances and non-native introductions. Agencies and counties are working cooperatively in the basin to prevent further invasion and spread, using integrated pest management techniques.

Fisheries

Eleven species representing four families occur in the main stem (Thurow, Corsi, and Moore, 1988). The native fish species include the cutthroat trout, mountain whitefish, mountain sucker, bluehead sucker, Utah sucker, Utah chub, redside shiner, longnose dace, speckled dace, mountain sculpin and Paiute sculpin. The most abundant game fish in the South Fork Snake River are mountain whitefish (*Prosopium williamsoni*) which are an important food source for bald eagles. Species introduced to the basin include rainbow, brook, brown, and lake trout, kokanee and coho salmon.

The South Fork Snake River is an important cutthroat trout *(Oncorhynchus clarki)* and brown trout (*Salmo trutta*) fishery (Schrader and Griswold, 1994). Its importance is associated with high growth rate and natural reproduction (Martin, 1996). Special IDFG fishing regulations, high densities and low mortality rates also contribute to the outstanding fishery condition. In a comparative study with eight other Idaho cutthroat streams, the South Fork Snake River ranked second only to the main Snake River in measured length at 4 years of age (Schill, 1991).

Although unresolved, some biologists believe two subspecies of cutthroat trout exist in the basin -- Yellowstone cutthroat and Snake River fine-spotted cutthroat (Behnke, 1992). The Yellowstone cutthroat exists in the basin as both migratory and non-migratory populations. The nonmigrants spend their entire life in the tributaries. The migrants move into the tributaries from the main stem to spawn and then return to the main stem (Thurow, Corsi, and Moore, 1988). The Yellowstone cutthroat trout has evolved with little interspecific competition, and has consequently developed a relatively broad niche in terms of feeding habits and habitat utilization (Targhee National Forest, 1993). Both subspecies are found throughout much of the basin, but the Yellowstone cutthroat is the

dominant subspecies in the South Fork Snake River and tributaries, while the fine-spotted cutthroat dominates above Palisades Dam in the reservoir and tributaries (Thurow, 1996; Figure 15). Palisades Dam, completed in 1957, created a flatwater lacustrine environment that effectively eliminated migration of cutthroat from the South Fork Snake River below the dam to tributaries to the reservoir (Thurow, Corsi, and Moore, 1988). Some fish still move downstream from the reservoir.

The Yellowstone cutthroat and fine-spotted cutthroat trout are listed as Species of Special Concern by the IDFG. Species of Special Concern are native species which are either low in numbers, limited in distribution, or have suffered significant habitat losses (IDFG, Conservation Data Center [CDC], 1994). Historically, the Yellowstone cutthroat occupied 3,797 miles of riverine habitat within Idaho (Duff, 1996). Current assessment indicates that approximately 1,622 stream miles are presently inhabited by Yellowstone cutthroat, or 43 percent of their original historic range. However, only a small percentage of this population has been genetically verified. There is concern that the genetic purity of many of these populations may be contaminated by rainbow trout hybridization. Of the twenty-one sub-basins with Yellowstone cutthroat trout in Idaho, nineteen (including the South Fork Snake River Basin) contain exotic trout species such as rainbow which threaten the genetic purity of the Yellowstone cutthroat species.

Thirteen tributaries to the main stem are considered biologically significant, because they are perennial with known cutthroat spawning. McCoy, Bear, Indian, and Big Elk creeks flow into Palisades Reservoir and are considered important spawning tributaries (Moore, Aslett, and Corsi, 1981). Palisades, Rainey, Pritchard, Pine, and Burns creeks are important spawning tributaries to the main stem. Dean (1996a) reported that healthy, stable reproducing populations of cutthroat exist in McCoy, Bear, Palisades, Pine, and Burns creeks.

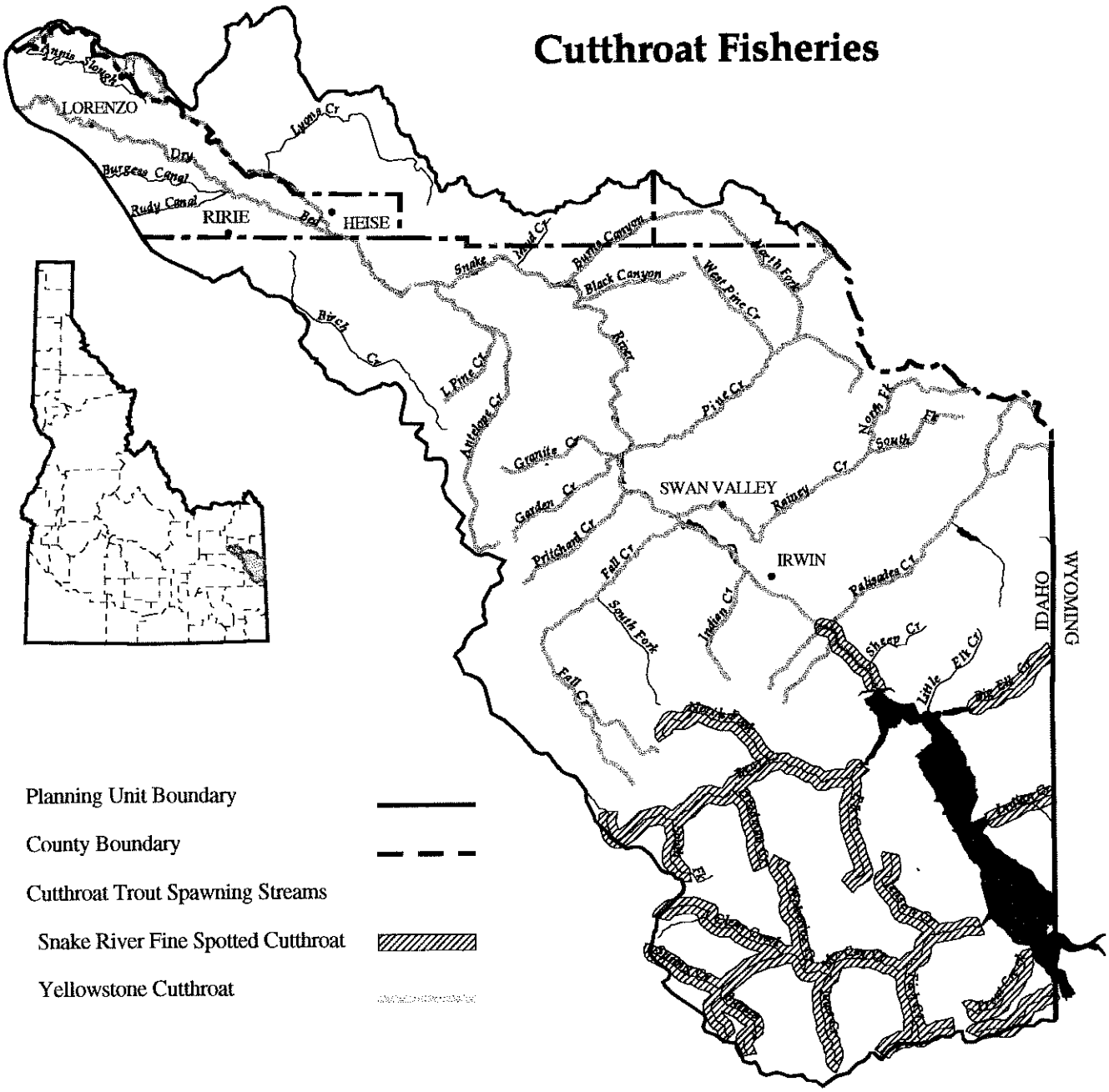
Threats to many of the spawning tributaries limit recruitment to the main stem fishery. Palisades Creek, the uppermost tributary to the South Fork Snake River, has excellent spawning and rearing potential, but 95 percent of the water is diverted one kilometer above the mouth during irrigation season (Moore, 1980). Currently, a bypass system is operated to increase migratory success. Indian Creek is severely degraded by cattle (Moore, 1980). The Fall Creek Yellowstone cutthroat population has been isolated for almost two million years because of a ten meter waterfall at the mouth (Dean, 1996b). Consequently, the thriving population of cutthroat trout may well be a unique subspecies. Rainey Creek is dewatered at times because of a porous alluvium in the upper section and five diversions in the lower section. Degradation occurs in lower Rainey Creek from dewatering and siltation. Springs recharge it before entering the South Fork Snake River. Pine Creek, including its three forks, is the largest tributary to the main stem used by spawning trout. The low gradient, upper reach flows through a flat valley and has a good riffle-pool structure. Some impacts occur from grazing. Antelope Creek drains an area with intense agriculture which has impacted the water quality and habitat in the lower section. The headwaters provide adequate habitat for spawning and rearing, supporting a self-sustaining population of resident trout. Burns Creek is considered to be the most important spawning tributary below Palisades Dam.

Despite the threats identified, all of these tributaries are considered by the IDFG to be important cutthroat trout spawning tributaries (Martin, 1996). An additional threat to the basin cutthroat fishery is the hybridization with rainbow trout, jeopardizing the viability of the native cutthroat population and fishery (Martin, 1996). The IDFG currently is radio-tagging rainbow trout to determine their current distribution in the basin.

Brown trout were introduced into Idaho in 1892. The species were not planted by IDFG into the South Fork Snake River Basin until 1968,

Figure 15

Cutthroat Fisheries



although the species were already present in 1955, comprising 5 percent of all trout samples. In 1979, brown trout represented 9 percent of the angler catch. From an economic perspective, they are of major importance in the South Fork Snake River drainage, providing anglers with an opportunity to catch "trophy-sized" fish. The official state record of 26.4 pounds was taken below Palisades Dam in 1981 (Martin, 1996). A study of juvenile Yellowstone cutthroat, brown trout, and mountain whitefish in the main stem found the winter density of cutthroat trout was the highest of the three species, brown trout was the lowest (Schrader and Griswold, 1994).

During the winter, the sub-yearling cutthroat and brown trout are most abundant in the side channels of the South Fork Snake River where cover and habitat occur. Available winter habitat is associated with river discharge (Schrader and Griswold, 1994). Recent research indicates a minimum flow of about 1500 cfs from October 1 to March 30 is needed to reduce juvenile mortality (Schrader and Griswold, 1994). The greatest loss of juvenile cutthroat and brown trout occurs at flows between 1540 to 1240 cfs, because the greatest number of habitats become unavailable as they dry up or freeze (Schrader and Griswold, 1994).

Wildlife

Wildlife habitats mapped for the basin include areas where selected wildlife are dependent to maintain their populations during critical times of the year (Figure 16). This includes crucial wintering ranges for elk and/or mule deer, white-tailed deer, mountain goat; nesting territories for heron rookeries; and bald eagle principal management parcels (Martin, 1996; Naderman, 1996; Whitfield, 1993; Hayden, 1989; CDC, 1996; BLM and Forest Service, 1991).

Mule deer (*Odocoileus hemionus*) and elk (*Cervus canadensis*) use all South Fork Snake River Basin habitats in the spring, summer, and fall, and the sagebrush-wheatgrass and forested habitats of the foothills and river corridor in the winter (BPA, 1995; Gardetto, 1996). Both species prefer higher elevations, but snow depths force them to lower elevations in the winter, mainly south facing slopes with lower snow depths. Mountain goats tend to concentrate on the more precipitous east side of the river, while mule deer and elk on the more open west side. Whitetail deer reside mainly in the floodplain of the main stem. Moose occur throughout the basin.

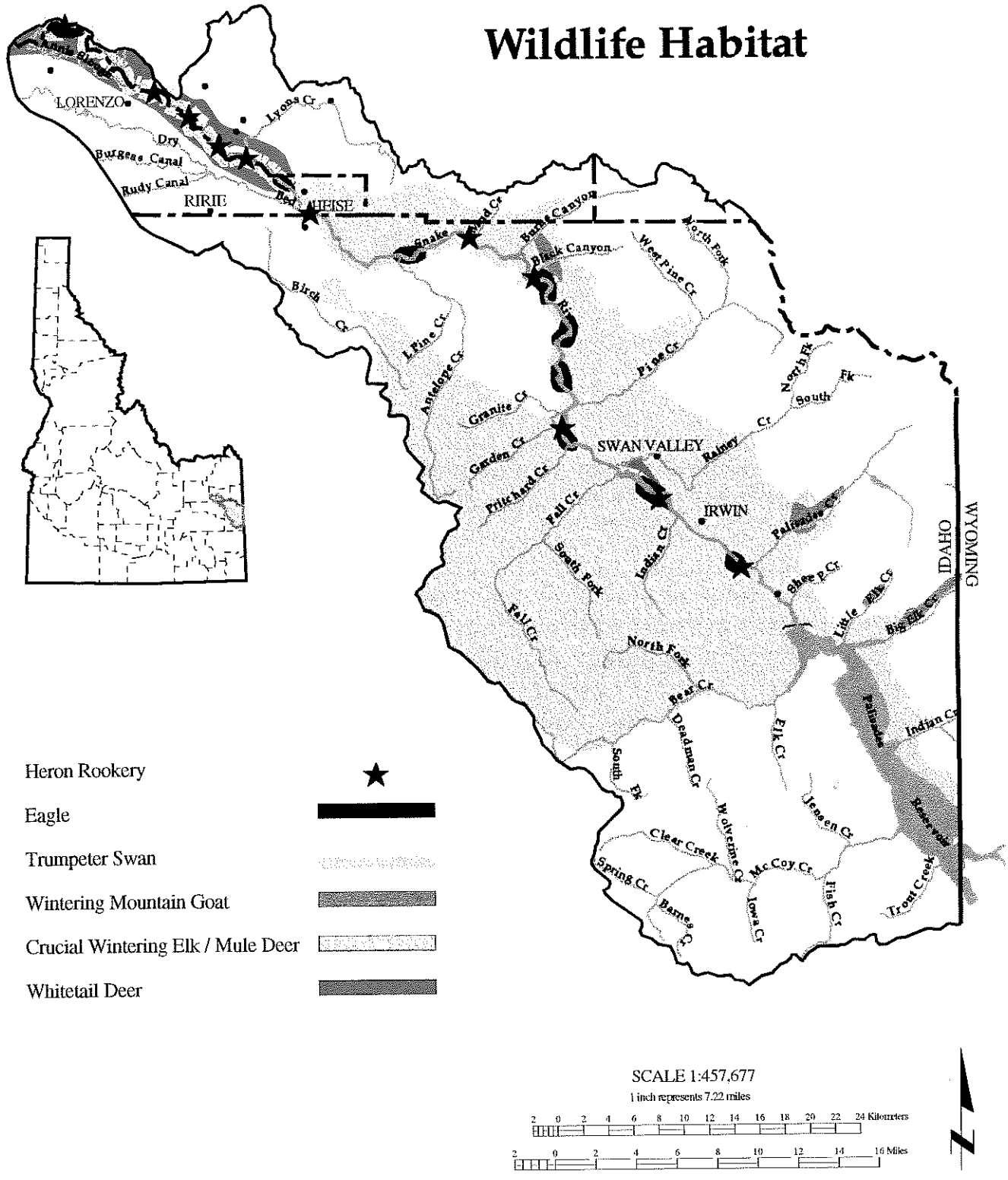
Canada geese (*Branta canadensis*) use the South Fork Snake River corridor for wintering, nesting and brood rearing (BPA, 1995). The river corridor has been identified as one of the most important nesting areas in the region (Krohn and Bizeau, 1980, cited in BPA, 1995). Canada geese primarily nest on the approximately 260 islands occurring on the South Fork Snake River between Palisades Dam and the Henrys Fork confluence. Between 1972 to 1979, the IDFG studied nesting success and found it depended on the magnitude and timing of spring releases (IDFG, 1979; Riggin and Hansen, 1992). Flows between 8000-16,000 cfs from March to May increase goose nesting success (Cochnauer and White, 1975). Flows below 8000 cfs allow nests to suffer from predation (Parker, 1973). Flows greater than 16,000 cfs inundate the nests. However, the IDFG believe that fish, stream channel, and riparian needs outweigh goose nesting needs when water is in short supply (Martin, 1996).

The South Fork Snake River is also used as a migratory wintering area by the trumpeter swan (*Cygnus buccinator*) (IDFG, 1994; Figure 16). Winter habitat requires ice-free waters, usually occurring where springs feed into the river, supporting abundant aquatic plant forage species such as pondweed, waterweed, duckweed, and water milfoil (BPA, 1995).

The northern goshawk (*Accipter gentilis*) nests in at least two locations in the basin. Goshawks typically locate their nests on gentle to moderate slopes with northern aspects adjacent to springs or streams (Reynolds, 1983, cited in BPA, 1995). Goshawks usually remain as residents once they have established nests.

Figure 16

Wildlife Habitat



Recently, the USFWS modified the process to list threatened and endangered species (*Federal Register*, February 28, 1996). Currently, there are only two species of animals listed as threatened or endangered in the South Fork Snake River Basin -- the peregrine falcon (*Falco peregrinus anatum*) is listed as endangered and the bald eagle (*Haliaeetus leucocephalus*) as threatened (IDFG, Conservation Data Center 1996). The peregrine falcon has historically nested on the South Fork Snake River cliffs (BLM and Forest Service, 1991). For nesting the birds need a combination of steep vertical surfaces to prevent predation, and ledges and cracks for scrapes and roost sites (Kilpatrick, 1987, cited in BPA, 1995). Typical nesting habitat is cliffs between 100 to 300 feet high, but rarely above 8500 feet (2590 meters) in elevation. The USFWS has attempted to restock peregrines in the South Fork Snake River corridor using birds from the Peregrine Fund in Boise. Presently, two active natural eyries are found in the corridor (Gardetto, 1996).

The entire upper Snake is regionally important as a critical bald eagle nesting and winter area (Riggin and Hansen, 1992). In 1967, no eagles were known to nest along the river. By 1982, there were ten breeding pairs. In 1986, 35 percent of all eagles nesting in Idaho nested in the South Fork Snake River Basin. (Greater Yellowstone Ecosystem Working Team, 1983; Swenson, et al., 1986; Meuleman, et al., 1986). In 1992, eleven nesting pairs and sixty wintering birds were identified in the basin (Martin and Hansen, 1992). Currently there are twelve nests in the basin; eleven occur on public land (Gardetto, 1996). The South Fork Snake River Basin currently contributes 50 percent of the total bald eagle production in Idaho and accounts for more than 30 percent for the Greater Yellowstone Ecosystem (BLM and Forest Service, 1991).

Bald eagles nest in large, prominent trees in multi-layered forest stands, usually in large conifers and cottonwood trees (DeGraff, et al., 1991, cited in BPA, 1995). Nesting territories are occupied annually, as long as an adequate breeding population exists. A pair of eagles may return to the same nest for many years if the location is near an adequate food source, such as fish, waterfowl, and rabbits (Paige, et al., 1990, cited in BPA, 1995). In the Greater Yellowstone Ecosystem, 45 percent of bald eagle nests occur in narrowleaf cottonwood with the remainder in blue spruce, Douglas fir, lodgepole pine or Engelmann spruce (Swenson, et al., 1986). Ten of eleven nests in the basin are found in cottonwoods, mostly large, old trees.

For foraging purposes, most eagle nests are placed near important spawning tributaries for cutthroat trout and Utah suckers, because the main stem may be silt-laden with spring runoff (Swenson, et al., 1986). Bald eagles forage in the tributaries, especially when the South Fork Snake River is frozen, but they rely predominately on the main stem when accessible. On the South Fork Snake River, both cutthroat trout and whitefish provide abundant food for bald eagles (Sather-Blair and Preston, 1985, cited in BPA, 1995). Low winter flows that cause extensive and prolonged icing negatively affect fish populations and impact the eagles as well.

In 1983, it was estimated that 72 percent of the existing nesting population of eagles could be impacted unless adequate management practices were applied (Greater Yellowstone Ecosystem Working Team, 1983). There are four nests that are seriously threatened by current and potential development in the vicinity of Palisades Creek, Swan Valley, Conant Valley, and Antelope Creek (Whitfield, 1996). Habitat for bald eagles was prioritized for protection from Palisades Dam to the confluence. Reaches closest to the dam were given the highest priority for protection, because of the imminent threat from development (Martin and Hansen, 1992).

Vertical vegetation stratification, plant species richness, and special habitat features such as snags are frequently related to bird species abundance in the riparian habitat. A study conducted from 1991 to 1994 studied the patterns of habitat use by breeding birds in cottonwood riparian forests along the South Fork Snake River from Palisades Dam to the Henrys Fork confluence (Saab, 1994). Bird distribution and abundance and vegetation data were collected for

57 cottonwood forest patches. Habitat conditions studied ranged from relatively undisturbed areas to areas used for livestock grazing and/or recreational activities.

Ninety-seven species were recorded in the study with 78 percent of them migratory (Saab, 1994). Preliminary results indicate species richness was slightly higher in undisturbed areas (82 species) than in grazed (79 species) or recreational sites (60 species). Bird abundance and species richness were greater in relatively undisturbed cottonwood patches with a greater diversity and density of shrubs and ground cover than that found in disturbed patches. Large cottonwood patches surrounded by natural landscapes had higher species richness than small cottonwood patches surrounded by agricultural landscapes.

Species composition was equally similar between grazed and recreation use sites (81 percent) and between undisturbed and grazed sites (81 percent), while undisturbed and recreational sites were the least similar (75 percent). Cottonwood forests in the reaches of the river that possessed the higher bird diversities, such as the canyon portion (Conant Valley to Black Canyon), tended to be more connected, large stands and have a greater mosaic of vegetative communities in the surrounding landscape.

Saab's (1996) study of breeding birds recommended that land acquisitions focus on large cottonwood patches surrounded by natural landscapes to maintain species richness of native birds. Maintaining large cottonwood patches is also critical for the long-term persistence of habitat interior species. Whereas, small fragments of riparian habitat are important for attracting the habitat edge specialists. Avian nest predators such as crows, magpies and starlings, and avian brood parasites persist with urban and rural development, and are potential threats to breeding bird productivity as land use development occurs.

In a recent publication, Frest (1994) reported several locations where springsnail mollusks, a Species of Special Concern, are found in the South Fork Snake River Basin. The sites and genera include Cress Creek Spring (*Physella, Oxyloma*), Kelly Canyon springs (*Lyogyrus, Physella*), Hawley Gulch springs and runs (*Lyogyrus*), Mud Creek (*Physella, Oxyloma, Deroceras*), Warm Springs complex (*Pyrgulopsis, Physella*), Wolverine Creek (*Lyogyrus*), Spring Creek (*Physella*), and McCoy Creek and tributaries (*Stagnicola, Physella, Lyogyrus*). Frest (1995) recommended that several of these species warrant listing under the Endangered Species Act, including *Lyogyrus spp.* and *Pyrgulopsis spp.*

RECREATION

The *Recreation* section is a summary of inventory information obtained while preparing the South Fork Snake River Basin Plan. More information is provided in the Recreation Technical Report located in IDWR files. Several federal, state, county and local entities manage lands and facilities providing recreation opportunities in the basin. Primary recreation providers are the Targhee National Forest, Caribou National Forest, and Idaho Falls District BLM. The USBR has facilities below Palisades Reservoir. Additional opportunities are available at sites managed by IDFG, Bonneville, Madison and Jefferson counties, and private entities.

Recreation use in the basin by activity is summarized in Table 19 by regional participation and agency. This table does not provide a complete quantification of recreation use, because much of the use occurs as dispersed use or through private entities which is difficult to assess. (Dispersed use is activity that occurs outside developed facilities.) The information does provide a general description of the composition of recreational activities that occur in the basin compared to regional participation. Because a recreation visit is estimated for each activity that an individual participates, the use estimates do not represent total numbers of individuals recreating in the basin.

Table 19. Estimated Recreation Activity Participation for Region 6 and the South Fork Snake River Basin.

Activity	REGION 6[1] PARTICIPATION Resident Travelers	Non-res. Travelers	Bureau of Land Management 1994 RVs[2] (% of total)	Bureau of Reclamation 1994 Rvs	U. S. Forest Service 1994 RVS (% of total)
Fishing	10.7%	8.0%			
Reservoirs					200 (0.01%)
Rivers			81,020 (28.2%)		196,300 (7.0%)
Ice					10,800 (0.4%)
Boating	5.3%[4]	2.6%[4]			
Canoe					9,400 (0.3%)
Sailboat					2,200 (0.1%)
Other non-motorized			74,950 (26.1%)		21,400 (0.8%)
Motorized boating			65,250 (22.7%)		43,000 (1.5%)
Tour/Ferry					1,000 (0.04%)
Other Water-based					
Swimming	2.3%				17,700 (0.6%)
Water skiing/Diving	1.0%				19,800 (0.7%)
Camping	5.3%	9.1%	19,400 (6.7%)		450,800(16.0%)
Organization Camps					105,400 (3.7%)
Hunting	3.0%				155,300 (5.5%)
Big Game			3,790 (1.3%)		
Waterfowl			1,250 (0.4%)		
ORV Travel	1.5%	0.6%	2,750 (1.0%)		64,300 (2.3%)
Other Motorized					445,100(15.8%)
Non-motorized					
Hiking	45.8%		5,700 (2.0%)		48,800 (1.7%)
Biking	6.9%		1,250 (0.4%)		14,700 (0.5%)
Horseback			1,250 (0.4%)		34,000 (1.2%)
Other Land-based					
Picnicking	5.3%		15,050 (5.2%)		78,600 (2.8%)
Nature study			13,250 (4.6%)		84,900 (3.0%)
Sightseeing	6.9%	17.5%			311,200(11.1%)
Tours					54,200 (1.9%)
Sports					36,800 (1.3%)
Recreation cabins					34,400 (1.2%)
Gather forest products					77,700 (2.8%)
Winter Sports			1,250 (0.4%)		307,500(10.9%)
Skiing	4.6%				
Snowmobile	2.3%				
Snowplay	1.5%				
Other			1,250 (0.4%)		188,400 (6.7%)
TOTAL RVs			**287,410**	**11,049[3]**	**2,708,900**

[1] Region 6 includes Bonneville, Clark, Fremont, Jefferson, Madison and Teton counties.
[2] RV - Recreation visit equals one person for one visit regardless of length of visit. Each activity a person participates is counted as one recreation visit. Therefore, total recreation visits do not estimate total numbers of people recreating.
[3] Indicates visitation at the Bureau of Reclamation site below Palisades Dam only. Visitation at facilities located on Palisades Reservoir are included in the U. S. Forest Service estimates.
[4] Water skiing is included under boating.

Sources: Parrish et al., 1996; Hunt et al., 1994; Targhee National Forest, 1995; Bureau of Land Management, 1995; Brown, 1995; Daniels, 1995.

The basin supports a wide diversity of recreation settings and experiences ranging from natural, undeveloped settings to areas with facilities. Most developed facilities are located within the South Fork Snake River corridor and include campgrounds, boat access and picnic facilities. Figure 17 depicts developed facilities and important recreation areas in the South Fork Snake River Basin.

The South Fork Snake River corridor is the focus of much concentrated recreation use. The Idaho Falls District BLM estimates 225,000 recreation visits in the South Fork Snake River corridor from Palisades Dam to the Henrys Fork confluence in 1995 (Brown, 1996). The composition of recreation activities in the river corridor is illustrated in Figure 18, page 58. Estimated hours fished during the summer has more than tripled since 1982 from 53,676 hours to 169,142 hours in 1996 (Moore and Schill, 1984; Schrader, 1996).

Public land occurs along most of the length of the river, theoretically providing extensive access (with the exception of private land in the Swan Valley area.) However, access is limited in some areas, because of the steep-walled canyon, dense vegetation, lack of roads, or private lands obstructing access to adjacent public lands.

Despite these limitations, several developed access points are located along the river. These include eleven boat access facilities, Kelly Island campground operated by the BLM, and Twin Bridges campground operated by Madison County (Figure 17). Seven boat access facilities are improved with concrete ramps. The remainder are unimproved bank launches. Additional access is possible by roads paralleling the river. Sections of Forest Service Road 058 parallel the river between Irwin and Fall Creek Falls. The Snake River Road (Forest Service Road 206) parallels the north side of the river from Black Canyon to below Wolf Flat. Estimated visits for access sites along the river managed by BLM are presented in Table 20.

To protect bald eagle nesting areas, heron rookeries, and improve vegetation and other wildlife resources, camping in the South Fork Snake River canyon (Conant to Black Canyon) is now restricted to designated camping areas (BLM and Forest Service, 1991). These designated areas are located in the vicinity of Pine Creek, Dry Canyon and Gormer Canyon, and are depicted in Figure 17.

Observation of recreation patterns over the past three years have identified some changes and trends in recreation use in the corridor. Recreation visits have increased significantly on the river in the reach below Heise. Personal water crafts (jet skies) are appearing in greater numbers. Guided fishing trips have increased. Anglers are not the only people floating the river -- more people are floating to enjoy the scenery. More people are camping in the canyon reach (Conant Valley to Black Canyon). In 1995 an estimated 713 people camped in the canyon (Brown, 1996).

The South Fork Snake River has a reputation for its native cutthroat fishery, and is nationally recognized as one of the top 100 trout fishing streams in America (Pero and Yuskavitch, 1989). The value of fishing and associated recreation activity to the local economy is estimated at almost $5.7 million annually (BLM and Forest Service, 1991). In a 1987 survey asking anglers to identify their most frequently fished waters, 13.4 percent of Region 6 residents named the Snake River, 4.9 percent the South Fork Snake, and 7.5 percent Palisades Reservoir (Reid, 1989). A random survey of resident and non-resident anglers purchasing a 1994 fishing license, identified the South Fork Snake River as one of the top ten waters fished, as well as one of the most preferred (IDFG, 1995a; IDFG, 1996).

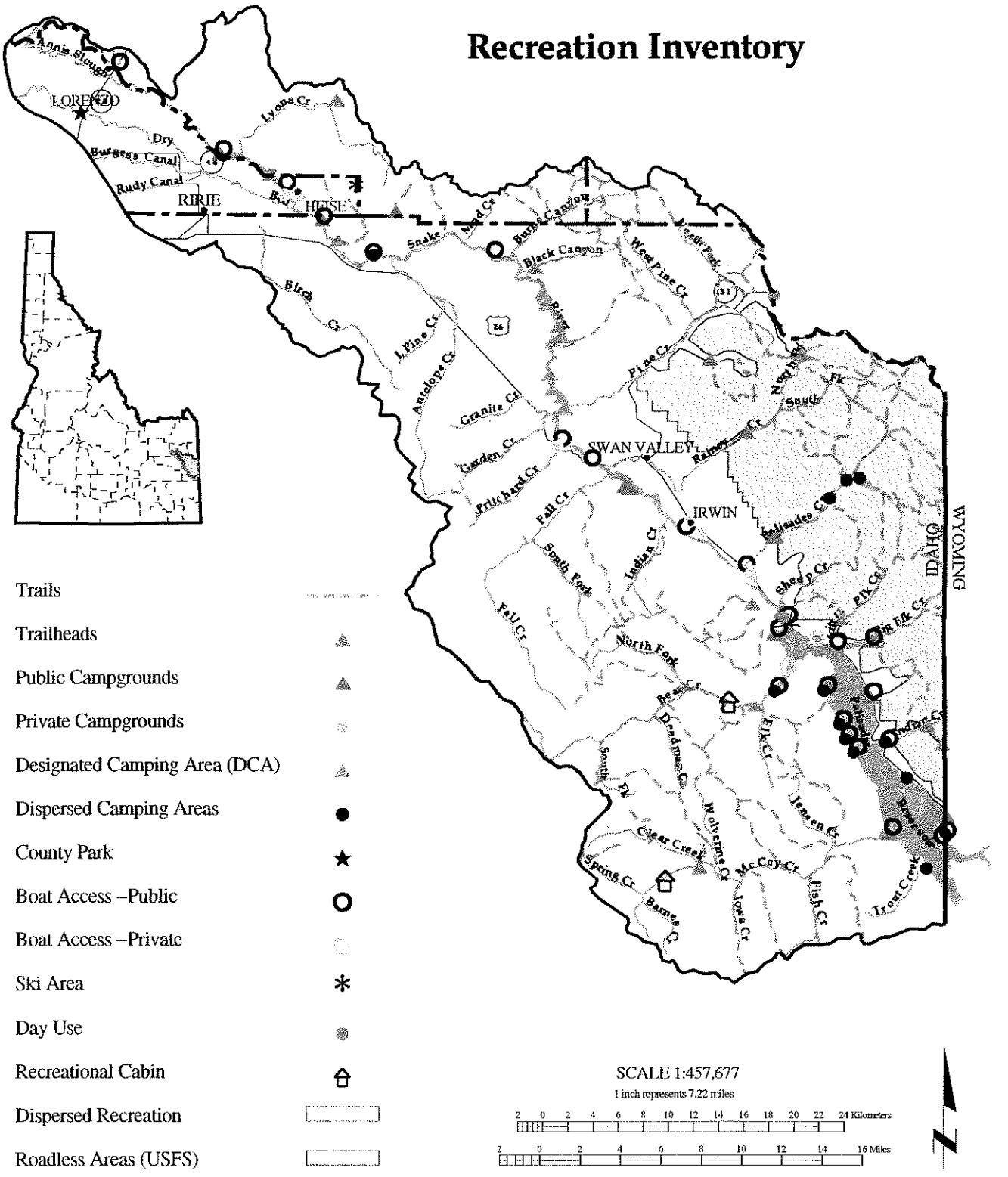
Table 20. 1995 Estimated Site Visits for BLM Managed Access Sites Along the South Fork Snake River Corridor.

Site	Visits
Conant Boat Access	36,267
Byington Boat Access	43,852
Lorenzo Boat Access(Undeveloped)	21,402
Kelly Island Campground	4,504

Source: Brown, 1996.

Figure 17

Recreation Inventory



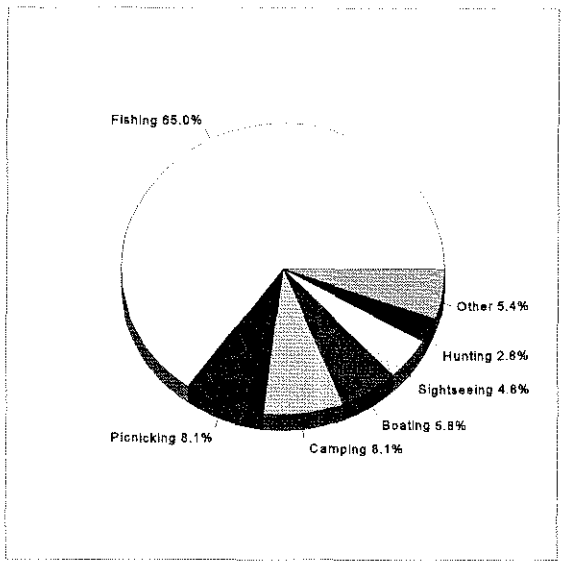


Figure 18. Composition of Recreation Activities in South Fork Snake River Corridor (Brown, 1996).

Angling use has increased significantly on the river. The IDFG estimated 89,000 angler hours on the river from March 1979 through February 1980. Based on the number of launches from the Conant boat ramp, an estimated 181,335 angler hours occurred below Conant in 1995 (Brown, 1996). Schrader (1996) estimated 169,142 angler hours during the 1996 summer season. The salmon fly hatch occurring in late June to early July results in significant angling activity for about a month.

Current IDFG management on the South Fork Snake River emphasizes a quality cutthroat trout fishery. Burns, Pine, Rainey, Pritchard, Palisades, and McCoy creeks and all other tributaries are also managed as a quality cutthroat trout fishery. Management objectives include restrictions on size and harvest of fish to achieve greater catch rates and larger "quality" size fish. These include a 2-fish limit with an 8 to 16 inch protective slot (IDFG, 1996). Harvest restrictions were initially implemented on the South Fork Snake River from Irwin to Heise gage in 1984, and extended to Palisades Dam in 1988 (IDFG, 1996). These management strategies resulted in increased size and numbers of cutthroat, and a 300 percent increase in fishing effort in 1989. The cutthroat harvest rules were implemented for the South Fork Snake River below Heise and all tributaries in 1990, and extended to all trout species on the South Fork Snake River in 1992 (IDFG, 1996).

The South Fork Snake River fishing season from Palisades Dam to the Heise stream gaging cable is open the Saturday of Memorial Day weekend through November 30. The reach below Heise is open all year. Additional restrictions apply to some important spawning tributaries. Pine Creek is closed to anglers until July 1. Burns Creek is closed until September 1.

The South Fork Snake River is also managed as a wild brown trout fishery, relying on natural production. The state record brown trout (26.4 pounds) was taken below Palisades Dam in 1981 (Martin, 1996). General management objectives are in place for whitefish with no special regulations for that species.

Many float the South Fork Snake River to view scenery and wildlife as well as to fish. Drift boats and rafts are common crafts seen on the river, as well as canoes. Personal water craft (jet skies) are also appearing on the river resulting in some conflicts among various recreation users. Motorized boating activity varies from year to year, but is estimated to range from 20-40 percent of the boating use (Brown, 1996; Taul, 1996).

Palisades Reservoir is a large reservoir with 16,100 surface acres at full pool. The reservoir is operated by the USBR, and the Targhee National Forest operates the recreation facilities. Bonneville County maintains the boat docks and has enforcement authority on the Idaho portion of the reservoir. Recreation activity consists of fishing, water skiing and camping on the shores. Several dispersed camping areas predominately accessible by boat are popular camping spots. Because the reservoir has such a large surface area, congested areas on the reservoir have not been a concern in the past, although some boat ramps receive heavy use.

Eight outfitters provide fishing trips on the South Fork Snake, operating from Palisades Dam to the confluence with the Henrys Fork. The

river is segmented into four sections consisting of Palisades Dam to Swan Valley Bridge, Swan Valley Bridge to Black Canyon, Black Canyon to Poplar, and Poplar to the Henrys Fork confluence. Each outfitter can operate up to four boats per day on a section, with no more than twelve boats total in a day (IOGLB rules). This would allow a maximum of 96 outfitter boats along the length of the South Fork Snake River during a day, or a maximum of 32 boats on any section.

Guided fishing trips on the South Fork Snake River have consistently been the largest component of the outfitting industry comprising 79 percent of the guide business in 1994, an increase of 24 percent from 1993 (Idaho Outfitters and Guides Licensing Board [IOGLB], 1995). In 1995, 5,877 individuals used the services of an outfitter to fish on the South Fork Snake.

Flows on the South Fork Snake River affect the ability to conduct outfitted trips. An informal survey of outfitters indicated flows of 8-10,000 cfs are ideal for guided fishing trips. The outfitters identified 15,000 cfs as a maximum flow and a minimum flow of 3,000 cfs. High and low flows limit angling success and the commercial marketability of guided trips. When flows are considered too high for successful fishing efforts, pressures increase on neighboring rivers such as the Henrys Fork as anglers look for other places to fish.

Big game hunting activity is recorded by unit number. The South Fork Snake River Basin is located mainly within Units 66, 67 and 69. Portions of Units 63A and 64 are located at the western end of the basin. These offer some of the few general bull elk hunting opportunities in southeastern Idaho, and receive heavy use (Martin, 1996). Table 21 depicts hunter days (the number of days hunters spent hunting for a given species) for big game -- deer, elk, moose and mountain goat.

Table 21. Estimated Hunter Days for Deer, Elk, Moose and Mountain Goat.

Year	Unit 63A	Unit 64	Unit 66	Unit 67	Unit 69	TOTAL
			DEER			
1990	423	4,065	6,946	5,773	11,303	**28,510**
1991	961	4,793	8,705	3,867	14,044	**32,370**
1992	135	2,844	9,386	2,476	10,157	**24,998**
1993	333	4,331	10,061	4,974	11,224	**30,923**
1994	670	585	720	778	1,840	**4,593**
			ELK			
1990	453	1,542	6,632	2,669	6,783	**18,079**
1991	845	2,386	10,651	4,681	6,863	**25,426**
1992	307	2,444	13,593	4,822	4,404	**25,570**
1993	414	2,442	14,415	5,843	5,318	**28,432**
1994	-	1,596	9,986	4,539	4,827	**20,948**
			MOOSE			
1990	38	64	46	82	110	**340**
1991	46	26	78	15	174	**339**
1992	41	32	73	18	81	**245**
1993	199	70	174	37	265	**745**
1994	104	85	106	145	121	**561**
			MOUNTAIN GOAT			
1990	-	-	-	72	-	**72**
1991	-	-	-	35	-	**35**
1992	-	-	-	48	-	**48**
1993	-	-	-	41	-	**41**
1994	-	-	-	40	-	**40**

Source: Nelson, 1990 and 1991; Kuck, 1992-1994.

SCENIC VALUES AND NATURAL FEATURES

The South Fork Snake River Basin is located in the Middle Rocky Mountain physiographic province characterized by complexly folded and faulted mountain ranges. The Snake River Range and Caribou Range dominate the eastern portion of the basin separated by a wide flat valley. The western portion of the basin occurs on the perimeter of the Snake River Plain province. The Geology and Soils section describes these geologic features in more detail.

An overview of outstanding natural areas in Idaho conducted by several state agencies identified the South Fork Snake River and its riparian forest as one of the most extensive cottonwood forests in the West (State of Idaho, 1975). In an evaluation of sites in Idaho, the South Fork Snake River received the highest rating for wildlife populations (Poccard, 1980). It has been proposed as a National Natural Landmark, because of its ecological characteristics (Johnson and Pfister, 1982). Other areas in the basin noted for distinctive scenic values include Menan Buttes, a National Natural Landmark described in the geology section of the plan, and Swan and Conant valleys.

A evaluation of the scenic values of waterways in the basin was conducted as part of the South Fork Snake River Basin Plan. The evaluation and results are presented in the *Resource Evaluation* section.

CULTURAL RESOURCES

Federal law and management policy requires assessment, survey and mitigation for potential cultural resource sites prior to implementation of federal project proposals, or actions on federal land. Although approximately 67 percent of the basin is under the jurisdiction of federal agencies, much has not been formally surveyed. Most Forest Service surveys occur in association with timber sales, but little timber harvest has occurred within this basin (Targhee National Forest, 1996a). Survey efforts have occurred as the result of USBR activities, road realignment, and range projects which have examined small areas of the South Fork Snake River drainage.

Completed surveys have identified more than 100 sites within the basin (Idaho State Historical Society, 1996). Prehistoric sites include Native American hunting camps, lithic workshops, and volcanic glass quarry sites. Many sites are historic, affiliated with mining and ranching activities, and the administration of Forest Service lands (BLM and Forest Service, 1991).

No sites are listed on the National Register of Historic Places, although many sites are eligible. The National Register is an official list maintained by the National Park Service of archaeological, historic, and architectural properties of national, state and local significance worthy of preservation. Compilation of the list was established in 1966. Known eligible sites located in the basin include: an aboriginal base camp near the Table Rock campground; a pictograph site near Warm Springs; the Heise, Brockman, Bald Mountain and Currant Creek guard stations; the Swan Valley Ranger Station; and the limekiln quarries on the Targhee National Forest (Targhee National Forest, 1996a; Willingham, 1996).

Resource Evaluation

As defined by the Idaho Code, a recreational or natural river "means a waterway which possesses outstanding fish and wildlife, recreation, geologic or aesthetic values" [Idaho Code 42-1732 (7) and (9)]. A natural river is free of substantial impoundments, dams or other structures and the riparian area is largely undeveloped. A recreational river may include some manmade development in the waterway or the riparian area. The resource evaluation is an exercise to identify rivers or streams that may be eligible for this designation. A designation is made only if the Board determines the value of preserving the waterway is in the public interest and outweighs developing the river for other beneficial uses. This determination is largely based on information received from the public

and at advisory group meetings. State designation does not change or infringe upon existing water rights or other vested property rights.

Criteria used to identify outstanding resource values for fish and wildlife, recreation, and scenic values are briefly described in the following sections. The resource evaluation criteria and results were reviewed by the advisory group, agencies and public during advisory group meetings. At that time, additional information were provided and tributaries were evaluated or reevaluated based on the new information. Table 22 summarizes the river and stream reaches identified with outstanding resource values. Figure 19 depicts the locations of these reaches.

FISH AND WILDLIFE (BIOLOGICAL)

The biological evaluation for the South Fork Snake River Basin considered the entire watershed of a stream reach. This procedure represents a combination of several different stream assessment methodologies, including the EPA Rapid Bioassessment Protocols (RBP) and Streamwalk, the DEQ's Beneficial Use Reconnaissance Procedure (BURP), and IDFG's Idaho Rivers Information System (IRIS) among others. There were twenty-six streams or reaches evaluated in the basin. All these streams had some biological information about them available, but it may not be sufficient to evaluate the resource value. The evaluation consisted of a two step procedure: 1) *River Biological Screening Process*---an initial screening to determine eligibility, and 2) *Crucial Species and Habitats*--- a final evaluation of the basin's unique species and their habitats.

Criteria

River Biological Screening Process

Biological data were collected from various sources, including IDFG, Targhee National Forest, Idaho Falls District BLM, IDWR field surveys, and specific research studies. The data were compiled for twenty biological attributes on each stream (Table 23, page 64). These twenty attributes were categorized into four components to help collect and organize the data:

1. ***Habitat: Aquatic***- physical conditions and water quality associated with the water in the stream channel;
2. ***Habitat: Riparian***- physical conditions and vegetation community characteristics in the floodplain;
3. ***Species: Aquatic*** - plant and animal species associated with the water in the stream channel;
4. ***Species: Riparian*** - plant and animal species in the floodplain.

Based on available data, each stream was evaluated for the number of attributes that were positive. An attribute was considered positive if the data indicated the characteristic contributed positively to the quality of the habitat.

Crucial Species and Habitats

Based on the available information for several identified key species, species complexes, and habitats in the South Fork Snake River Basin, reaches were also assessed for presence and current status of crucial species and habitats. These "key" species or habitats were selected on the basis of ecological importance as noted by biologists. These species and habitats include the following:

- Unique riparian ecosystem (cottonwood *Populus angustifolia* gallery forest; or spring-fed system)
- Yellowstone cutthroat trout (*Oncorhynchus clarki Bavaria*)
- Fine-spotted cutthroat trout (*Oncorhynchus clarki* ssp.)
- Bald eagle (*Haliaeetus leucocephalus*)
- Breeding birds (predominately land birds, few water birds)

Results

Both components of the evaluation were considered to determine if a reach possessed outstanding biological values. Reaches with outstanding biological values fulfilled the following criteria:

Table 22. Summary of Outstanding Resource Evaluation for the South Fork Snake River Basin.

STREAM REACH	FISH & WILDLIFE	SCENIC	RECREATION
Bear Creek	✘+		✘
Big Elk Creek			
State line to T1S, R46E, NW ½ Sec. 17	✘	✘	✘
T1S, R46E, NW ½ Sec. 17 to high water of reservoir	✘		✘
Black Canyon	✘		✘
Burns Creek (tributary to Palisades Reservoir)	✘		✘
Burns Creek (tributary to main stem)	✘+	✘	✘
Cress Creek	✘	✘	✘
Elk Creek (tributary to Bear Creek)	✘		✘
Fall Creek			
Headwaters to Forest Road 058	✘+		✘
Forest Road 058 to mouth	✘+	✘	✘
Indian Creek (tributary to Palisades Reservoir)	✘		
Indian Creek (tributary to main stem)	✘		✘
Iowa Creek (tributary to McCoy Creek)	✘		✘
Jensen Creek (tributary to McCoy Creek)	✘		✘
Little Elk Creek			✘
Little Kelly			
Headwaters to T4N, R41E, NW ½ Sec. 29		✘	
McCoy Creek	✘+		✘
Mike Spencer Canyon			✘
Palisades Creek			
Headwaters to Palisades Campground	✘+	✘	✘
Palisades Campground to mouth	✘		
Pine Creek			
Headwaters to No Cut Timber Canyon	✘+		
No Cut Timber Canyon to Mouth	✘+	✘	
Pine Creek, North Fork	✘+		✘
Pine Creek, West Fork	✘+		✘
Pritchard Creek			
Headwaters to BLM Boundary	✘		✘
BLM Boundary to mouth	✘		
Rainey Creek			
Headwaters to Forest boundary	✘+		✘
Forest boundary to mouth	✘+		
Sheep Creek			✘
South Fork Snake River			
State line to confluence of Salt and South Fork Snake rivers	✘		✘
Confluence of Salt and South Fork Snake rivers to Palisades Dam	✘	✘	✘
Palisades Dam to Irwin footbridge	✘		✘
Irwin footbridge to Henrys Fork confluence	✘	✘	✘
Tie Creek (tributary to Pine Creek)	✘		
Trout Creek	✘+		✘
Warm Springs	✘		
Waterfall Canyon	✘	✘	✘
Wolverine Creek	✘		✘

✘ = Stream reach evaluated as having outstanding resource values for the resource indicated.
✘+ = Includes perennial tributaries.

Figure 19

Waterways with Outstanding Resource Values

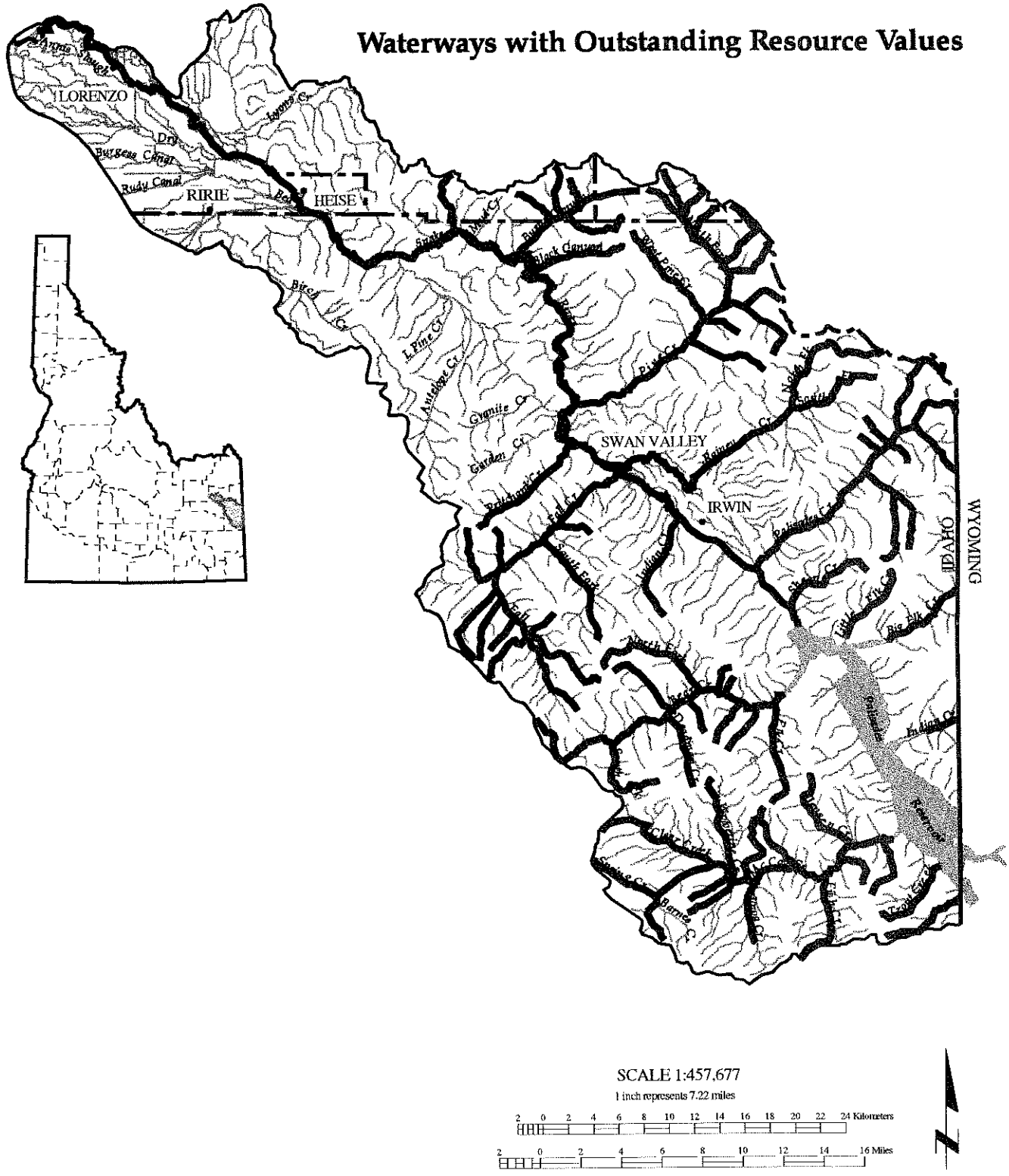


Table 23. River Biological Screening Process Criteria

HABITAT--Aquatic

1. Bottom substrate type (observe in channel-forming pool tail-outs [at least 1/3 of stream width] and low gradient riffles): cobble and boulders dominant; fine sediment not dominant
2. Instream cover: large woody debris and/or undercut bank
3. Instream habitat: complexity of stream channel habitats present (riffles [or bends], runs, pools)
4. Water quality: at least one of the following DEQ classifications apply to study reach :
   - Meets all beneficial uses
   - Water quality criteria/standards satisfied
   - Outstanding Resource Water
   - Special Resource Water
5. Crucial spawning habitat

HABITAT--Riparian

6. Bank stability: vegetation canopy and roots cover majority of bank and no slumping or eroding occurs
7. Riparian vegetation cover: dominated by shrubs and/or trees
8. Special management areas:
   - Area of Critical Environmental Concern
   - Pioneer Area
   - Priority Wetlands
   - Research Natural Area
   - Recovery Area
   - Special Interest Botanical Area
   - Wild & Scenic River or eligible
   - Wildlife Refuge
   - Wildlife Management Area
   - Wilderness Area or proposed

Crucial wildlife habitat:

9. wintering
10. migratory/roosting

SPECIES--Aquatic

11. IDFG fishery management classification; at least one of the following IDFG fishery classifications applies to study reach:
    - Trophy
    - Preservation
    - Quality
    - Wild Trout
    - Anadromous
12. Fish species richness: diversity (no. species with balanced abundances) relatively high
13. Fish species composition: predominantly native or game species
14. Aquatic insect composition: predominantly species of low pollution/sediment tolerance (e.g., mayflies, stoneflies, caddisflies, etc.)

Rare aquatic biota:

15. Federal listed species
16. Conservation Data Center listed species

SPECIES--Riparian

17. Riparian species richness: diversity (total no. species with balanced abundances) relatively high
18. Riparian species composition: predominantly native species

Rare riparian biota:

19. Federal listed species
20. Conservation Data Center listed species

- at least 50 percent of the available data was positive (all reaches evaluated met this criteria); and

- the presence of at least one of the following crucial habitats or sensitive species: unique riparian ecosystem, active cutthroat spawning or rearing, active eagle nesting, or unusually high breeding bird diversity.

Reaches identified with biologically outstanding values using these criteria are summarized in Table 24.

RECREATION EVALUATION

The recreation evaluation focused on recreational opportunities occurring within specific river or stream reaches. The evaluation entailed identification of recreation units; analysis

Table 24. Summary of Outstanding Biological Resources for Stream Reaches in the South Fork Snake River Basin.

REACH	River Biological Screening Process[1]	Crucial Species and Habitats[2]	Outstanding Biological Values
Burns cr. (res trib)	18/20	√	Spawning tributary with good population of cutthroat trout; bald eagle foraging habitat
Trout Cr.	16/20	√	Spawning tributary with good population of cutthroat trout
McCoy Cr. (incl. Fish Cr.. & other perennial trib.)	10/16	√	Important spawning tributary with strong population of cutthroat trout; bald eagle foraging habitat
Bear Cr. (incl. Elk Cr. and other perennial tributaries)	12/18	√	Important spawning tributary with strong population of cutthroat trout; bald eagle foraging habitat
Indian Cr. (res tributary)	16/20	√	Spawning tributary with good population of cutthroat trout
Big Elk Cr.	17/20	√	Spawning tributary with good population of cutthroat trout; bald eagle foraging habitat, kokanee spawning
Little Elk Cr.	10/10		
Palisades Cr. (incl. headwaters trib., perennial trib..)	12/16	√	Important spawning tributary with strong population of cutthroat trout; bald eagle foraging habitat
Indian Cr. (river trib)	9/11	√	Spawning tributary with good population of cutthroat trout
Fall Cr. (incl. perennial trib.)	9/14	√	Disjunct population of cutthroat
Rainey Cr. (inc. perennial trib..)	7/11	√	Important potential spawning tributary with good population of cutthroat trout; bald eagle foraging
Pritchard Cr.	7/11	√	Spawning tributary with good population of cutthroat trout
Pine Cr. (incl. West & North Pine Cr, Tie Cr., and other perennial trib.)	10/15	√	Important spawning tributary with strong population of cutthroat trout; bald eagle foraging habitat
Black Canyon	17/20	√	Spawning tributary with good population of cutthroat trout
Warm Springs Cr.	16/20	√	Spawning tributary with good population of cutthroat trout; unique spring-fed aquatic community and riparian cottonwood gallery forest with good structural diversity; bald eagle foraging habitat
Burns Cr. (incl. perennial trib.)	15/20	√	Important spawning tributary with strong population of cutthroat trout; mature, healthy riparian community with good structural and species diversity; bald eagle foraging
Wolverine Cr.	16/20	√	Spawning tributary with good population of cutthroat trout; bald eagle foraging habitat
Antelope Cr.	6/11		
Cress Cr.	10/14	√	Unique spring-fed riparian community with good structural diversity
Palisades Reservoir	11/11	√	Bald eagle nesting
S Fk Snake R: Palisades Dam to Irwin	14/18	√	Bald eagle nesting; important cutthroat trout rearing habitat
South Fork Snake R: Irwin to Conant Valley (Granite Cr.)	15/17	√	Bald eagle nesting; above average breeding bird diversity; important cutthroat trout rearing habitat, mature, healthy riparian community with good structural and species diversity
South Fork Snake R: Conant Valley to Black Canyon	15/17	√	Bald eagle nesting; above average breeding bird diversity; important cutthroat trout rearing habitat, mature, healthy riparian community with good structural and species diversity
South Fork Snake R: Black Canyon to Heise gaging station	13/17	√	Bald eagle nesting; mature, healthy cottonwood gallery forest; above average breeding bird diversity; important cutthroat trout rearing habitat
South Fork Snake R: Heise gage station to Heise Br	10/16	√	Bald eagles perching;;mature, healthy cottonwood gallery forest; important cutthroat trout rearing habitat
South Fork Snake R: Heise Br to Henry's Fork confluence	16/18	√	Bald eagle nesting; mature, healthy cottonwood gallery forest; important cutthroat trout rearing habitat

[1] = Total no. of positive attributes / Data available of maximum 20 attributes [2] = ✓indicates presence of crucial species or habitat

of the recreational diversity and importance of each recreation unit; and categorization of a final evaluation value for each unit (outstanding, high, or moderate to low).

The river reaches within the South Fork Snake River Basin were grouped into segments or discrete recreation units delineated on the basis of land use patterns, access and/or recreational use patterns. Each recreation unit was individually evaluated for recreational diversity and the importance of recreational opportunities. Specific recreational features of these units are summarized in evaluation forms located in IDWR files.

Recreational diversity is a measure of the variety of recreational opportunities available in the recreation unit. Three criteria were assessed to arrive at a diversity value: 1) identification of land-based and water-based recreation opportunities, 2) natural features, and 3) level of access.

Land-based and water-based recreation activities occurring within the river corridor were identified through review of agency documents and maps describing recreation facilities, and communications with various agencies and user groups. Land-based activities include camping, hiking, or hunting. Water-based recreation includes fishing, swimming and boating.

Natural features were identified which enhance recreation opportunities or experiences. These include description of water characteristics influencing the type of boating activity possible; summary of the aesthetic values of the unit; and identification of special fish and wildlife habitat characteristics providing increased opportunity for wildlife observation or other wildlife-related recreation.

Level of access was described to provide information regarding the types of recreational activities possible, potential use volume, and opportunities for primitive or isolated versus a more developed recreation experience.

Recreational importance was determined through review of three criteria: 1) unique or rare features which may enhance the recreation experience such as high quality fisheries or wildlife habitat; 2) public concern for the recreational values of the unit (determined from public and advisory group input, and agency consultation; and 3) special designations and/or agency recreation management objectives.

The final recreation evaluation class for each recreation unit was based on a combined assessment of diversity and importance.

A recreation unit evaluated as outstanding: a) provides significant recreation opportunities encompassing a great diversity of activities; b) provides a unique or rare experience within the region or basin; and/or c) receives the highest use.

A recreation unit evaluated as high is characterized by river segments: a) receiving high use; b) providing a high diversity of recreational opportunities; and/or c) providing an important recreation experience which is unique but typical for the region.

Moderate to low designations define those river segments with: a) recreational opportunities typical in the region; b) receiving moderate to low use; and/or c) having moderate to low recreation diversity.

Table 25 (pages 68 and 69) summarizes the recreation evaluation for river reaches evaluated in the South Fork Snake River Basin. The evaluation focused on the main stem of the South Fork Snake River and thirty major tributaries. Many stream reaches in the basin lacked sufficient data to evaluate recreation opportunities and were not evaluated.

SCENIC VALUES EVALUATION

The objective of the scenic values evaluation was to determine the distinctiveness or scenic quality of landscape settings. The evaluation involved two steps. One was to categorize landscapes along stream reaches into individual visual units. The second was to evaluate the scenic distinction or aesthetic value of these

visual units to identify outstanding scenic landscapes.

Delineating Visual Units

A visual unit defines a landscape area with similar spatial characteristics such as landform, vegetation, water form, or cultural modifications (Tetlow and Sheppard, 1980). Noticeable changes in these characteristics significantly changing the viewing experience defines the boundary between visual units. Visual units provide a frame of reference to later evaluate the scenic value of landscape features.

Visual unit boundaries were determined by considering a river or stream as a linear viewing corridor or series of viewing experiences. The outermost boundary of the unit is defined by the edge of canyon walls, or the extent of the viewshed. Any distinct or conspicuous change in landscape elements significantly changing the viewing experience as one progressed along the corridor marks the boundary between visual units. In the South Fork Snake River Basin, visual unit boundaries generally indicate changes in the stream pattern or water characteristics (i.e., free flowing water versus reservoirs, single channel versus braided, or flowing versus cascading); differences in canyon wall scale and enclosure; presence of unique landforms; changes in density and types of vegetation patterns; and/or changes in the degree or type of land use patterns.

Visual unit boundaries were delineated during site visits conducted from 1993 to 1995. Information was recorded on maps and through photography. Forms were also completed in the field and later photographic documentation reviewed to record landform, vegetation, water character, cultural modifications and other characteristics for each unit. Boundaries were drawn on 7.5 minute U.S. Geological Survey quadrangle maps and checked against orthophotoquads to verify accuracy.

The scenic evaluation focused on the main stem of the South Fork Snake River and major tributaries. Of the sixteen streams evaluated for scenic values, sixty-nine visual units were identified. Not all tributaries were evaluated, especially if access was difficult. The entire tributary was not evaluated if time did not allow access to the entire stream. This was the case for the headwaters of several streams. Streams that extended into Wyoming were only evaluated for scenic values within Idaho.

Scenic Distinction Evaluation

Each visual unit was evaluated for scenic distinction. Scenic distinction is a measure of the aesthetic quality of a landscape from a regional perspective. This evaluation must consider the landscape features within the context of the region or physiographic province that it occurs. Therefore, landscape elements for the South Fork Snake River Basin are evaluated relative to typical landscape features in Eastern Idaho and not Northern Idaho.

The Forest Service and BLM have established procedures for measuring the aesthetic quality of landscapes (BLM, 1986; Forest Service, 1974). Scenic distinction for the South Fork Snake River Basin used the scoring presented in Table 26, page 70. This table was developed by the BLM for use in evaluating scenic quality of public lands, and uses criteria similar to the Forest Service system. The model assesses the degree of variety a landscape possesses. The premise behind this chart is that all landscapes have scenic value, but areas with the most variety or harmonious composition have the greatest value (BLM, 1986; Forest Service, 1974).

The degree of visual variety and harmonious composition of seven factors (landform, vegetation, water, color, adjacent scenery, scarcity and cultural modifications) is evaluated using a numeric rating system. Each component comprising the landscape is evaluated individually, using a value of one to five (with the exception of cultural modifications which are rated -4 to 2) to rate the amount of variety,

Table 25. Recreation Evaluation Criteria and Results for the South Fork Snake River Basin.

Outstanding Significant recreational opportunities available as indicated by a great diversity of activities; unique or rare experience; and/or highest use areas.	**Bear Creek** *(Headwaters to high water of reservoir)* - significant diversity of recreational opportunities; one of the few areas in the state to participate in general bull elk hunting **Big Elk Creek** *(State line to high water of reservoir)* - unique opportunity to observe and fish for kokanee; one of the few areas in the state to participate in general bull elk hunting **Black Canyon** *(Headwaters to mouth)* - one of the few areas in the state to participate in general bull elk hunting **Burns Creek** *(Headwaters to mouth)* - one of the few areas in the state to participate in general bull elk hunting; high motorized use trail **Cress Creek** *(Headwaters to mouth)* - high quality spring-fed stream ecosystem providing unique education opportunities to the area; high use which is increasing yearly **Elk Creek** *(headwaters to mouth)* - one of the few areas in the state to participate in general bull elk hunting **Fall Creek** *(Headwaters to mouth)* - one of the few areas in the state to participate in general bull elk hunting; highest hunter densities in the basin **Indian Creek** *(Tributary to main stem)* - one of the few areas in the state to participate in general bull elk hunting **Iowa Creek** *(Tributary to McCoy Creek)* - Historic mining town, Caribou City, determined eligible for the National Register, planned for interpretation **Jensen Creek** *(Tributary to McCoy Creek)* - one of the few areas in the state to participate in general bull elk hunting **Little Elk Creek** *(headwaters to mouth)* - one of the few places in Idaho to hunt mountain goat; one of the few areas in the state to participate in general bull elk hunting; **McCoy Creek** *(Headwaters to mouth)* - one of the few areas in the state to participate in general bull elk hunting; highest fishing pressure of all tributaries in the basin **Mike Spencer Canyon** *(Tributary to Pine Creek)* - one of the few areas in the state to participate in general bull elk hunting **Palisades Creek** *(Headwaters to Palisades Creek Campground)* - unique opportunities -- easy access to high mountain lakes; wilderness setting; high use National Recreational Trail; one of the few areas in the state to participate in general bull elk hunting **Pine Creek, North and West Forks** *(Headwaters to mouth)* - one of the few areas in the state to participate in general bull elk hunting **Pritchard Creek** *(Headwaters to mouth)* - one of the few areas in the state to participate in general bull elk hunting in a isolated setting **Rainey Creek** *(Headwaters to Forest boundary)* - one of the few areas in the state to participate in general bull elk hunting **South Fork Snake River (Palisades Reservoir)** *(State line to dam)* - significant diversity of recreational opportunities; highest use destination reservoir in the state **South Fork Snake River** *(Palisades Dam to confluence with Henrys Fork)* - unique quality fishing opportunities which attract people nationally; fishing opportunities in both a roaded and unroaded setting; one of the few areas in the state to participate in general bull elk hunting **Sheep Creek** *(Headwaters to mouth)* - one of the few areas in the state to participate in general bull elk hunting **Trout Creek** *(Tributary to Palisades Reservoir)* - one of the few areas in the state to participate in general bull elk hunting **Waterfall Canyon** *(Tributary to Palisades Creek)* - Waterfalls, one of the few areas in the state to participate in general bull elk hunting **Wolverine Creek** *(headwaters to mouth)* - one of the few areas in the state to participate in general bull elk hunting

High River segments with a high use volume; high diversity; and/or a recreation opportunity which is unique but typical in the region.	None identified
Moderate and Low River segments with moderate to low use volume; moderate to low diversity of opportunities; and/or providing recreational opportunities typical and abundant within the region.	**Antelope Creek** *(Headwaters to mouth)* - moderate to low diversity of recreational opportunities **Indian Creek** *(tributary to reservoir)* - moderate/low diversity of recreational opportunities **Kelly Creek** *(Headwaters to mouth)* - moderate rating for uniqueness because of ski opportunities; moderate/low diversity of recreational opportunities **Little Kelly Creek** *(Headwaters to mouth)* - moderate diversity of recreational opportunities **Palisades Creek** *(Palisades campground to mouth)* - low diversity of recreational opportunities on private land **Pine Creek** *(Headwaters to Forest boundary* - moderate diversity of recreational opportunities **Pine Creek** *(Forest boundary to mouth)* - moderate/low diversity of recreational opportunities because of difficult access **Rainey Creek** *(Forest Boundary to mouth)* - moderate to low diversity of recreational opportunities **Sheep Creek** *(Headwaters to mouth)* - moderate diversity of recreational opportunities

contrast, harmony, or distinctiveness within the unit -- the higher the rating, the greater the variety or more distinctive the feature. Several factors are considered when evaluating these individual landscape features and are described below.

Landform - This component considers variation in topography. The more variation in topography the more interesting. Land forms perceived as outstanding or distinctive are steep, massive, severely eroded or sculpted, or have interesting rock formations and outcrops.

Vegetation - Evaluating the vegetation component of the landscape requires consideration of variety in patterns, forms and textures of plant material. Landscapes with several plant communities are usually considered more interesting than landscapes characterized by one type. The variety or diversity of plant material in an individual plant community is also considered.

Color - Color is evaluated with respect to harmony, vividness and contrast in the landscape setting. In the South Fork Snake River Canyon, the vivid green of vegetation provides a pleasing contrast against the dark basalt of the cliffs. Landscapes with muted colors or monotonous color schemes are rated lower. It is important to consider seasonal variations such as peak autumn color and wildflower displays.

Water form - Water is an ingredient that adds movement or serenity to a scene. The degree that water dominates the scene is the key in rating its contribution to the scenic value of the landscape. Studies in which observers are asked to rate the quality of the scenery have consistently found that scenes with water are always rated higher than scenes without. This makes it more difficult to differentiate scenic values for a river basin study when water is present in all landscapes. The primary criterion is movement or dominance of water in the landscape. While water within the canyon would tend to dominate the desert landscape, in the context of the South Fork Snake River Canyon slow moving water (typically found in reservoirs) would be considered less interesting than water characterized by more visible movement such as rapids and falls, or with interesting patterns such as braiding or extensive meanders.

Table 26. Scenic Distinction Evaluation Criteria

LANDFORM	High vertical relief; severe surface variation; detail features dominant 5	Steep canyons; variety in shape and pattern of landforms; detail features not dominant 3	Low rolling hills; flat valley bottoms; few or no interesting land features 1
VEGETATION	Variety of vegetation types in interesting forms, textures, and patterns 5	Some variety in vegetation, but only one or two major types 3	Little or no variety in vegetation 1
WATER	Clear and clean; cascading whitewater; dominant feature in landscape 5	Flowing or still, but not dominant in landscape 3	Absent, or present but slack water or slow moving 0
COLOR	Rich color combination; vivid color; pleasing color contrasts 5	Some intensity or variety in color and contrast, but not dominant element 3	Subtle color variations or contrasts; generally mute tones 1
ADJACENT SCENERY	Adjacent scenery greatly enhances visual quality 5	Adjacent scenery moderately enhances overall visual quality 3	Adjacent scenery has little or no influence on overall visual quality 0
SCARCITY	Very rare in region; consistent chance for exceptional wildlife, wildflower viewing, etc. 5	Distinctive, although somewhat similar to others in the region 3	Interesting within its setting, but fairly common within the region 1
CULTURAL MODIFICATIONS	Modifications add favorable to visual variety while promoting visual harmony 2	Modifications add little or no visual variety and introduce no discordant elements 0	Modifications add variety but are very discordant and promote strong disharmony -4

SOURCE: BLM, 1986.

Adjacent scenery - The influence of adjacent scenery can be an important consideration for landscape settings which by themselves are not considered to have high scenic value, but provide a frame for some spectacular adjacent scenery.

Scarcity - Landscape scarcity considers situations where a number of not so spectacular elements in an unusual or unique combination may produce a memorable scene, or gives added value to unique features that are rare such as plant communities or geological features.

Cultural modifications - Alterations to the landscape may detract from the scenery, but also may enhance. For example, studies in Arizona showed that agricultural landscapes were rated higher for scenic value than the natural creosote flatlands. The key is whether the development is harmonious using materials that blend with the landscape or contrast in a positive way. A cultural modification that would be considered to be positive would use materials that mimiccolors, textures, form and line found in the surrounding landscape setting. Agricultural settings tend to enhance the scenic value of some landscapes.

Using these concepts, a scenic distinction evaluation was completed for each visual unit identified in the South Fork Snake River Basin. A narrative description of each element was prepared and each element given a numerical rating. A final rating is derived by totaling the scores for all seven landscape features. This score determines the scenic distinction category:

class A = outstanding - scores of 32 to 19
class B = high - scores of 18 to 12
class C = moderate/low - scores of 11 or less

Table 27 describes the scenic distinction evaluation results for the South Fork Snake River Basin. Evaluation forms (available in IDWR files) describe the landscape features and document the scoring for each visual unit.

Table 27. Results of the Scenic Evaluation for the South Fork Snake River Basin.

SCENIC DISTINCTION CATEGORY	STREAM REACH
Class A = Outstanding Landscapes with significant variety in landscape features; and/or possessing distinctive or unique, rare features (received a score of 32 to 19).	South Fork Snake River (Confluence of Salt and South Fork Snake rivers to Palisades Dam; one-mile west of Idaho-Wyoming state line) South Fork Snake River (Irwin footbridge to Henrys Fork confluence) Big Elk Creek (State line to T 1 S, R 46 E, NW ½ of Sec. 17) Burns Creek (T 4 N, R 43 E, SE 1/4 of Sec. 28 to Beartrap Canyon Cress Creek Fall Creek (Forest Road 058 to mouth) Little Kelly Creek (Headwaters to T 4 N, R 41 E, NW ½ of Sec. 29) Palisades Creek (Headwaters to Palisades Creek campground) Pine Creek (No Cut Timber Canyon to mouth) Waterfall Canyon
Class B = High Landscapes with moderate variety in landscape features (received a score of 18 to 12).	South Fork Snake River (Palisades Dam to Irwin footbridge) Antelope Creek Bear Creek Big Elk Creek (T 1 S, R 46 E, NW ½ of Sec. 17 to mouth) Fall Creek Indian Creek (reservoir tributary) Kelly Creek (Kelly Ski Area to Little Kelly Creek confluence) Little Kelly Creek (T 4 N, R 41 E, NW ½ of Sec. 29 to mouth) Lyons Creek (Headwaters to T 4 N, R 41 E, SE 1/4 of Sec. 5) Lyons Creek (Herbert to T 4 N, R 40 E, SE 1/4 of Sec. 10) McCoy Creek Palisades Creek (Palisades Creek campground to Highway 26) Pine Creek (North Fork Pine Creek confluence to No Cut Timber Canyon) Rainey Creek Sheep Creek
Class C = Moderate to Low Landscapes where characteristic features possess little variety (received a score of 11 or less).	South Fork Snake River (State line to Salt and South Fork Snake rivers confluence) Kelly Creek (Headwaters to Kelly Ski Area) Kelly Creek (Little Kelly Creek confluence to mouth) Lyons Creek (T 4 N, R 41 E, SE 1/4 of Sec. 5 to Herbert) Lyons Creek (T 4 N, R 40 E, SE 1/4 of Sec. 10 to Bench) Pine Creek (Headwaters to North Fork Pine Creek confluence)

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ISSUES, CONSIDERATIONS, AND PLAN OBJECTIVES

Local Issues

In February and March 1995, public meetings were conducted in Irwin, Victor, Ririe and Idaho Falls to inform the public about preparation of a South Fork Snake River Comprehensive State Water Plan. The public was asked to identify issues, values and solutions. Comments were recorded for meeting participants' response to the following discussion topics:

- Identify values you would like to see protected, sustained or improved in the future. (Values may be lifestyle opportunities or experiences, or features found in the basin.)
- Identify specific concerns, problems or changes relative to water policy and management that need to be addressed in the South Fork Snake River Comprehensive State Water Plan.
- Suggest specific development, improvement, conservation and/or preservation actions to maintain values you have identified, or to address concerns and issues you noted.

The South Fork Snake Advisory Group reviewed the comments received and provided some additional suggestions. Over 200 comments were received. These comments were reviewed, consolidated and summarized under eleven categories. A summary of public comment received is contained in Appendix B.

To help focus the scope of the plan and set priorities for future public meetings, the advisory group reviewed the issues listed under the eleven categories, and ranked each on a scale of 1 to 5. Issues were ranked for how important they were, and how much effort the advisory group should devote in addressing the issue. The remainder of the planning effort for the basin focused on the top ranked issues for each category. These are summarized by category below.

WATER QUALITY

Water quality concerns focus mainly on potential threats from residential development in the corridor and basin. There is serious concern about the potential pollution of the shallow alluvial aquifer and river from increased densities of septic systems with new development. Soil surveys for Swan Valley, Conant Valley and Ririe identify high water tables and associated soils as a severe limitation for construction of sanitation facilities in some areas (SCS, 1979 and 1981a).

Development pressures have also resulted in removal of riparian vegetation along the river which can act as a filtering buffer. Concerns are that increased removal of vegetation and replacement with turf may lead to contamination to the river from fertilizers and herbicides used on the more manicured landscapes. Increased activities along the shoreline are feared to lead to increased sedimentation in waterways.

Other water quality issues include questions about current monitoring of water quality and communication with the public about the results. The public wants to ensure that water quality is regularly monitored to identify problems as they occur, and that they are kept apprised of the status of water quality in the basin. Concerns about sanitation management of recreation use in the canyon were also expressed.

FISHERIES

The South Fork Snake River has a significant cutthroat fishery as described in the *Fish and Wildlife* section. The river is considered one of the top 100 trout fisheries in the nation, and attracts anglers from around the world.

Commercial outfitters depend on the fisheries and have seen a 68 percent increase in business between 1990 and 1994 (IOGLB, 1995). Angling use by private individuals has also increased, resulting in concerns about the effects of increased pressures and over harvest.

The public expressed a desire to maintain the quality of the fishery and the fishing experience. Maintenance of the river fishery depends on spawning access to tributaries, recruitment of juveniles back to the river, and survival of juveniles through the fall and winter period (Wright, 1996). Threats to the future of the South Fork Snake River fishery include reductions in habitat quantity and quality.

One important issue is maintenance of winter habitat which is dependent on flows. Research conducted by Schrader and Griswold (1994) determined a flow of 1,500 cfs from October 1 to March 30 to be the biological minimum flow for sustaining the cutthroat fishery population in the South Fork Snake River Basin. In dry years, these flows have not occurred as water is stored in Palisades Reservoir to ensure the reservoir fills to provide irrigation water in the coming season.

RIPARIAN MANAGEMENT

The cottonwood riparian forest and other riparian vegetation along the South Fork Snake River and tributaries contributes to the wildlife and scenic values of the basin. The riparian forest along the South Fork Snake River is the largest stand of narrowleaf cottonwood in the Intermountain Region (Riggin and Hansen, 1992). Maintenance of this habitat is critical to the survival of the bald eagle, breeding bird diversity, and other wildlife values (Swenson, et al., 1986; Saab, 1991; and BLM and Forest Service, 1991).

Concerns focused on the decline in vigor and size of cottonwood stands. Cottonwood regeneration is dependent on flood events large enough to move sediment (Merigliano, 1996). Construction of Palisades Dam has changed river flows and reduced the volume of flood events. The need to explore options for improving cottonwood regeneration was expressed.

Development occurring along the river corridor poses additional threats to the viability of riparian habitat because of native vegetation removal. Bonneville County and Jefferson County require 80-foot and 75-foot setbacks from the highwater mark, respectively (Bonneville County Commissioners, 1995; Jefferson County Planning Commission, 1988). The setback applies to structures and does not prevent alteration to vegetation. Some are concerned that development along the river corridor would inhibit the possibility of providing flows to benefit riparian habitat.

WILDLIFE

Wildlife concerns involve maintaining the vitality of the bald eagle population and Canada geese nesting success. Potential threats to the bald eagle population include: loss of cottonwoods important for nesting habitat, increase in residential development and associated removal of cottonwood habitat, disturbance from increased recreational use, and winter flows and icing which hinder access to food.

The nesting success of Canada geese is dependent on the timing and magnitude of spring releases (Riggin and Hansen, 1992). Canada geese nest on islands on the main stem. Low flows result in predation of nests; high flows flood nests.

RECREATION

The South Fork Snake River offers a variety of quality outdoor recreation opportunities, including fishing, hunting, scenic boating, hiking, skiing, biking and camping. Recreation activity in the basin is increasing as the area population expands and the South Fork Snake River is discovered by people from outside the area. Increased use results in conflicts between different user types, including motorized and non-motorized users, commercial outfitters and the public, and resident and non-resident recreationists.

River flows are regulated by releases from Palisades Reservoir predominantly governed by irrigation and flood control objectives. Recreation opportunities and the quality of the recreation experience are dependent on the quantity and timing of these releases. The public has expressed concerns about changes to the quality of the outdoor recreation experience from increased recreational use and timing of river flows. Others believe construction of Palisades Reservoir and controlled releases have improved recreation opportunities and the experience.

Additional issues mentioned include boater safety near the Great Feeder. Several boaters have been swept through the head gates and injured. An irrigation storage project has been proposed in the past at Burns Canyon (also known as the Lynn Crandall Project) which would inundate the unroaded canyon reach of the South Fork Snake. This project was listed in the Board's 1992 *Idaho State Water Plan* as a potential storage reservoir site. Many citizens expressed concern about the effects to recreation opportunities and the fishery if Lynn Crandall dam were constructed.

GROWTH AND DEVELOPMENT

Land development in the basin raises many concerns. More than 50 platted subdivisions have been inventoried in the South Fork Snake River Basin at the end of 1995. Most of these are concentrated in Swan Valley, Irwin and the north perimeter of Palisades Reservoir. A few are above the canyon east of Ririe and a few are located along the Dry Bed. Local communities are concerned about the rising property taxes and the burden to provide fire and other services with increased populations.

Relative to water management, the public has significant concerns about water quality impacts. With increased housing densities and septic systems, there are concerns that ground water and eventually the river will become contaminated. Many expressed a desire to see a community sewage system built to minimize impacts to water quality. However, the costs associated with constructing a system are a limiting factor.

Most concerns involving land development focus on the river corridor, particularly private land development in the canyon. The effects to natural resource values described earlier in this plan are a concern. Many comments expressed a desire to restrict development to maintain riparian vegetation, wildlife and fishery habitat, recreation opportunities, and scenic values. Coupled with concern for controls on development adjacent to the river are concerns about restrictions to private property rights.

Some comments concerned additional water development options in the basin. Several sites have been investigated for potential hydro development or storage projects in the past. These include the Lynn Crandall site located on the South Fork Snake River at the Burns Creek confluence. Comments were expressed supporting and opposing construction of the Lynn Crandall Project.

AGENCY MANAGEMENT

Public comment focused on the numerous entities managing resources in the basin, frustration at the lack of coordination, and the desire for management decisions to be based on good science and information. The Board also received public comment supporting and opposing state protection designation for rivers and streams in the basin. Some comments mentioned support or opposition to wild and scenic designation for the South Fork Snake River.

WATER ALLOCATION

Water allocation concerns the distribution and use of water in the basin. Some members of the public are concerned about the possibility of zero flows below Palisades Dam and the resulting adverse effects. A desire was expressed to find more flexibility in management of the river and allocation of water to achieve a balance in meeting the needs of all water users. Suggestions were provided for ways to coordinate water management to ensure sufficient flows to protect all users. The need to protect existing water rights and diversions, and acknowledge other

legal constraints, is also an important consideration.

OPERATION OF PALISADES

Most comments addressed the desire to see some flexibility in the operation of the system to meet multiple demands. Some members of the public wanted to see adjustment to timing and flows to meet multiple needs, including irrigation, flood management, protecting private property, fisheries, wildlife, cottonwood regeneration and recreation.

IRRIGATION

Some individuals expressed the desire to see improved irrigation efficiency with the objective of making conserved water available for other uses and needs such as instream flows. Others noted that water conserved from irrigation may result in undesirable consequences such as reduction in recharge to the aquifer. Concerns were also expressed that actions and recommendations pertaining to irrigation issues must not impact existing water rights and access to maintain diversion structures.

FLOOD MANAGEMENT

Flood protection in the South Fork Snake River Basin is provided by two upstream reservoirs (Palisades and Jackson Lake) and flood control levees downstream of Heise. With the increased development occurring along the river corridor, the public expressed concern about development in floodplains. Development along the river encroaching into the flood area may reduce the volume of flood stage flows and affect the USBR's ability to manage floods without property damage. Damage from flooding might result in increased costs to taxpayers.

The levees constructed below Heise were designed to accommodate regulated flows of 30,000 cfs. However, deposition in the river channel raises the height of the river bed and reduces the capacity of these levees to accommodate floods. There is a concern that the current levee system will need to be raised or expanded to provide continued protection in this reach of the South Fork Snake River. This has become an expensive practice in the Jackson, Wyoming area where levees are expanded to protect residences. Many felt the current levee system should not be expanded to protect additional lands.

Institutional Constraints And Opportunities

Other state, federal, and local entities have major roles in the regulation and management of water and land use. Comprehensive plan consistency with other plans is one factor among several considered by the Board in its policy decisions. Several city, county, state, and federal planning documents produced in recent years concern the South Fork Snake River Basin. These have been taken into consideration in the development of the South Fork Snake River Basin Comprehensive State Water Plan. Some provide a framework for which actions and recommendations contained in the Board's plan must be compatible. Many present opportunities to implement actions and recommendations proposed by the Board for the South Fork Snake River Basin.

SNAKE RIVER REGULATION

Operation and Management of the Upper Snake System and Palisades Reservoir

Palisades Reservoir is one component of the Upper Snake Reservoir System operated by the USBR. The system includes five storage reservoirs in Idaho and two in Wyoming (Figure 20; Table 28). These seven reservoirs have a total storage capacity of 4.37 million acre feet, and supply 1.31 million acres of agricultural land with either a full or partial irrigation water supply (USBR, 1996). Operation of Henrys Lake, owned by the North Fork Reservoir Company, is coordinated with the USBR reservoirs. The Upper Snake Reservoir System is operated primarily for irrigation and flood control with power generation, recreation, fish and wildlife being secondary. Operation of Palisades

Figure 20

Upper Snake Reservoir System

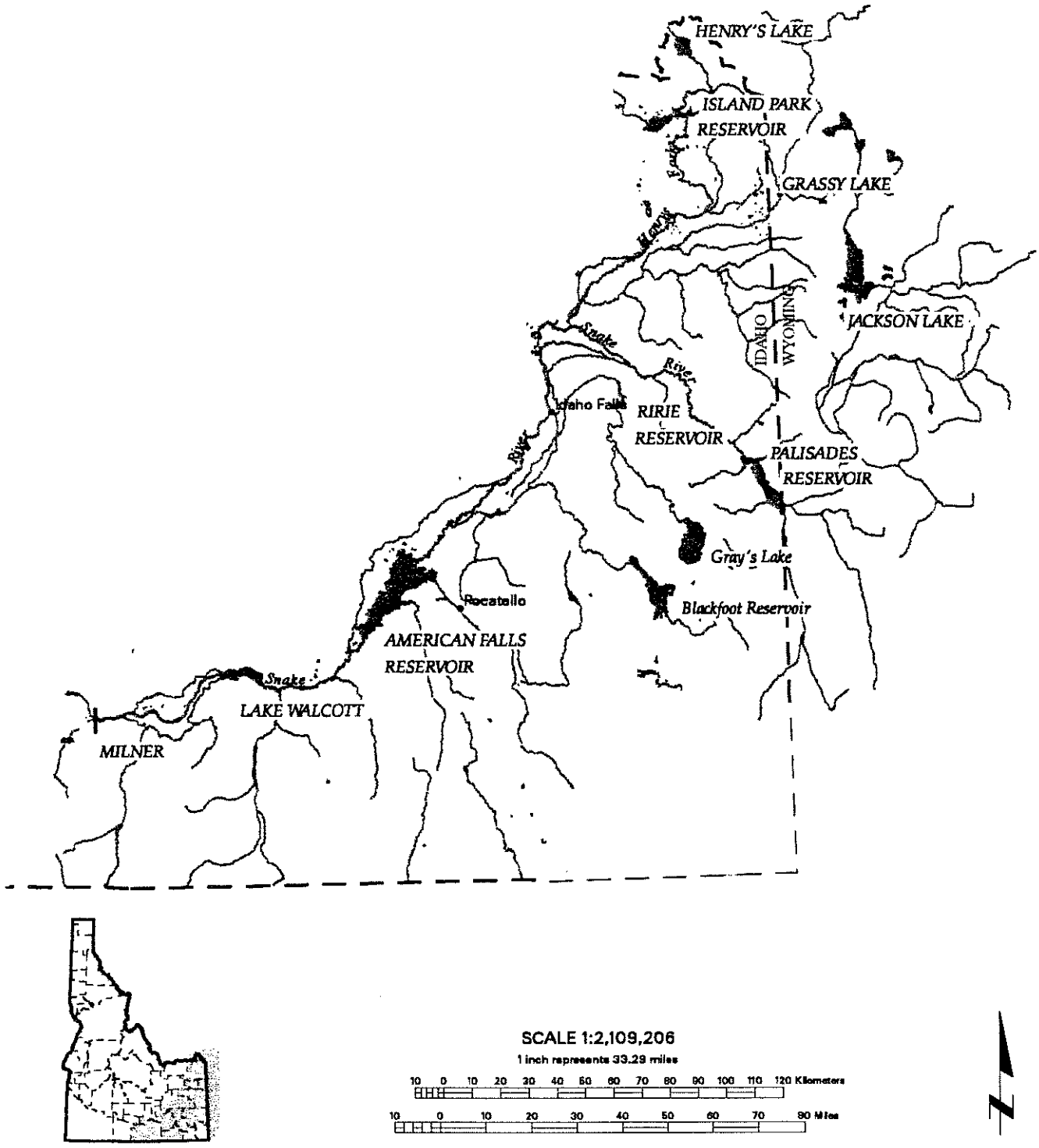

Table 28. Upper Snake System Federal Reservoirs

Reservoir	Total Storage (AF)	Active Storage(AF)	Storage Rights Priority Dates
Jackson Lake	847,000	847,000	1906, 1910, 1913
Palisades Reservoir	1,401,000	1,200,000	1921*, 1939
Ririe Reservoir	90,500	80,500	1969
Grassy Lake	15,470	15,200	1936
Island Park	135,586	135,205	1921, 1935, 1940
American Falls	1,672,590	1,672,590	1921*, 1921
Lake Walcott	210,200	95,200	1909

* Winter Water Savings Contracts, see page 79.
Source: USBR, 1996.

and the other Upper Snake reservoirs is controlled by several factors: 1) appropriation, use and distribution of water must comply with state water law; 2) contractual obligations to space holders must be fulfilled; and 3) projects must be operated in a manner consistent with congressional authorization for the project.

The Upper Snake Reservoir System is operated as a unified storage system, storing and releasing water to maximize the capability of the reservoirs. Two major system operation principals are followed: 1) water is stored as far upstream as possible, and 2) water is released first from the reservoirs that are easiest to refill (USBR, 1996). Palisades Reservoir is the second-highest storage reservoir on the main stem of the Snake River and is operated for a variety of purposes, including irrigation water storage, flood control, and power production.

Irrigation water is stored as far upstream as possible. Releases are made as needed through the summer and fall to meet irrigation demands, and to move water downstream to American Falls Reservoir. Water demand is determined by weather, crop consumptive use requirements, and cropping patterns. Irrigation releases are determined by the water rights available to meet the needs of approximately 50 canals (USBR, 1996).

The reservoirs act to hold flood waters upstream and release the water gradually over time. The required space needed for flood control storage is determined by rule curves which indicate how much space must be available in a reservoir based on date and runoff forecast. Forecasts are determined by observed precipitation and runoff, snowpack moisture, and historical conditions. During the fall, reservoirs are lowered and maintained to provide adequate storage for possible rain-on-snow events. After January, space is maintained according to the quantity of anticipated inflow from spring runoff.

Refilling the reservoir for irrigation is balanced with flood control objectives. Providing too much flood control space jeopardizes reservoir refill, and placing too much emphasis on reservoir refill jeopardizes flood control operations. Jackson Lake, Palisades Reservoir and Ririe Reservoir provide major flood control for the Upper Snake watershed above Milner Dam. Palisades Reservoir is managed in conjunction with Jackson Lake to limit flood flows to 20,000 cfs at the Heise stream gage (USBR, 1996). Jackson Lake provides 25 percent of the flood control space and Palisades Reservoir provides 75 percent of the needed flood control space (CoE, 1988). Ririe Reservoir, located to the south of the South Fork Snake Basin, is operated to limit Willow Creek flows to 1,200 cfs, providing additional flood protection to Idaho Falls, Ammon, Iona and Ucon (USBR, 1996; Federal Emergency Management Agency, 1981). Other reservoirs above Milner incidentally provide flood control space.

Power production at Palisades Reservoir is secondary to irrigation storage and flood control operations. Whenever possible, water releases for irrigation or flood control are diverted through the powerhouse, but water is not released

specifically for power production (USBR 1996). During the period of 1992 to 1994, the power plant was upgraded from the original 119.9 MW capacity to a 176.6 MW capacity, an increase of 49 percent. During the Federal Fiscal Year 1995, the Palisades Power plant produced 176,000 MW-hours of electricity (USBR, 1995).

Winter releases from Palisades Reservoir are established early in November based on carryover storage and fall inflow. The usual minimum winter outflow is 1,100 - 1,200 cfs, however, during drought years the winter flow has been as low as 550 cfs (USBR, 1996). If carryover storage is large, higher releases may be made around the end of the calendar year to create or maintain storage space for flood control operations. Average winter releases are 2,260 cfs (USBR, 1996).

The amount of water available in the entire Upper Snake System and the amount of carry-over from the previous year impact the timing and volume of flood control and irrigation releases. The management of the system and Palisades Reservoir is modified according to the amount of available water. If the spring runoff forecast is low, the amount of water drawn down for flood control will be less than normal, increasing the chance of refilling the reservoir. If the spring runoff forecast is higher than normal, the amount of flood control storage space must be increased to allow for flood control operations.

A water rights accounting system is maintained by the Water District 01 watermaster to ensure that the storage and use of water is properly accounted to the appropriate space holders, regardless of where the water is physically stored or actually released. This allows the system to be operated more efficiently than if water were physically stored according to the storage right priorities. A space holder contract is the purchase of a certain amount of reservoir storage space, not a contract to deliver a specific amount of water. Under this system, space holders can retain unused stored water from one year to the next, however, the total amount of water cannot exceed the volume of the contracted space. There are 52 entities with storage space contracts in Palisades Reservoir (USBR, 1996).

Some storage water rights in Palisades Reservoir are "winter water savings" rights. Water users ceased diverting water in the winter in exchange for an earlier storage priority date in the reservoir (USBR, 1996). Those entities with winter water savings rights must not divert water during the winter or they will lose their early priority date.

Water District 01 Water Rental Pool

The Idaho Legislature provided the Idaho Water Resource Board with the authority to operate a water bank in 1979. Water bank rules and regulations were adopted in 1980 and revised in 1991 and 1992. A water rental pool has been in existence in the Upper Snake River Basin since 1919. Prior to 1979 it operated on an informal basis. The Board designated the Committee of Nine as the local entity to operate the rental pool for Water District 01. The Committee of Nine is an advisory committee representing major irrigation entities in the district.

The Upper Snake pool is the largest and most active water bank in Idaho. Since 1979, an average of 388,000 AF of space has been placed in the rental pool, and an average of 135,000 AF of yield has not been leased (Sutter, 1995). Of the total 2,252,921 AF of yield placed in the rental pool from 1987-1994, 28 percent has not been leased. However, in 1992, the sixth year of a continuous drought, only 4,652 AF of yield was placed in the Upper Snake Rental Pool, while requests for irrigation water far outstripped supply.

The primary purpose of the Upper Snake Rental Pool is to meet the needs of irrigation water users within Water District 01. First priority is given to irrigators with storage rights in USBR reservoirs. Secondary priority for irrigators using water in the USBR project area. Other beneficial uses are given a lower priority. The largest purchaser of District 01 rental pool water prior to 1991 was Idaho Power. Since then the USBR has been the largest purchaser, using

the water to meet salmon flow augmentation objectives. This is discussed in the next section.

The water bank provides flexibility in the system by allowing entities that are in short supply to lease water. Leasing water from the rental pool has been suggested as an opportunity to provide instream flows for fishery and other resources benefitting from instream flows. However, water rental for these purposes would be a low priority.

Endangered Species Act and Salmon Flow Augmentation

The USBR is directed by the biological opinion issued by the National Marine Fisheries Service on March 2, 1995 to provide water from storage to augment river flow during periods of downstream salmon migration. The Idaho Legislature passed a resolution in 1996 that opposes flow augmentation as a long-term solution for salmon recovery. However, the resolution set conditions under which the USBR may release up to 427,000 AF each year from its projects on the Snake River for flow augmentation through 1999.

The Governor has created an "Idaho Policy" that requires an annual assessment of whether water is available for flow augmentation. The policy seeks to balance the amount of water released from Idaho reservoirs with downstream actions that influence fish passage at Snake and Columbia River dams.

USBR operations at Jackson and Palisades dams impact the South Fork Snake River Basin. The USBR controls approximately 4,000 AF of uncontracted space in Jackson Reservoir and 10,500 AF of uncontracted space in Palisades Reservoir. In dry years the USBR has released water normally held to increase head for power generation. Palisades contains 200,000 AF of space reserved for this purpose. It is questionable whether salmon flow augmentation is a legal use of powerhead water. The USBR purchases water from the District 01 Water Rental Pool and uses powerhead to meet salmon flows objectives.

Water Rights

Water rights are administered by the Idaho Department of Water Resources. They are issued by date of appropriation, for specific quantities, diversion points, places of use, and purposes. Idaho follows the Prior Appropriation Doctrine, best described as "first in time - first in right." Changes in water rights such as diversion points must be approved by IDWR. River regulation and appropriation of water must comply with Idaho water law.

Water stored in USBR reservoirs have two separate rights - the right to store and release water, and the right to divert water. Storage rights are associated with the storage facility and are usually held by the facility owner. Diversion rights for irrigation are appurtenant to the land and are often held by an entity such as a canal company. Both types of rights have specifications for purpose, amounts, site, and date of priority. The USBR holds the storage rights for Palisades Reservoir. Reservoir storage rights are satisfied in order of priority. A reservoir may have several priority dates, indicating that storage at the reservoir has increased, or natural flow rights were exchanged for storage rights.

Instream Flows

Except for salmon flow augmentation water, the USBR does not release storable water over Milner Dam that can be controlled above the dam (USBR, 1996). A minimum flow of zero is allowed for the Snake River at Milner Dam in the *Idaho State Water Plan*. This is recognition that flows have sometimes been reduced to zero at the dam. In licensing the Milner hydropower project, the FERC has specific "target flows" for the Snake River at Milner Dam of 200 cfs. The target flow must be satisfied only when water in excess of irrigation needs is available (FERC, 1990). Target flow may be acquired from Idaho Power Company storage in American Falls Reservoir, or may be leased from the Upper Snake Rental Pool.

In 1905, a 10-mile reach of the Snake River at Blackfoot had no streamflow for several days,

indicating that water demands were exceeding natural flow (Kjelstrom, 1992). The Minidoka Project was initiated to store excess winter and spring flows to alleviate water shortages (USBR, 1996). Releases for irrigation from Jackson Lake (constructed in 1907 and reconstructed in 1910), and later Palisades Reservoir, now enhance summer flows in the river at Blackfoot.

Snake River Compact

Allocation of Snake River water to the states of Idaho and Wyoming is contained in the Snake River Compact signed in 1949, and approved by Congress in 1950. The compact allocates 96 percent of the natural flow to Idaho and the remaining 4 percent to Wyoming for storage or direct diversion. Wyoming's portion is estimated at 200,000 AF based on run-off at the Idaho-Wyoming line.

The Wyoming portion of Snake River water may be diverted or stored by the state with no restrictions for 100,000 AF. Use of the remaining 100,000 AF by Wyoming requires replacement storage to benefit existing Idaho water users. Wyoming has contracted 33,000 AF of storage in Palisades Reservoir from the USBR as replacement storage to meet its obligations under the Compact. Wyoming may use this space by exchange to maintain higher lake levels in Jackson Lake or supplement low fall and winter flows below the lake.

Fort Hall Indian Water Rights Agreement

The Idaho Water Resource Board entered into negotiations with the Shoshone-Bannock Tribes of the Fort Hall Indian Reservation in 1985 concerning the extent of water rights of the Tribe. The negotiations led to ratification by Congress of the Fort Hall Indian Water Rights Act of 1990, adopted by the Idaho Legislature in 1991. The agreement quantifies the Tribes' water right claims above Hells Canyon Dam. Tribal water rights were quantified at 581,030 AF annually for present and future irrigation, DCMI, hydropower and stock water uses.

The agreement authorizes the Shoshone-Bannocks to operate a tribal water bank pursuant to state law. The Bank will be operated by a Tribal Rental Pool Committee. Only water accruing to the Tribes' 83,900 AF of space in Palisades Reservoir and 46,931 AF in American Falls Reservoir may be placed in the water bank. Rental of this storage space is subject to the terms of the Michaud Contract. Water users in the Fort Hall Indian Irrigation Project have a right of first refusal for any storage water available from the rental pool. Water that accrues to the Tribal storage space in Palisades may not be released for use past Milner. The Tribal water stored in American Falls Reservoir may be used below Milner Dam without refill penalties being incurred by the Tribe. The right to contract storage rights is the only Tribal water right located within the South Fork Snake River Basin.

Additionally, 100,000 AF of rental water from Palisades and Ririe reservoirs was allocated as mitigation water to non-Indian water users to compensate for impacts to existing water rights from the agreement. These water users have incorporated as Mitigation Inc. to manage this water. Water not leased by the water users is added to the water bank.

Snake River Resource Review

The USBR is currently conducting a comprehensive review of its operations and the resources in the Snake River Basin above Brownlee Dam. The main objective is to develop a decision support system to analyze operation of the system. The decision support system can help to explore how the system might respond to different management scenarios to meet traditional uses while responding to additional demands for water. The review is scheduled for completion in the year 2000. The resource review provides an opportunity to coordinate the information and recommendations developed during the Board's state water planning activities in the South Fork Snake River Basin with other agencies.

BUREAU OF LAND MANAGEMENT AND FOREST SERVICE MANAGEMENT

Snake River Activity/Operations Plan

The Snake River Activity/Operations Plan is a plan prepared jointly by the Idaho Falls District BLM and Targhee National Forest to ensure maintenance of the natural resources on federal lands along the South Fork Snake River (BLM and Forest Service, 1991). The plan was developed with the help of a fifteen-member Task Force to identify issues and problems, and provide ideas and suggestions. Management actions contained in the document are proposed to prevent degradation of resources, perpetuate the cottonwood ecosystem, and maintain current land uses. The objectives and goals contained in the Snake River Activity/Operations Plan and the South Fork Snake River Comprehensive State Water Plan support each other in maintaining the outstanding fish, wildlife, recreation and scenic values identified in the basin.

Targhee National Forest Plan Revision

The Targhee National Forest manages almost 65 percent of the lands in the South Fork Snake River Basin. The first Forest Plan for the Targhee National Forest was completed in 1985. A draft Environmental Impact Statement and Forest Plan Revision were released for public comment in early 1996. A final plan is expected in 1997. The Forest Plan Revision will guide all natural resource management activities, and establishes management standards, guidelines and prescriptions for the Forest over the next ten to fifteen years.

The draft plan proposes management goals and objectives that can lead to implementation of recommendations in the Board's South Fork Snake River Water Plan. Some of the goals and objectives proposed within the South Fork Snake River Basin include:

- continued implementation of the Snake River Activity/Operations Plan
- continued cooperation with other agencies to ensure cottonwood regeneration along the South Fork Snake River;
- silvicultural management to improve wildlife habitat;
- providing a variety of recreational activities ranging from motorized to primitive;
- maintaining scenic values in the South Fork Snake River Canyon;
- maintaining recreation values from Palisades Dam to Conant Valley;
- maintaining or enhancing bald eagle habitat, big game habitat, and improve goose nesting opportunities on the South Fork Snake River (Targhee National Forest, 1996b).

Wild and Scenic River Studies

The Targhee National Forest and Idaho Falls District BLM have conducted wild and scenic river studies for reaches in the South Fork Snake River Basin. The wild and scenic river study process involves two steps: 1) an eligibility analysis to determine if a river reach possesses the minimum criteria for further study as a potential wild and scenic river; and 2) a suitability study to evaluate if a river should be recommended for inclusion into the National Wild and Scenic River System. Three designations are possible, indicating the degree of development along the reach -- wild, scenic or recreational.

The Draft Forest Plan Revision prepared by the Targhee National Forest contains the results of a tentative eligibility determination. This analysis identified free-flowing river or stream reaches with "outstandingly remarkable" geologic, scenic, recreational, fish, wildlife, historic and/or cultural values. Additionally, the Medicine Lodge Resource Management Plan, completed by the BLM in 1985, conducted an eligibility study for the main stem from Palisades Dam to the Henrys Fork confluence (BLM, 1985). The results of the eligibility findings are summarized in Table 29.

The reaches found eligible will be managed to preserve those values contributing to eligibility. The agencies need to complete a suitability study prior to recommending

Table 29. Eligible Wild and Scenic Reaches in the South Fork Snake River Basin.

Reach	Location	Potential Classification	"Outstandingly Remarkable" Values
Forest Plan Revision*			
South Fork Snake River	Palisades Dam to Conant Valley power line	recreational	recreation, fish and wildlife
South Fork Snake River	Conant Valley power line to Lufkin Flat	scenic	recreation, scenic values, fish and wildlife
South Fork Snake River	Lufkin Flat to Riley Diversion	recreational	recreation, fish and wildlife
Big Elk Creek	Main stem and lower 2 miles of the 3 forks	wild	wildness, scenic values
McCoy Creek	Lower 3.5 miles	recreational	fisheries
Bear Creek	Main stem and North Fork and Deadman Creeks	recreational	fisheries
Palisades Creek	Confluence with North Fork Palisades Creek and Corral Canyon to Palisades Campground	wild	wildness, scenic values
Waterfall Canyon	Source to Upper Palisades Lake	wild	wildness, scenic values
Pine Creek	Tie Canyon to Forest boundary	recreational	fisheries
Burns Canyon	Crystal Lake to confluence with S Fk Snake River	recreational	fisheries
Medicine Lodge RMP			
South Fork Snake River	Palisade Dam to Conant Valley power line	recreational	
South Fork Snake River	Conant Valley power line to Riley Diversion	scenic	
South Fork Snake River	Riley Diversion to Henrys Fork confluence	recreational	

* Results of a tentative eligibility determination.

designation of eligible reaches as wild and scenic. Congressional approval is also needed for a river to become a part of the National Wild and Scenic River System. The Board encourages the Forest Service and BLM to work within the state planning process rather than pursuing federal protection of waters within the South Fork Snake Basin.

PALISADES WILDLIFE MITIGATION PLAN

The Pacific Northwest Electric Power Planning and Conservation Act of 1980 requires the Bonneville Power Administration (BPA) to mitigate for wildlife losses caused by hydropower dam construction and operation. Palisades Dam, constructed in 1956, inundated nearly 16,000 acres of wildlife habitat, including cottonwood forests, wetlands, agricultural lands and shrub-steppe (Riggin and Hansen, 1992). The BPA and IDFG prepared a South Fork Snake River /Palisades Wildlife Mitigation Project in 1986, identifying opportunities to compensate for loss of wildlife and habitat from construction and operation of Palisades Dam. BPA prepared an Environmental Assessment for the project, making a final decision to fund implementation of the project in 1995. Estimated total costs to implement mitigation for all components of the plan including big game, upland game, and waterfowl habitat is about $28 million (Ragotzkie, 1996).

The mitigation project focuses on habitat protection and enhancement measures to protect riparian habitat along the South Fork Snake, lower Henrys Fork, and Snake River upstream of Idaho Falls. Habitat is protected through acquisition of conservation easements or land from willing landowners through voluntary participation. Habitat enhancements would occur on public lands, including fencing riparian areas, grazing management, managing cottonwood forests for improved bald eagle nesting and winter habitat, revegetating areas for wildlife food and cover, supporting noxious weed control, and erosion control.

Currently, conservation easements are being pursued through 5 landowners covering about 2500 acres on the South Fork Snake River and

Pine Creek. Fee-title acquisition is being explored for about 150 acres on the South Fork Snake River (Ragotzkie, 1996). Coordination is also occurring with the BLM, Natural Resource Conservation Service, the Shoshone-Bannock Tribes and county weed supervisors to develop a biological noxious weed program on BLM and other public lands adjacent to the South Fork Snake River to control leafy spurge. This program provides opportunity to address some of the concerns about development and loss of wildlife habitat in the South Fork Snake River Basin.

IDAHO DEPARTMENT OF FISH AND GAME MANAGEMENT

In addition to its role in implementing the Palisades Wildlife Mitigation Plan, the IDFG is mandated to preserve, protect, perpetuate, and manage the fish and wildlife resources of Idaho. The Department's Fisheries Management Plan (1996-2000) contains several objectives that will support the Board's desire to protect the outstanding fishery in the basin. These include: preserving genetic integrity and population viability of native cutthroat trout; working cooperatively to obtain winter flows to enhance long-term population stability; and improving recruitment to the South Fork Snake River from tributary streams.

Additionally, the IDFG has the technical capability to conduct studies providing information necessary for the Board to pursue minimum stream flows for some important spawning tributaries in the basin. The IDFG responsibility in implementing the Palisades Wildlife Mitigation Plan will help in maintaining outstanding wildlife values identified in the basin.

SOIL CONSERVATION AND WATER QUALITY MANAGEMENT

Soil and water conservation districts are sub-units of state government managed by a local board of supervisors elected by local voters. The districts work with landowners on a voluntary basis addressing natural resource management in a site specific manner. Their activities help landowners and operators control soil erosion, and improve water quality and wildlife habitat. These objectives are accomplished with the aid of several partners including Natural Resources Conservation Service, Idaho Soil Conservation Commission, Idaho Association of Conservation Districts, and the Idaho Division of Environmental Quality.

The Natural Resources Conservation Service, an agency of the U.S. Department of Agriculture, provides on-site technical assistance to private landowners. Range and riparian improvements may be implemented through loans and grants available through the Idaho Soil Conservation Commission.

The Division of Environmental Quality (DEQ) maintains and enforces water quality standards. The DEQ makes grants to the soil and water conservation districts to assist in water quality plans, and for cost-sharing with farmers who apply Best Management Practices (BMPs). The East Side Soil and Water Conservation District has received funding for two State Agricultural Water Quality Program projects in the basin for agricultural land in the Antelope Creek and Granite Creek watersheds.

The DEQ has identified stream reaches in the South Fork Snake River Basin that are water quality limited (all beneficial uses are not being met) pursuant to Section 303(d) of the Clean Water Act. This designation requires development of Total Maximum Daily Loads (TMDLs) standards to control point and nonpoint pollution sources. Reaches are prioritized for development of TMDLs based on risks. All reaches in the South Fork Snake River were assigned a low priority, meaning although designated uses are not fully supported, the risk to human health and aquatic life, or recreational, economic and aesthetic values of the water body are minimal.

In 1995, the Idaho Legislature adopted water quality statutes to respond to 303d listings. The statutes implement a process to prioritize watersheds needing pollution management, and to develop water quality action plans through

community-based advisory committees. The approach was two-tiered, with Basin Advisory Groups (BAGs) developing recommendations to the Division of Environmental Quality regarding water quality standards and monitoring, pollution budgets and prioritization of impaired waters. Watershed Advisory Groups (WAGs) would develop and implement watershed action plans that would fulfill the TMDL requirement. The Upper Snake BAG covers the area including the South Fork Snake River Basin. The Upper Snake BAG has considered designating a South Fork Snake WAG to develop a TMDL plan for the South Fork Snake River Basin, but has not formally designated such a group.

The programs administered by the above-described entities offer opportunities to maintain water quality and other related goals in the basin. Availability of funding and personnel are important in the timeliness of the program implementation.

COUNTY LAND USE PLANS

Portions of three counties are located in the basin -- Bonneville, Jefferson and Madison counties. Each county has adopted, or is in the process of adopting, comprehensive land use plans and zoning ordinances. The comprehensive plans contain goals and policies directing the desired land use and activities in the county which are implemented through the ordinances.

Bonneville County adopted a comprehensive land use plan in 1995. The plan contains specific strategies for the Swan Valley area. Goals include maintaining existing agricultural lands; protecting water quality; permitting low density residential development that avoids sensitive areas; and preserving natural amenities (Bonneville County Commissioners, 1995). Buildings must be setback 75-feet from the highwater mark of waterways.

Jefferson County completed its comprehensive land use plan and zoning ordinance in 1988. Policies applicable to the South Fork Snake River Basin include the desire to preserve prime agricultural land; promoting housing development in areas capable of providing the utilities and services needed; preserving unique areas; encouraging compatible land uses in floodplains; and promoting development of floodways into linear parks and river access areas (Jefferson County Planning Commission, 1988).

Zoning is based on the size of the parcel. Parcels 20 acres or larger are zoned agricultural. The zoning category is intended to preserve agricultural and related uses, discouraging suburban development. Parcels from 5 to 20 acres in size are zoned agricultural residential. This zoning category was established to accommodate the transition from rural to low-density urban uses while maintaining agricultural uses. Parcels less than 5 acres are zoned residential. This zoning category requires a request for zoning change from commissioners. The minimum lot is 10,000 square feet. The zoning category provides minimum standards for residential single-family development. The county area in the South Fork Snake River Basin is predominately zoned agricultural (Smith, 1996). The zoning ordinance requires a 80-feet setback from the highwater mark of streams.

Madison County is currently conducting planning studies. The plan is comprised of three components -- a comprehensive land use plan, a zoning ordinance and subdivision ordinance. Public comment received at hearings for the comprehensive land use component are being evaluated. A hearing on the subdivision ordinance is scheduled in the immediate future. After hearings are conducted for a component of the plan, sections are submitted to the commissioners for review. A final set of hearings will be held before adoption by the county commissioners.

Depending on how these goals are interpreted and implemented, land use decisions made by counties can achieve some of the recommendations made by the Board in the South Fork Snake River Water Plan. Local citizens must continue to actively participate in hearings and make known their desires to county commissioners just as they have in helping the Board develop this plan.

Goals and Objectives

In adopting a comprehensive state water plan, the Board is guided by these criteria from the Idaho Code 42-1734A:

1. Existing rights, established duties, and the relative priorities of water established in the Idaho Constitution shall be protected and preserved.

2. Optimum economic development in the interest of and for the benefit of the state as a whole shall be achieved by integration and coordination of the use of water, the augmentation of existing supplies, and the protection of designated waterways for all beneficial purposes.

3. Adequate and safe water supplies for human consumption and maximum supplies for other beneficial uses shall be preserved and protected.

4. Minimum stream flow for aquatic life, recreation, aesthetics, and water quality, and the protection and preservation of waterways shall be fostered and encouraged. Consideration shall be given to the development and protection of water recreation facilities.

5. Watershed conservation practices consistent with sound engineering and economic principles shall be encouraged.

Specific goals and objectives for the South Fork Snake River Basin Plan reflect current local issues, current and future uses of water, and the natural resources of the basin. The top ranking issues identified by the public led to identification of a list of wants and needs, or desired outcomes, for the South Fork Snake River Basin. The South Fork Snake Advisory Group reviewed the desired outcomes at the March 1996 meeting, and developed a list of goals for each of the eleven issue categories. Goals are general statements about the outcome or desired future for the basin. Goals agreed to include:

Water Quality

1. Protect water quality of the South Fork Snake and all tributaries.
2. Accumulate data to allow monitoring and verification of water quality impacts.
3. Monitor and manage activities in the river corridor potentially impacting water quality to minimize pollution.
4. Minimize soil erosion.
5. Maintain or improve water in a biologically beneficial condition.

Fisheries

6. Maintain or improve the health of the cutthroat fishery.
7. Prevent over harvest of the fishery.

Riparian Management

8. Maintain or improve the health of the riparian area.

Wildlife

9. Maintain or improve wildlife habitat.
10. Recognize the value of waterfowl, wildlife and birds of prey.
11. Maintain or improve basin ecological integrity.

Recreation

12. Maintain or improve the quality of the outdoor recreation experience.
13. Maintain or improve the quality of the fishing experience.
14. Improve safety at the Big Feeder for boaters.

Development & Growth

15. Minimize or prevent adverse effects from development along the river corridor, particularly the canyon.
16. Protect private property rights.
17. Encourage citizens to be involved in the development or revision of county land use plans.

Agency Management

18. Management decisions should use the best available science.
19. Improve coordination among agencies, private landowners and the public in managing resources in the South Fork Snake River Basin.

Water Allocation

20. Work toward cooperation between all water users.
21. Look at ways to allow greater flexibility in allocating water to different uses and address the changing demands for water in the basin and state while respecting existing rights.
22. Identify areas where instream flows are appropriate.

Operation of Palisades

23. Balance flows and timing from Palisades Reservoir to meet the needs of irrigators, flood management, power generation, private property owners, fisheries, wildlife, cottonwood regeneration, and recreation.

Irrigation

24. Encourage irrigation efficiency.

Flood Management

25. Address future flood management in the South Fork Snake River Basin

Strategies Considered in Response to Issues, Concerns and Goals

Advisory group meetings focused on providing information and discussing the priority issues identified early in the process. The advisory group and public suggested strategies to address the issues and achieve goals. Strategies include actions, recommendations or policies that would accomplish the desired goal. Over an eight month period, the Board received more than 245 strategies from the advisory group, other members of the public, and agencies. These strategies represent the alternatives considered for the basin.

The advisory group, local citizens and agency representatives reviewed the alternative strategies. The group first conducted an evaluation of all the strategies, identifying those they could not support. Those strategies that received support by all were forwarded as recommendations to the Board. Strategies not receiving complete group support were discussed by meeting participants to determine if consensus could be reached by suggesting word changes or new strategies. When participants felt comfortable with a strategy it was added to a list of recommendations submitted to the Board. The recommendations supported by the Board are listed in the *Actions and Recommendations* section that follows. The strategies, or alternatives, considered are listed in Appendix C.

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ACTIONS AND RECOMMENDATIONS

A principal role of the Board is to establish water policy for the state, including the development of comprehensive water plans for specific geographic areas. In planning for the water resources of the state, the Board is charged with weighing and balancing competing uses and needs. Multi-objective resource planning necessarily involves making trade-offs aimed at achieving the best combination of objectives.

Actions and recommendations of the Board are consistent with the Idaho Code, private property rights, local and state management plans, and recognize public consensus achieved at South Fork Snake Advisory Group meetings conducted April, May and June, 1996. These actions and recommendations reflect the desires of local citizens of the basin and in the region. All local, state, and federal agencies are encouraged to administer their activities to help achieve the actions and recommendations contained in the Comprehensive State Water Plan for the South Fork Snake River Basin.

Actions

The South Fork Snake Plan comprised a review and analysis of the present and future needs and opportunities for fifteen resource categories[1] specified by the Idaho Legislature. A need was identified to provide for state protected river designation to protect current values for Idaho and to preclude federal designation.

STATE RIVER PROTECTION DESIGNATIONS

A comprehensive state water plan may designate waterways as "natural" or "recreational." As defined by the Idaho Code, a recreational or natural river is "a waterway which possesses outstanding fish and wildlife, recreation, geologic or aesthetic values" [Idaho Code 42-1731 (7) and (9)]. Natural rivers are free of substantial man-made development in the waterway, and the riparian area is largely undeveloped. Recreational rivers may include man-made development in the waterway or the riparian area. A designation is made only if the Board determines the value of preserving the waterway is in the public interest and outweighs developing the river for other beneficial uses.

It is the policy of the Board to amend a comprehensive state water plan when it determines that amendments are in the public interest. If development opportunities conflicting with the designation become available before a review period, an amendment to the plan can be requested. The Board will consider proposals for amendment to the South Fork Snake River Basin Water Plan from private parties as well as state agencies. In the event the Board determines that a proposal will not substantially impair the values which were the basis of a protected river designation, the Board shall amend the plan following the procedures required for the adoption of the original plan (Idaho Code, Sections 42-1734A and B).

The Idaho Water Resource Board considers the impacts of protected river designations on the social, economic and environmental livelihood of the region, and determines the value of preserving the outstanding waterways of the South Fork Snake River Basin with their current beneficial uses outweighs the value of further development at this time. The Board believes

[1] Resource categories include navigation; power development; energy conservation; fish and wildlife; recreational opportunities; irrigation; flood control; water supply; timber; mining; livestock watering; scenic values; natural or cultural features; domestic, municipal, commercial, and industrial water uses; and other aspects of environmental or economic development [Idaho Code 42-1734A(3)] .

state protected river designations are preferable to federal protection, and are in the best interest of the residents of Idaho. Federal protection limits the flexibility of planning for the reach, and removes the option of amending the designation by action of the Idaho Water Resource Board and Idaho Legislature. Federal agencies are encouraged to manage lands to compliment the state protection designations.

Pursuant to Idaho Code 42-1734A(6), the following activities are prohibited within the stream channel or below the highwater mark on the reaches designated "natural" rivers:

- construction or expansion of dams or impoundments;
- construction of hydropower projects;
- construction of water diversion works;
- dredge or placer mining;
- alterations of the stream bed; and
- mineral or sand and gravel extraction within the stream bed.

The Board determines which of the above prohibitions apply to rivers designated "recreational". Prohibitions for natural or recreational designations do not interfere with activities necessary to maintain and improve existing utilities, roadways, managed stream access facilities, diversion works, and for the maintenance of private property. State designation does not change or infringe upon existing water rights or other vested property rights. It does not restrict the expansion or maintenance of existing uses.

To protect the public interest, current resource use, and the multiple-use character of the basin, the Idaho Water Resource Board designates river/stream reaches as natural or recreational as indicated. The Board recognizes that no action using their comprehensive state water planning authorities can interfere with vested rights, or the repair, replacement, or continued operation of existing facilities and works.

Natural Rivers

The Board designates the following stream reaches as "natural" rivers:

Fish Creek (5.2 miles[2]): Headwaters to confluence with McCoy Creek

Big Elk Creek (4.5 miles): Idaho-Wyoming state line to 100 yards upstream of the Big Elk Creek trail head

Little Elk Creek (3.5 miles): Headwaters to confluence with Spring Run Canyon

Bear Creek and perennial tributaries (36.1 miles): Bear Creek from area where Skyline Road (Forest Road 077) no longer parallels the creek (located in T.2 S., R. 43 E., NE 1/4 of Section 20) downstream to Deadman Creek confluence, and the following perennial tributaries:

- South Fork Bear Creek: headwaters to mouth
- Deadman Creek: headwaters to mouth
- Chaparral Hollow: headwaters to mouth
- Warm Springs Creek: headwaters to mouth
- North Fork Bear Creek: headwaters to mouth
- Small Creek: headwaters to mouth
- Poison Creek: headwaters to mouth
- Currant Creek: headwaters to mouth
- Muddy Creek: headwaters to mouth

Palisades Creek and perennial tributaries (29.7 miles): Headwaters to junction with Forest Trail 099, and the following perennial tributaries:

- North Fork Palisades Creek: headwaters to mouth
- East Fork Palisades Creek: Idaho-Wyoming state line to mouth
- Corral Creek: Idaho-Wyoming state line to mouth
- Lost Spring Canyon: headwaters to mouth
- Dead Man Canyon: headwaters to mouth
- Little Dry Canyon: headwaters to mouth

[2]Mileage was calculated with a geographic information system using hydrography at a scale of 1:100,000.

- Dry Canyon: headwaters to mouth, including Upper Palisades Lake
- Water Fall Canyon: headwaters to confluence with Dry Canyon

Fall Creek and perennial tributaries (13.1 miles): Fall Creek from its headwaters to confluence with Trap Creek, and the following perennial tributaries:

- East Fork Fall Creek : headwaters to mouth
- Willow Springs Creek: headwaters to mouth

Pine Creek and perennial tributaries (2.8 miles): Pine Creek 100 yards downstream of power line crossing (located in T. 2 N., R. 43 E., Section 15) to confluence with South Fork Snake River

North Fork Pine Creek and perennial tributaries (15.0 miles): North Fork Pine Creek from its headwaters to confluence with Elk Flat Fork, and the following perennial tributaries:

- Elk Flat Fork: headwaters to mouth
- Holter Creek: headwaters to mouth
- Red Creek: headwaters to mouth
- Corral Creek: headwaters to mouth

West Pine Creek (5.2 miles): Headwaters, including unnamed headwater tributaries to 100 yards upstream of West Pine Girls Camp (located in T. 3 N., R. 44 E., NW 1/4 of Section 29)

Burns Creek and perennial tributaries (17.3 miles): Burns Creek from its headwaters (and including unnamed headwater tributaries) to the Burns Canyon trail head, and the following perennial tributaries:

- Beartrap Canyon: headwaters to mouth
- Little Burns Canyon: headwaters to mouth
- Jensen Creek: headwaters to mouth
- Hell Hole Canyon: headwaters to mouth

State "natural" designation does not change or infringe upon existing water rights or vested property rights.

Recreational Rivers

The Board designates the following river/streams as "recreational" rivers:

South Fork Snake River (63.9 miles): Palisades Dam to confluence with Henrys Fork

Burns Creek (*tributary to reservoir*) (4.7 miles): Headwaters to Idaho-Wyoming state line

Trout Creek (4.6 miles): Headwaters, including all unnamed headwater tributaries, to confluence with Palisades Reservoir

McCoy Creek and perennial tributaries (62.9 miles): McCoy Creek from its headwaters to back waters of Palisades Reservoir, and the following perennial tributaries:

- Spring Creek: headwaters to mouth
- City Creek: headwaters to mouth
- Clear Creek: headwaters to mouth
- Camp Creek: headwaters to mouth
- Wolverine Creek: headwaters to mouth
- Miners Delight Creek: headwaters to mouth
- Kirk Creek: headwaters to mouth
- Iowa Creek: headwaters to mouth
- Box Canyon Creek: headwaters to mouth
- Hell Creek: headwaters to mouth
- Jensen Creek: headwaters to mouth
- Bitters Creek: headwaters to mouth

Indian Creek *(tributary to reservoir)* (1.8 miles): Idaho-Wyoming state line to Smith Canyon

Big Elk Creek (0.4 miles): One-hundred yards upstream of Big Elk Creek trail head to backwaters of Palisades Reservoir

Little Elk Creek (1.1 miles): Confluence with Spring Run Canyon to the backwaters of Palisades Reservoir

Bear Creek and perennial tributary (16.4 miles): Headwaters to point where Skyline Road (Forest Road 077) no longer parallels the creek

(located in T.2 S., R. 43 E., NE 1/4 of Section 20), and from Deadman Creek confluence to backwaters of Palisades Reservoir, and the following perennial tributary:

- Elk Creek: headwaters to mouth

Sheep Creek (5.4 miles): Headwaters to confluence with South Fork Snake River

Palisades Creek (8.2 miles): Junction with Forest Trail 099 to confluence with South Fork Snake River

Indian Creek (*tributary to main stem*)(5.9 miles): Headwaters to confluence with South Fork Snake River

Fall Creek and perennial tributaries (39.3 miles): Confluence with Trap Creek to mouth, and the following perennial tributaries:

- Beaver Creek: headwaters to mouth
- Trap Creek: headwaters to mouth
- Haskin Creek: headwaters to mouth
- Camp Creek: headwaters to mouth
- Gibson Creek: headwaters to mouth
- Blacktail Creek: headwaters to mouth
- South Fork Fall Creek: headwaters to mouth
- Currant Hollow: headwaters to mouth

Rainey Creek and perennial tributaries (25.1 miles): Headwaters to confluence with South Fork Snake River, and the following perennial tributaries:

- North Fork Rainey Creek: headwaters to mouth
- South Fork Rainey Creek: headwaters to mouth

Pritchard Creek (6.5 miles): Headwaters to confluence with South Fork Snake River

Pine Creek and perennial tributaries (21.6 miles): Headwaters to 100 yards downstream of power line crossing (located in T. 2 N., R. 43 E., Section 15), and the following perennial tributaries:

- Tie Canyon: headwaters to mouth
- Poison Creek: headwaters to mouth
- West Pine Creek: one-hundred yards upstream of West Pine Girls Camp to mouth
- Mike Spencer Canyon: headwaters to mouth

North Pine Creek and perennial tributary (8.1 miles): Elk Flat Fork confluence to mouth, and the following perennial tributary:

- Lookingglass Creek: headwaters to mouth

Black Canyon (9.1 miles): Headwaters to confluence with South Fork Snake River

Warm Springs (0.2 miles): Source to confluence with South Fork Snake River

Burns Creek (0.6 miles): Burns Canyon trail head to confluence with South Fork Snake River

Wolverine Creek (3.4 miles): Headwaters to confluence with South Fork Snake River

Cress Creek (0.1 miles): Source to confluence with Sunnydell Canal

A recreational designation for the South Fork Snake River is not intended to prevent a water user from cleaning, maintaining, or replacing an existing water diversion structure. A water user may remove obstructions from the stream channel such as gravel bars, if the obstructions interfere with the delivery or use of water under any existing water right.

Activities prohibited on "natural" rivers are also prohibited on "recreational" rivers in the South Fork Snake Basin with the following exceptions:

- Alterations of the South Fork Snake River stream bed necessary to keep the river within its historical meander below Heise, or other similar activities necessary to fulfill the flood management responsibilities of Flood Control District No. 1 are allowed in the reach from Grassy Banks (one mile above Heise gage) to the confluence with the Henrys Fork. Such activities must comply with the Stream Channel Protection Act and the rules adopted to implement the act.

• Alteration of the stream bed for installation of fisheries enhancement structures is allowed on the following reaches designated recreational: Bear Creek, Big Elk Creek, Fall Creek, North Fork Pine Creek, Palisades Creek, Pine Creek, Pritchard Creek, and Rainey Creek. Alterations of the stream bed must comply with the Idaho Stream Channel Alterations Rules and Minimum Standards.

• Stream channel alterations are allowed for public agencies to reconstruct or realign recreation trails to prevent resource damage on the following reaches designated recreational: Cress Creek, Bear Creek, Trap Creek, South Fork Fall Creek, Palisades Creek, North Fork Pine Creek, and Rainey Creek. Alterations of the stream bed must comply with the Idaho Stream Channel Alterations Rules and Minimum Standards.

• Stream channel alterations are allowed for public agencies to reconstruct or construct new livestock bridges to prevent resource damage on the following reaches designated recreational: Bear Creek, South Fork Fall Creek, Lookingglass Creek and North Fork Pine Creek. Alterations of the stream bed must comply with the Idaho Stream Channel Alterations Rules and Minimum Standards.

• Stream channel alterations are allowed for temporary roads for vegetation management on Burns Creek (tributary to Palisades Reservoir). Alterations of the stream bed must comply with the Idaho Stream Channel Alterations Rules and Minimum Standards.

• Stream channel alterations for recreational dredge mining may continue on McCoy Creek from the headwaters to Fish Creek confluence, and on the following perennial tributaries: City Creek, Camp Creek, Miners Delight Creek and Iowa Creek. This activity is allowed as currently regulated by the Caribou National Forest through a Special Use Permit issued according to the guidelines established in the "Environmental Assessment for Small Placer Mining Operations in the Caribou Basin Area" (Record of Decision issued December 12, 1994), and with a Stream Channel Alteration Permit from the Idaho Department of Water Resources. Temporary diversions for the purposes of sluicing are allowed, but must obtain a Temporary Approval of Water Appropriation from the Idaho Department of Water Resources.

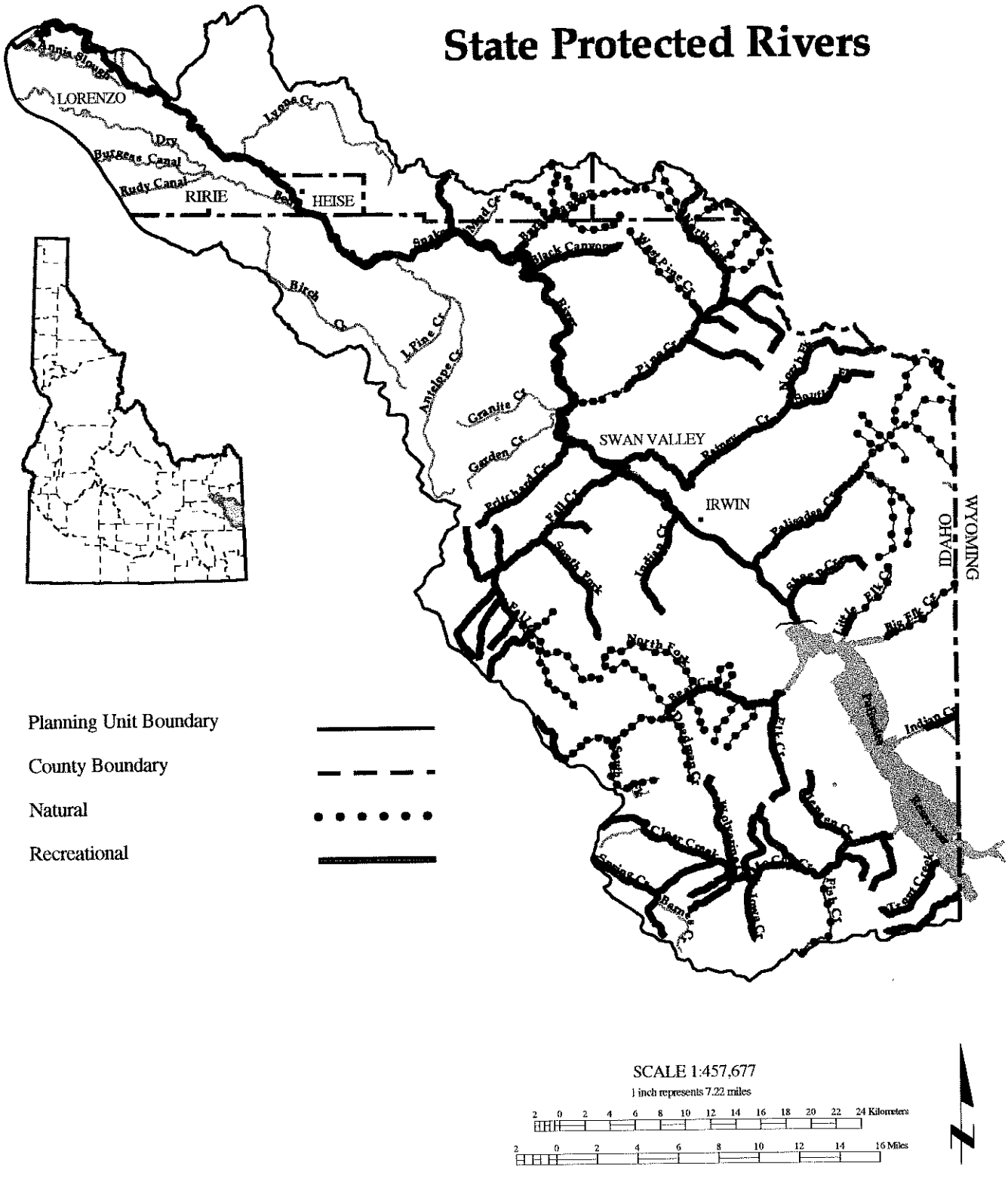
• Construction of boat ramps and docks may be allowed on the South Fork Snake River with Board and other regulatory agency approval for the reaches between Palisades Dam to Pine Creek confluence and Black Canyon to Henrys Fork confluence. Alterations of the stream bed must comply with the Idaho Stream Channel Alterations Rules and Regulations and Minimum Standards. This exemption does not apply to the reach between Pine Creek confluence to Black Canyon.

These prohibitions do not interfere with activities necessary to maintain and improve existing utilities, roadways, managed stream access facilities, diversion works, and for the maintenance of private property. State "recreational" and "natural" designation does not change or infringe upon existing water rights or vested property rights. Figure 21 shows the stream reaches with state protection designations.

MINIMUM STREAM FLOWS

It is the policy of Idaho that the Idaho Water Resource Board should seek to appropriate waters in the state for instream flow purposes when it is in the public interest. Idaho Code, Title 42, Chapter 15 provides the authority and spells out procedures for the Board to appropriate water for minimum streamflows. A minimum streamflow is a quantity of water, or lake level, in the public interest required to protect fish and wildlife habitat, aquatic life, recreation, aesthetic beauty, navigation, transportation or water quality. By law, a minimum streamflow is not an ideal flow, but the minimum necessary to achieve the objectives. The water right is held by the Board and is junior to all earlier water rights. It is not a guaranteed minimum flow, but is only achieved after senior water rights are fulfilled.

Figure 21


State Protected Rivers
LORENZO
RIRIE
HEISE
SWAN VALLEY
IRWIN
IDAHO
WYOMING
Planning Unit Boundary
County Boundary
Natural
Recreational
SCALE 1:457,677
1 inch represents 7.22 miles
24 Kilometers
16 Miles

In order for the Board to acquire a minimum streamflow, a process separate from the development of a comprehensive state water plan must occur. Studies to determine the quantity and timing of the minimum streamflow will need to be conducted. The Director of the Idaho Department of Water Resources determines whether the instream flow right is granted in accordance with Title 42, Chapter 25 of the Idaho Code. Legislative review of instream flow rights granted by the IDWR is required.

To protect fisheries values, minimum streamflow studies to identify critical reaches have been recommended for several important cutthroat spawning tributaries and for kokanee habitat on Big Elk Creek:

- Bear Creek
- Big Elk Creek
- Burns Creek
- Fall Creek
- Palisades Creek
- Pine Creek

Idaho Code requires specific data to support an application for a minimum streamflow. The Board currently does not have the data required by the Code to pursue minimum streamflows on the recommended streams. The Board recommends that IDFG, in cooperation with BLM and Forest Service, conduct studies to quantify flows and acquire other necessary information to process minimum streamflow applications for the above-mentioned streams within the next five years. If the appropriate information is available, and indicates a minimum streamflow is warranted, the Board will take action.

AMENDMENTS TO STATE WATER PLAN

The *Idaho State Water Plan* is a statewide policy plan initially adopted by the Board in 1976. This effort has evolved into a continuing process directed towards formulation, adoption, and implementation of water management policies which guide development, conservation and protection of the State's water resources. While the *Idaho State Water Plan* provides broad direction about water policy and management for the state, comprehensive state water plans provide more detailed guidance for specific basins or watersheds. During preparation of a component of the comprehensive state water plan, the polices in the *Idaho State Water Plan* are reviewed and amendments relative to that basin may be proposed.

The *Idaho State Water Plan* contains a policy which provides for protection of potential reservoir sites from significant land use change, and lists sites to reserve within Idaho (IWRB, 1992). The Lynn Crandall site on the South Fork Snake River near the Burns Canyon confluence was one of the sites identified. Information received at public meetings and recommendations from the South Fork Snake Advisory Group asked for removal of Lynn Crandall as a potential reservoir site in the *Idaho State Water Plan*. Some input was received supporting continued consideration of the site as a future storage site.

The public expressed concerns about impacts to the cutthroat fishery, wildlife, recreation and scenic values with construction of the Lynn Crandall project. The resource inventory and evaluation described in this plan document outstanding fish and wildlife, recreation and scenic values for this reach of the South Fork Snake River. Weighing the environmental and social values impacted by construction of Lynn Crandall, the Board has determined it is in the public interest to remove Lynn Crandall as a potential reservoir site from the *Idaho State Water Plan*. Additionally, the Board requests the USBR to relinquish land withdrawals reserved for the project site. The USBR filed a water right application for storage for the Lynn Crandall Project with IDWR having a 1969 priority date. No action has been taken to pursue a permit or license. The Board requests that the USBR withdraw this application.

Recommendations

The Board does not have the authority or funding to implement many of the recommendations contained in the Comprehensive State Water Plan. However, the Board does have the authority to establish water policy for the state, planning for the improvement, development and conservation of water resources. These plans are also submitted to the Idaho Legislature for review and ratification. The plan for the South Fork Snake River Basin was developed with significant input and participation by citizens and agencies. The Board requests the agencies and entities referenced implement the recommendations contained in the plan, and state agencies "exercise their duties in a manner consistent with the comprehensive state water plan" [Idaho Code 42-1734B (4)]. Federal agencies are encouraged to manage their lands in a manner consistent with the recommendations contained in this plan.

NORTHWEST POWER PLANNING COUNCIL (NWPPC) PROTECTED AREA DESIGNATIONS

The Board has designated the rivers listed on pages 89-91, and shown in Figure 21, as state protected rivers. The Board recommends that NWPPC actions be in accordance with these designations.

OPERATION OF PALISADES RESERVOIR

Discussion at advisory group meetings regarding instream flows below Palisades Dam did not result in consensus with final recommendations forwarded to the Board. However, many suggestions and ideas were presented that merit further exploration.

Much of the discussion about releases at Palisades Dam indicate a need for all water interests to gather collectively and discuss their concerns. The Board believes this approach would benefit water interests in the South Fork Snake River Basin. The Board recommends that the U. S. Bureau of Reclamation work cooperatively and meet at least semiannually (before and after the irrigation season) with all water interests in a facilitated forum to exchange information and ideas about releases from the Upper Snake System (including Palisades Dam). A watershed council could be the ideal forum to facilitate these meetings. Semiannual meetings would provide a means for all water interests to talk to each other and understand others' concerns. Water interests would have an opportunity to collectively evaluate options for water resource management within legal, administrative and operating constraints to maximize benefits for all interests. Some options that may be explored by this forum include:

Continued coordination and exploration of timing releases for objectives such as salmon flow augmentation, Idaho Power releases, and aquifer recharge to achieve other multiple benefits such as winter flows for the fishery, improving Canada geese nesting success, and providing recreation opportunities.

Explore opportunities to purchase water from the water bank to guarantee minimum winter flows for the fishery, and identify entities willing to do so.

The USBR's Snake River Resource Review Project provides an outstanding opportunity to model different management scenarios for the Upper Snake System. The project will develop a decision support system helping managers to analyze different operation alternatives for the Snake System above Brownlee Reservoir. The Board supports the cooperative efforts of the Idaho Department of Water Resources and the USBR to develop an improved river management decision-making system for the Upper Snake. The Board encourages an analysis of the potential risks associated with filling the Upper Snake System reservoirs under various release scenarios at Palisades Dam, including winter flows for fishery maintenance.

SNAKE PLAIN AQUIFER RECHARGE

The Snake Plain Aquifer provides an opportunity to store water for beneficial use. The Board makes use of water in the basin as part of

the recharge program. To efficiently manage the state's water, a technically sound, hydrologic-based aquifer recharge plan needs to be prepared. The plan needs to establish clear objectives for the recharge program, determine locations and timing to apply recharge water to maximize recharge objectives, and determine consistency with conjunctive management policies. As part of this effort, some of the constraints associated with winter water savings should be reexamined.

WILD AND SCENIC RIVER SYSTEM

The Forest Service and BLM have found the South Fork Snake River and other waterways in the basin eligible for further study as potential federal wild and scenic rivers. Because of the comprehensive scope of state water planning, the Board encourages the BLM and Forest Service to work within the state water planning process rather than pursuing federal protection of waters within Idaho. State water planning provides a means of ensuring coordinated water planning with federal and state governments. Additionally, the Board requests that the Forest Service and BLM manage lands in a manner compatible with state protection designations.

LAND DEVELOPMENT IN THE BASIN

Issues and concerns associated with land development pressures in the basin frequently were mentioned during public meetings. Although a priority issue, the advisory group did not have an opportunity to work towards agreement on recommendations for this issue topic. The Board believes that maintenance of the outstanding resource values inventoried in the South Fork Snake River Basin is largely dependent on the direction and character of future development. Counties and local communities have the most influence over the future character of the basin through their planning and zoning decisions.

The Board supports the efforts of county commissioners, community officials and planning departments to work closely with the public when making decisions about land use development in the South Fork Snake River Basin. Formation of a watershed council with active participation by local government may improve communication further, and help identify local concerns and goals to achieve the future landscape setting and community desired by the local citizens. The Board encourages the communities of Swan Valley and Irwin to work cooperatively in coordinating planning activities with each other and Bonneville County.

Cooperative agreements for watershed protection need to be established between developers, farmers, and land managers in the basin, to insure that the impending changes to the South Fork Snake River Basin do not have adverse consequences for the water quality and the biological communities. Increased urbanization, soil types and the hydrologic conditions of the basin indicate conventional septic systems will not be adequate. The Board recommends that counties investigate options for financing and constructing sewage systems in the Swan Valley, Conant Valley and Irwin areas to prevent pollution of ground and surface water.

It is recommended that authorities closely monitor permitting and installation of septic systems to ensure protection of the water quality of the South Fork Snake River and its tributaries. Site planning should consider the soil assimilative capacity in selecting lot sizes. Careful review and establishment of stringent guidelines by county officials and Health District VII personnel for implementation of sewage systems should continue. The IDWR and Health District VII should continue to coordinate installation and permitting of septic systems and wells to protect ground water in the basin.

FLOOD MANAGEMENT

As the basin sees an increase in population and development, potential impacts from flooding will increase. The counties and communities in the basin participate in the National Flood Insurance Program (NFIP). Participation has resulted in adoption of floodplain ordinances which outline land use measures to minimize flood damage. The Board encourages these

entities to continue their participation in the NFIP so that risks from flooding can be minimized, and land owners have the opportunity to purchase flood insurance. The Board encourages the counties and communities to continue to take responsibility for monitoring development in the floodplain to ensure floodplain ordinances are followed, and development does not increase potential flood damage.

Flood control operations of Palisades Dam are guided by flood control rule curves with a flood stage flow of 24,500 cfs (Beus, 1996). Flows in excess of 25,000 cfs at Heise have occurred on four occasions since construction of Palisades Dam (1957). The Board recommends development should not encroach into the area inundated by these flows to minimize flood damage.

The levees below Heise were constructed to provide protection for 100-year flood events. Deposition in the South Fork Snake River channel has, and will continue, to decrease the effectiveness of these levees to contain flows of 30,000 cfs (the 100-year flood event). Sustained high velocity flows may erode levees and increase flooding risks. Major river channel shifts could impinge the levees in this reach. Currently levee maintenance by Flood Control District No.1 has consisted of riprap repairs. Current values of lands adjacent to the levees are not high enough to justify significant investments for maintenance of the levee system. However, future development may increase land values and require more expensive options. The counties are encouraged to manage lands adjacent to the levees so that land values do not require expensive flood control measures. The Board recommends that the U.S. Corps of Engineers conduct a study to identify appropriate and cost-effective flood management options to address the issue of deposition in the river channel.

MANAGEMENT OF RECREATION RESOURCES

The demands on recreation resources in the South Fork Snake River Basin have increased significantly in the past five years. These demands are the result of the outstanding recreation opportunities available on the South Fork Snake River and the growing regional and local populations. The budgets of agencies responsible for managing recreation opportunities in the basin are not keeping pace with the demand, and many have experienced reduced budgets in recent years. In order to maintain the quality of the recreation experience and protect associated resources contributing to the experience, sufficient funding must be procured.

The Omnibus Consolidated Rescissions and Appropriation Act of 1996 provides authority for the BLM and Forest Service to manage recreation fee demonstration projects. The program would allow collection of fees, and return 100 percent of the revenues for the operation, maintenance, improvement and expansion of projects at the site of collection. The Board encourages the BLM and Forest Service, in cooperation with other state and county recreation management agencies, to explore the option of collecting fees for facilities along the South Fork Snake River corridor under this program. Revenues should be used to help offset the cost of operations, maintenance and enforcement in the river corridor, and protect outstanding resource values identified in the South Fork Snake River Plan.

SOUTH FORK SNAKE RIVER BASIN PLANNING BOUNDARIES

Public comment has identified some tributaries to the Salt River that would best be evaluated as part of the South Fork Snake River Basin. Adequate evaluation of these tributaries has not occurred as part of the Board's comprehensive state water planning process for the current effort. During the next review or revision to the South Fork Snake River Basin Comprehensive State Water Plan, the Idaho Water Resource Board will expand the planning basin boundaries to include tributaries to the Salt River originating in Idaho. The tributaries include: Jackknife Creek, Tincup Creek, Stump Creek, Tygee Creek, Crow Creek, Jack Creek and their tributaries.

ADDITIONAL RECOMMENDATIONS

The following recommendations were generated during South Fork Snake Advisory Group meetings conducted in April, May and June 1996. The recommendations that follow reflect strategies that received support during group discussions at advisory group meetings. The Board adopts these recommendations as part of the Comprehensive State Water Plan for the South Fork Snake River Basin.

Water Quality

1. Agencies and property owners are encouraged to use appropriate best management practices (BMPs) for all land uses. Soil conservation districts can encourage implementation of BMPs to minimize soil erosion appropriate to farming and grazing operation and needs.

2. Local soil conservation districts are requested to seek funding and identify additional drainages that could benefit from the State Agricultural Water Quality Program, promoting voluntary participation and local decision-making.

3. Soil conservation districts are asked to review the Conservation Reserve Program (CRP) to identify additional incentives for farmers to reduce erosion.

4. Land management agencies are encouraged to increase education and enforcement to reduce erosion from off-road vehicle use.

5. DEQ and IDFG are encouraged to continue to maintain or improve water quality in a condition suitable for the preservation of healthy populations of the native cutthroat trout.

6. DEQ and Health District VII are encouraged to study the impacts of possible pollution from septic tank discharge in the South Fork Snake River Basin. This would include determining appropriate housing densities and sanitation technologies given soils types and other relevant factors.

7. BLM and Forest Service requirements to pack out human waste in the canyon section of the South Fork Snake River should continue.

8. The soil and water conservation districts, landowners and a watershed council are encouraged to work together to retain Conservation Reserve Program (CRP) lands in grass cover after contracts expire, or determine other feasible alternatives.

9. Agencies collecting water quality data, including DEQ, IDWR, USGS, IDFG, and universities, are encouraged to develop a common database to allow sharing of information between agencies.

10. The Board supports citizen involvement in the formulation of water quality monitoring plans and reporting by DEQ and the Health District. These data should be reported regularly.

11. DEQ is encouraged to implement an appropriate water quality monitoring program to ensure that adverse water quality trends are detected in a timely manner.

12. The Idaho Department of Agriculture and canal companies are encouraged to educate people about the potential effects to downstream users of dumping into canals and other waterways.

13. DEQ, the Health District, and counties are encouraged to explore feasible options for counties in the basin to finance sewage systems for water quality protection.

14. Idaho Department of Agriculture is encouraged to educate pesticide users that any rinsing, dumping or spilling of pesticides into waterways is prohibited and can adversely impact water quality.

Fisheries

1. To safeguard against over harvest in the future while providing for increasing recreational demand, the Board supports IDFG efforts to continue focusing on trout habitat maintenance,

and increasing overall habitat quality and quantity. If over harvest occurs, Idaho Department of Fish and Game is encouraged to develop more restrictive regulations.

2. IDFG is encouraged to continue working with other land management agencies and land owners to increase spawning habitat by protecting spawning tributaries and screening tributary diversions.

3. The Board recommends the NRCS, IDFG and Trout Unlimited initiate further planning and evaluation of the Rainey-Palisades Creek irrigation project to determine if other alternatives are available to improve irrigation efficiency and fish passage. These entities should also explore cooperative funding options.

Riparian Management

1. Land management agencies are encouraged to educate the community about the importance of cottonwood regeneration.

2. The Board recommends the Legislature pass legislation to allow tax incentives for leaving riparian areas undeveloped, or improving riparian habitat and badly eroded areas.

3. Control noxious weeds through use of biological techniques by encouraging and supporting continued efforts by the South Fork Biological Weed Control Committee.

4. Recommend state and federal agencies, and local governments work cooperatively to identify options to preserve and enhance the cottonwood forest. Options to consider include fencing high use areas on the main stem or tributaries, beaver control, or creative land zoning.

5. The BLM, Forest Service and IDFG are encouraged to investigate the feasibility and expense of planting cottonwoods.

6. A cooperative study involving state and federal agencies investigating the feasibility of using flood flows to help promote cottonwood regeneration is recommended. Determine the most plausible flows that will not significantly impact property. Determine other beneficial and adverse impacts that would occur with these flows.

Wildlife

1. Encourage BLM, Forest Service, U.S. Fish and Wildlife Service and/or IDFG to install posters at boat put-ins to warn people about disturbing or harassing birds (especially bald eagles) and other wildlife.

2. The IDFG is encouraged to work cooperatively with USBR regarding releases to ensure Canada geese nesting success.

3. Organization by IDFG of an annual volunteer effort for regular maintenance of goose nesting boxes is recommended.

Recreation

1. Idaho Department of Parks and Recreation, county sheriffs, and boating organizations are requested to encourage, educate and promote proper boating etiquette on the South Fork Snake River. This could involve implementation of a program to help various recreation users resolve conflicts and learn to respect each other.

2. Legislation is needed allowing the Idaho Outfitters and Guides Licensing Board to issue larger fines to ensure strict enforcement of outfitter and guide regulations. Legislation should allow confiscation of property in addition to monetary fines for individuals who illegally practice outfitting.

3. The Board supports establishing a Memorandum of Understanding (MOU) between the Idaho Department of Fish and Game, Idaho Outfitters and Guides Licensing Board, U. S. Forest Service, Bureau of Land Management, and Bonneville County to coordinate efforts to enforce regulations for the outfitting and guiding industry and recreational activities on the South Fork Snake.

Agency Management

1. Concerned citizens are encouraged to establish a watershed council for the South Fork Snake River Basin to help coordinate management agencies' and local officials' activities and ensure that citizens' concerns are accommodated in the decisions. Membership and participation should be broad-based, including all interest groups and agencies.

Use the watershed council as a forum to:

- Establish agreements in cooperation with landowners along the river to protect water quality.
- Coordinate with landowners and agencies to resolve conflicts.
- Educate homeowners about the sources of pollution harmful to aquatic life, i.e., lawn chemicals, septic tank discharge, automotive and household fluids, and siltation.
- Educate landowners about the opportunity to obtain loans and grants from the Soil and Water Conservation Districts (through the Idaho Soil Conservation Commission) for range and riparian improvements.

2. The watershed council should explore funding opportunities to support council activities, including the availability of mitigation monies from the Bonneville Power Administration.

Water Allocation

1. Agencies and organizations desiring instream flows, such as IDFG and Trout Unlimited, are encouraged to explore ways to secure these flows. Options to consider might include buying reservoir storage space, purchasing from the water bank, and/or working with irrigators to identify minimum flows in the river.

Operation of Palisades Project

1. If possible within operating constraints, the USBR is encouraged to release water early enough from Palisades and Jackson dams with the goal of maintaining flows less than 18,000 cfs during July to enhance recreation.

2. Wildlife agencies and organizations are encouraged to work with irrigators and the USBR on any compromises to achieve flow rates to better balance wildlife needs.

3. The USBR is requested to establish ramping rate protocols for Palisades Dam that can be accommodated in system constraints.

4. The USBR is encouraged to manage releases from the Upper Snake projects to integrate flows needed for fisheries, recreation, wildlife and riparian habitat, in addition to irrigation and flood control objectives.

Irrigation

1. The IDWR is encouraged to quantify how improved efficiency effects aquifer recharge and water levels at wells and springs.

2. The watermaster and canal companies are encouraged to investigate options for improving voice messaging and posting messages over the weekend to Water District One to improve efficiency in managing water.

Flood Management

1. A study to address the high water table and flooding concerns in Ririe and surrounding areas is recommended.

2. Flood Control District No. 1 should maintain existing dikes/levees/riprap for property currently protected. Do not allow expansion of dikes/levees/riprap to make additional land available for development.

3. The counties are encouraged to discourage building in the floodplain.

4. The counties are encouraged to restrict development adjacent to the South Fork Snake River corridor that would infringe upon the U.S. Bureau of Reclamation's ability to release flood stage flows of 24,500[3] from Palisades Dam.

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[3] Source for 24,500 cfs flood stage flow is Beus, 1996.

Impacts of Actions and Recommendations

On waterway reaches designated natural, the Board must prohibit construction or expansion of dams or impoundments; construction of new hydropower projects; construction of water diversion works; dredge or placer mining; alterations of the stream bed; and mineral or sand and gravel extraction within the stream bed (Idaho Code 42-1734A(5)). This designation does not change or infringe upon existing water rights or other vested rights.

On waterway reaches designated recreational, the Board prohibits construction or expansion of dams or impoundments; construction of hydropower projects; construction of water diversion works; dredge or placer mining; and mineral or sand and gravel extraction. Within the stream channel, alterations would be prohibited except those necessary (1) to maintain and improve existing utilities, roadways, diversion works, fishery enhancement structures, and stream access facilities; (2) for the maintenance of private property; (3) for construction of new fishery enhancement facilities on Bear, Big Elk, Fall, North Fork Pine, Palisades, Pine, Pritchard and Rainey creeks; (4) for reconstruction or realignment of recreational trails on Cress, Bear, Trap, South Fork Fall, Palisades, North Fork Pine, and Rainey creeks; (5) for reconstruction or construction of new livestock bridges on Bear, South Fork Fall, Lookingglass and North Fork Pine creeks; and (6) for temporary roads for vegetation management on Burns Creek (tributary to reservoir). Recreational dredge mining is allowed on McCoy Creek when conducted in accordance with Special Use Permits granted by the Forest Service and the Stream Channel Alteration Permit program administered by IDWR.

Construction of private river access facilities (i.e., boat docks) on the South Fork Snake River may be allowed with approval by the Idaho Water Resource Board and other regulatory agencies for the following reaches: between Palisades Dam to Pine Creek confluence and between Black Canyon to Henrys Fork confluence. Construction must comply with the Idaho Stream Channel Alterations Rules and Minimum Standards. Private river access facilities are not allowed on the South Fork Snake River from Pine Creek confluence to Black Canyon.

No provision of the Comprehensive State Water Plan will limit, restrict, or conflict with approved applications for the appropriation of water or with any vested property rights, i.e. existing water rights, diversion, mineral rights, and other private property rights. No provision of this plan will prevent a water user or their agent from cleaning, maintaining, or replacing an existing water diversion structure. A water user or their agent may remove any obstructions from the stream channel, if such obstruction interferes with the delivery of, or use of, water under any existing water right. No provision of this plan is intended to interfere with the Flood Control District No. 1's maintenance of the levee system below Heise. Management of land adjacent to protected rivers remains the responsibility of the land owners or managers, and local planning authorities. Designation of waterways as protected rivers will not affect the operation or legal use of any existing hydropower project which does not enlarge existing boundaries or impoundments.

Changes in land use activities in the basin may result in requests for changes in nature of use, place of use, or point of diversion of existing water rights. These activities will require appropriate review and approval by the Idaho Department of Water Resources and may be prohibited if the Director determines changes are not in the public interest. The state protection designations, in addition to maintaining the outstanding fish and wildlife, recreation and scenic values identified in the basin, protect the current water uses in the basin.

Construction of Lynn Crandall would impound the canyon section of the South Fork Snake River and alter the hydrologic regime. This plan prohibits construction of this project. The opportunity to store water available in high water years, and maximize power generation at Palisades Powerhouse are lost. Changes in flow

below the dam and a change from a river to reservoir environment in the canyon would significantly impact the outstanding cutthroat fishery in the canyon, associated recreational opportunities, and the riparian environment. The fishery and recreation are an important part of the local economy and attract people from around the nation. It is also considered an important part of the quality of life to the local citizens.

Responsible timber, farm and ranch management practices are fully consistent with protected designations and can continue unhindered under such designations.

The Snake River Activity/Operations Plan, BPA Wildlife Mitigation Plan, resource management plans of soil conservation and water districts, and IDFG Fisheries Management Plan will have a positive influence in the basin. Continued implementation of these plans will help reduce erosion, siltation, and destruction of water quality, and in turn help maintain or improve water quality, and wildlife and fishery habitat. The South Fork Snake River Plan does not impact continued implementation of these plans.

Water quality activities of the DEQ can be enhanced through formation of a local watershed council as recommended by the Board, providing an entity to function as a WAG for the basin. The watershed council will improve agency communication and coordination, and give local citizens a stronger, coordinated voice in resource management in the basin.

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GLOSSARY AND ACRONYMS

AF - acre-feet

AFA - acre-feet per acre

Beneficial use - a set of uses of water which are deemed by law to provide legitimate basis for a water right.

Best management practices - the state-of-the-art practices that are efficient and effective, practical, economical, and environmentally sound to minimize soil erosion.

BLM - U.S. Department of Interior, Bureau of Land Management

Board - the Idaho Water Resources Board (IWRB).

BPA - U. S. Department of Energy, Bonneville Power Administration

CDC - Idaho Department of Fish and Game, Conservation Data Center

cfs - cubic feet per second, a unit of measure for the rate of discharge of water. One cubic foot per second is the rate of flow of a stream with a cross section of one square foot which is flowing at a mean velocity of one foot per second. It is equal to 448.8 gallons per minute, or 1.98 acre-foot per day.

CoE - U. S. Army Corps of Engineers

Comprehensive state water plan - the plan adopted by the Board pursuant to section 43-1734A, Idaho Code, or a component of such plan developed for a particular water resource, waterway or waterways and approved by the Idaho Legislature.

Confluence - the flowing together of two or more bodies of water.

Conservation - increasing the efficiency of energy and water use, production, or distribution.

Consumptive use - the amount of water that actually is consumed during its application to beneficial use and is removed from the stream system.

Culinary supply - water meeting all applicable safe drinking water requirements suitable for residential and commercial use.

DCMI - Domestic, commercial, municipal and industrial uses.

> **Domestic** - water used for residential household purposes and residential lawn and garden watering. Municipal irrigation of parks and golf courses is included here.
>
> **Commercial** - water used by hotels, motels, restaurants, office buildings, retail sales stores, educational institutions, churches, hospitals, and government and military facilities.
>
> **Municipal** - consists of the sum of "residential" and "commercial" uses, which are not usually identified separately in available records of water use.
>
> **Industrial** - water used to manufacture products. Places of industrial use include meat packing, dairies, cheese factories, other food processing enterprises, gravel washing, and ready-mix concrete operations.

DEQ - Idaho Department of Health and Welfare, Division of Environmental Quality

Ecosystem - a complex system composed of a community of flora and fauna taking into account the chemical and physical environment with which the system is interrelated.

Endangered Species Act - Section 7 of this federal statute, (16 U.S.C. §1536), requires that the government take no action which may jeopardize the continued existence of any endangered or threatened species or adversely modify its critical habitat. Where the federal government is involved in a water project (either by building it or issuing a permit or license), the Endangered Species Act may prohibit the government from proceeding if the loss of water will be harmful to such species.

Endangered species - any species which, as determined by the U.S. Fish and Wildlife Service or National Marine Fisheries Service, is in danger of extinction throughout all or a significant portion of its range.

EPA - *Environmental Protection Agency*

FERC - Federal Energy Regulatory Commission established in 1977 (replacing the Federal Power Commission) with the primary responsibility of ensuring the Nation's consumers adequate energy supplies at just and reasonable rates and providing regulatory incentives for increased productivity, efficiency, and competition. Its primary functions are to establish and enforce rates and regulations regarding interstate aspects of the electric, natural gas, and oil industries. It also issues licenses for non-Federal hydroelectric plants and certifies small power production and cogeneration facilities.

Floodplain - the land that may be submerged by floodwaters. The plain built up by stream deposition. The 100-year floodplain identifies the land in the floodplain subject to a 1 percent or greater chance of flooding in any given year.

Floodway - the channel of the stream, plus any adjacent floodplain areas, that must be kept free of encroachment so that the 100-year flood can be carried without substantial increases in flood heights.

Habitat - the place or type of natural site where a plant or animal normally lives and grows.

Head - the elevational difference between the surfaces of water; usually upstream and downstream of a turbine or pump. The differential of pressure causing flow in a fluid system, usually expressed in terms of the height of a liquid column that the pressure will support.

Highwater mark (line) - the line that separates the aquatic vegetation from terrestrial vegetation.

Hydropower project - any development which uses a flow of water as a source of electrical or mechanical power, or which regulates the flow of water for the purpose of generating electrical or mechanical power. A hydropower project development includes all powerhouses, dams, water conduits, transmission lines, water impoundments, roads, and other appurtenant works and structures.

Idaho Code - the Idaho laws, in this case those pertaining to water issues.

IDFG - Idaho Department of Fish and Game

IDWR - Idaho Department of Water Resources

IOGLB - Idaho Outfitters and Guides Licensing Board

Irrigation - water used for irrigation of cropland. Residential lawn and garden uses are not included.

IWRB - Idaho Water Resource Board

kwh - Kilowatt- hour - unit of energy equal to that expended by one kilowatt in one hour.

Kilowatt (kw) - unit of electric power equal to 1,000 watts, or about 1.34 horsepower.

Lava plain - a broad stretch of nearly level to gently undulating surface underlain by basaltic flows.

Loam - moderately coarse, medium and moderately fine-textured soils that include such textural classes as sandy loam, fine sandy loam, very fine sandy loam, silt loam, silt, clay loam, sandy clay loam and silty clay loam.

Main stem - the main channel of a river, in this plan it is referring to the South Fork Snake River.

Megawatt (MW) - unit of electrical power equal to 1,000,000 watts, or about 1,340 horsepower.

Minimum stream (instream) flow - the water that is not diverted and used but rather remains for wildlife habitat, recreation, navigation, and aesthetic beauty.

Natural River - a waterway which possesses outstanding fish and wildlife, recreation, geologic or scenic values, which is free of substantial existing man-made impoundments, dams or other structures, and of which the riparian areas are largely undeveloped, although accessible in places by trails and roads.

NWPPC - Northwest Power Planning Council

Placer or dredge mining - any dredge or other operation to recover minerals with the use of a dredge boat or sluice washing plant whether fed by bucket line or separate dragline or any other method. This could include, but is not limited to, suction dredges which are capable of moving more than 2 cubic yards per hour of surficial material.

Plain - a region of general uniform slope, comparatively level, of considerable extent, and not broken by marked elevations and depression.

PNRBC - Pacific Northwest River Basins Commission

Preliminary permit - a FERC authorization granting priority right to file a license application, and authorizing the permittee to conduct studies and analyses necessary to prepare a complete license application. A preliminary permit does not permit any construction.

Private, Domestic, and Stock - water used from private wells or springs for individual homes, usually in rural areas not accessible to public water supply systems.

Public interest - something that impacts the majority of the people, usually beneficially.

Public water supply - water supplied to either private or publicly owned community systems which serve at least 15 service connections or 25 individuals at least 60 days per year. Water from public supplies is used for residential, commercial, and industrial purposes, including irrigation of publicly owned areas.

Ramp rate - the maximum allowable rate of change in output from a power plant. The ramp rate is established to prevent undesirable effects due to rapid changes in loading, or in the case of hydroelectric plants, discharge.

Recreational dredge mining - dredge mining in which the nozzle is 5 inches or less, and moves less than 2 cubic yards per hour.

Recreational River - a waterway which possesses outstanding fish and wildlife, recreation, geologic or scenic values, and which might include some man-made development within the waterway or within the riparian area of the waterway.

Riparian - living on or adjacent to a water supply such as a riverbank, lake, or pond; that area within 100 feet of the mean highwater mark of a waterway.

River basin - the total drainage or catchment area of a stream (i.e., the watershed).

Riparian vegetation - vegetation that is associated with aquatic (streams, rivers, lakes) habitats.

RVD - Recreational Visitor Days. One RVD is equivalent to one person spending 12 hours at a particular activity.

SAWQP - State Agricultural Water Quality Plan

SCS - U.S. Department of Agriculture, Soil Conservation Service. This agency reorganized and changed its name to the Natural Resource Conservation Service (NRCS) in 1994.

Secondary systems - pressurized lawn and garden irrigation systems using untreated water for irrigation of lawns, gardens, and publicly owned open areas.

Threatened species - a species, determined by the U.S. Fish and Wildlife Service or National Marine Fisheries Service, which are likely to become endangered within the foreseeable future throughout all or a significant portion of their range.

TMDL - Total Maximum Daily Load. Total maximum daily load is the sum of all pollutants in a waterway. Pollutant levels established through TMDL standards must be at or below the level established for the waterway to abide by water quality standards.

Turbidity - a measure of the extent to which light passing through water is reduced due to suspended materials. Excessive turbidity may interfere with light penetration and minimize photosynthesis, thereby causing a decrease in primary productivity. It may alter water temperature and interfere directly with essential physiological functions of fish and other aquatic organisms, making it difficult for fish to locate a food source.

USBR - U.S. Department of Interior, Bureau of Reclamation

USGS - U. S. Geological Survey

Vested rights - those rights that are fixed and not contingent upon any future actions; for example, mining claims or a water right. A protected river designation cannot interfere with vested property rights made prior to the designation.

Water table - the highest part of the soil or underlying rock material that is wholly saturated with water. On some places an upper, or perched, water table may be separated from a lower one by a dry zone.

Waterway - a river, stream, creek, lake or spring, or a portion thereof.

Wetlands - lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is covered by shallow water. Wetlands must have the following three attributes: (1) at least periodically, the land supports predominately hydrophytes; (2) the substrate is predominately undrained hydric soil; and (3) the substrate is on soil and is saturated with water or covered by shallow water at some time during the growing season of each year.

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APPENDICES

APPENDIX A:
SOUTH FORK SNAKE ADVISORY GROUP

ADVISORY GROUP MEMBERS

Mark Bennion - South Fork Snake River canyon landowner
Dr. Steven Christensen - Ririe area landowner
Bill George - Blue Ribbon Coalition
Renell Weeks - Swan Valley area landowner
John Hill - Outfitters and guides
Ron Hover - Idaho Wildlife Council
Gerald Jeppesen - Madison County Commissioner
Tamar Jergensen - South Fork Snake Watershed Council
Theron McGarry - Grazing
Jon Ochi - Idaho Rivers United
Shaun Robertson / Chad Colter - The Shoshone-Bannock Tribes
Bill Shurtliff - Bonneville County Commissioner
Claude Storer - Irrigator / Committee of Nine
Kenneth Stromberg - Jefferson County Commissioner
Bill Terry - Trout Unlimited, Upper Snake River Cutthroats Chapter
Delbert Winterfeld - Dryland farmer / Soil Conservation Districts
Gerald Wolz - Private citizen / recreationist

SUMMARY OF SOUTH FORK SNAKE ADVISORY GROUP MEETINGS

The following summarizes the nine advisory group meetings held between June 1995 and June 1996. Attendance sheets and more specific information about each of these meetings is contained in IDWR files.

Meeting #1 - Monday, June 19, 1995; 7:00 - 10:00 p.m.; Ririe Lions Hall, Ririe, Idaho

The meeting began with introductions and review of material mailed to the South Fork Snake Advisory Group (SFSAG) earlier. The Idaho Water Resource Board (Board) and Idaho Department of Water Resources' (IDWR) staff answered questions about the planning process and the Board's authority. The SFSAG and the two Board members present (Jerry Rigby and Dave Rydalch) signed a Letter of Acknowledgment. The letter formally recognizes the willingness of all SFSAG members to participate on the advisory group.

An Issue Summary list, containing a condensed version of all public comment, was reviewed. Issues were grouped into eleven categories. IDWR recorded comments about the issues on flipcharts. After discussing five of the eleven categories, the SFSAG decided to send comments about the remaining issue categories to IDWR by July 10. IDWR would compile a final issue list with items that the Board has control or authority to carry out highlighted. IDWR will mail this list to the SFSAG on July 10. The SFSAG would review this list, set priorities, and send back the prioritized list to IDWR by July 30.

Meeting #2 - Monday, August 28, 1995; 6:30 - 10:00 p.m.; Ririe Senior Citizens Center, Ririe, Idaho

This meeting focused on issues concerning water quality, fisheries, riparian management and wildlife. Four speakers were invited to present information to the SFSAG. They included Chris Mebane of the Division of Environmental Quality (DEQ), Bob Martin from the Idaho Department of Fish and Game, Mike Merigliano from the University of Montana, and Justin Naderman with the Idaho Department of Fish and Game.

Chris Mebane from the Eastern Region of the Division of Environmental Quality presented information on water quality. He described the results of a water quality study conducted September through October 1994 during

drawdown of Palisades Reservoir. In brief, the study concluded that state standards for turbidity and dissolved oxygen were not exceeded. Temperature parameters were exceeded. He also discussed water quality limited streams and reaches in the South Fork Snake River Basin. The South Fork Snake River in the basin is listed as a water quality limited reach because of reduced flows and not due to pollutants. Future actions of DEQ with respect to monitoring water quality segments were discussed in brief.

Bob Martin, Environmental Coordinator for Region 6 of the Idaho Department of Fish and Game, presented information on the fisheries. Habitat, recruitment needs, and comparison of growth rates of trout in the South Fork Snake River to other Idaho waterways were discussed. The importance of vegetation, and tributary and side channels for spawning were mentioned. Some discussion occurred about the threat of hybridization of cutthroat trout with rainbow trout, and disease.

Mike Merigliano, a research assistant with the University of Montana, discussed his research on cottonwood regeneration on the South Fork Snake River from Palisades Dam to Heise. Slides were presented depicting the historic development of cottonwood stands on the South Fork Snake River, and how this related to historic flood regimes before and after Palisades Dam.

Justin Naderman, Regional Wildlife Biologist with IDFG, summarized information about wildlife in the South Fork Snake River Basin. He first discussed bald eagle habitat requirements and the significance of the South Fork Snake River population, because it is the primary producer in the Greater Yellowstone Ecosystem. He discussed Canada geese and flow regime needs for successful reproduction. A flow of 8000 cubic feet per second is ideal with a constant flow Mid-May to March. Also noted were the important wintering habitat for elk, deer and moose, the presence of mountain goat and black bear in the basin.

After the presentations by the speakers, attendees were asked to submit strategies addressing the issues presented at this meeting.

Meeting #3 - Monday, November 6, 1995; 6:30 - 10:00 p.m.; Ririe Senior Citizens Center, Ririe, Idaho

The third South Fork Snake Advisory Group meeting focused on agency management & direction, growth & development, and recreation topics. A worksheet that summarized the top ranking issues for these topics was distributed. The worksheet's purpose is to provide a means for the advisory group and public to suggest strategies or solutions to address the wants/needs listed under each issue topic. A master list of all suggestions is being compiled and will be considered and refined by the SFSAG at a meeting in the Spring of 1996.

Summaries on other agency planning efforts occurring within the basin, existing and potential water development, and recreation information were distributed. A chart listing current planning efforts by other agencies within the basin was reviewed. This chart lists six major planning efforts currently occurring within the South Fork Snake River Basin, and four additional activities that include the basin. The scope, status, and contacts for these planning efforts were briefly discussed.

A "Suitable Timber" map was discussed. The map depicts areas that the Targhee National Forest have identified as technically capable and available to grow and harvest timber. A map depicting "Mines and Prospects" was described. A "Water Development" map was presented and a written summary distributed describing existing and potential water development. A "Land Development" map was described depicting all platted subdivisions located in the basin. Rhett Bradford, Mayor of the City of Irwin, spoke about land use development and its effects to the area.

Wade Brown, recreation planner with Bureau of Land Management, discussed recreation activity on the South Fork Snake River. He reviewed use statistics and recreation trends, river access, and impacts and monitoring. Ellen Berggren, from the Idaho Department of Water Resources, provided some additional information about recreation in the basin. Some information about regional recreation trends and use from studies conducted by University of Idaho in 1987 and 1993 were described. Estimates of recreation use by activity for each agency were reported. Some information on angler use and catch rates were reported for past years. Recent information is not available. Information on estimated hunters days was also presented. Number of clients serviced by the outfitting industry over the last five years were presented. A written summary of this information was distributed.

A listing of all strategies submitted to the Board to date were available for review at the meeting. Attendees were given the opportunity to add strategies to these lists during meeting breaks and at the end of the meeting.

Meeting #4 - Monday, January 22, 1996; 6:30 - 10:00 p.m.; Ririe Senior Citizens Center, Ririe, Idaho

The fourth South Fork Snake Advisory Group meeting focused on water quantity & allocation, irrigation, flood management, and operation of Palisades Dam. Mapped information addressing these topics was displayed for public review. Maps depicted irrigated and non-irrigated agricultural land in the South Fork Snake River Basin and the region, flood control district boundaries, canal company boundaries, and existing and potential water development projects.

Phil Rassier with the Attorney General's office talked about Idaho water law. His presentation included explanation of the following topics: the history and definition of the prior appropriation doctrine; allocation of water in times of shortages; definition of changes to water rights such as enlargement, transfers and expansions; losses of water rights; management of groundwater and conjunctive management; explanation of the public trust doctrine and federal reserved rights; and the Snake River Basin adjudication. Mike Beus discussed operation of the Upper Snake System with a focus on Palisades Reservoir. He noted that there were several constraints that guided operation of the system. These included federal and state law, project authorizations, contracts with irrigators, and federal and state regulatory constraints including the Endangered Species Act.

A listing of all strategies submitted to the Board to date were available for review at the meeting. Attendees were given the opportunity to add strategies to these lists during meeting breaks and at the end of the meeting.

Meeting #5 - Monday, February 26, 1996; 6:30 - 10:00 p.m.; Ririe Senior Citizens Center, Ririe, Idaho

The main objective of the fifth South Fork Snake Advisory Group meeting was to review the evaluation of outstanding fish and wildlife, scenic and recreation resources conducted by the Idaho Department of Water Resources. First an explanation of why the Board needs to identify outstanding resource values was provided. Then the criteria used to determine outstanding resource values were presented.

Dave Greegor, aquatic biologist with the Department, described the biological evaluation. The biological evaluation reviewed available data about aquatic and riparian habitat and species, and the presence of crucial species and habitats. Ellen Berggren, water resources planner with the Department, described the recreation and scenic values evaluation.

After the presentations, people were invited to examine the maps and supporting documentation for the outstanding resource evaluations. Flip charts were also provided to offer additional suggestion for recommendations, actions or policies for inclusion in the South Fork Snake River Basin Plan.

Meeting #6 - Monday, March 25, 1996; 6:30 - 10:00 p.m.; Ririe Senior Citizens Center, Ririe, Idaho

The main objective of the sixth South Fork Snake Advisory Group meeting was to review and finalize the goals for the South Fork Snake River Basin, and evaluate the strategies compiled since August 1996. Based on the issues and concerns identified at past meetings a set of goals, or the desired future, were drafted. Goals listed under each of the eleven issue categories were reviewed and discussed by the group. Revisions were made to many so that all in attendance felt comfortable with them.

Next the South Fork Snake Advisory Group was given a twenty-five page list of strategies to evaluate. The list was compiled from suggestions received from the advisory group and public. The advisory group was asked to review all the strategies on the list and circle those they could not support as written. The purpose of this exercise was to identify strategies agreeable to everyone, and identify where conflict may exist. Those strategies that have group agreement will be presented to the Board for inclusion in the South Fork Snake River Basin Plan. Strategies where there is not agreement by the group will be discussed at the remaining meetings, determining if strategies can be revised so they are acceptable to all, or to suggest other ideas.

Meeting #7 - Monday, April 15, 1996; 7:00 - 10:00 p.m.; Ririe Senior Citizens Center, Ririe, Idaho

The seventh South Fork Snake Advisory Group meeting reviewed the final goals established for the South Fork Snake River Basin, and the results of the strategy evaluation that occurred at the previous meeting. First, the results of the strategy evaluation were briefly discussed. Advisory group members reviewed 245 strategies at the last meeting. They were to identify those they did not support as written. Of the 245 strategies reviewed, the advisory group agreed on about 9 percent of them. The group was close to agreement for another 30 percent of the strategies (only one or two individuals did not support). About 32 percent of the strategies received moderate agreement (three or four individuals did not support). More substantial disagreement occurred for the remaining 30 percent of the strategies (five or more people did not support).

Planning staff at IDWR identified all the strategies where a consensus seemed close (disagreement by three or fewer advisory group members), grouping strategies with similar topics together. The advisory group reviewed and discussed each group of strategies, focusing on one group at a time. The process involved discussion of the strategies, suggestions for wording changes, or suggestions for new strategies. When the group felt comfortable with the final strategies, discussion moved to the next category.

Meeting #8 - Friday, May 17, 1996; 7:00 - 10:00 p.m.; Ririe Senior Citizens, Ririe, Idaho

The objective of the eighth South Fork Snake Advisory Group meeting was to make recommendations to the Board for natural or recreational river designations, and identify waterways for minimum streamflow study. Ground rules proposed to help the group work cooperatively were reviewed before beginning discussion about natural and recreational designations. The definition of a state natural or recreational river was briefly discussed, and the restrictions associated with each designation were described.

The advisory group discussed potential designations for Pine, Burns, Bear, and Big Elk creeks, and Warm Springs. These discussions resulted in agreement on several points. Since discussions for individual streams were taking a great deal of time, Ellen Berggren (Idaho Department of Water Resources) proposed reviewing the list of eligible streams to determine which did not have group support for designation. Based on the comments and discussion for the previous streams, Ellen would make a preliminary cut at specific designations for the streams selected by the group. This preliminary cut would be sent to the advisory group for their

review before submitting recommendations to the Board. This approach resulted in the group agreeing to designate all eligible streams with stipulations made for some waterways.

Discussion next addressed the issue of a minimum streamflow for the main stem South Fork Snake River. The discussion noted the legal constraints associated with operation of Palisades Dam, and the need to manage flows to meet contractual obligations to irrigators. Several suggestions were offered to meet contractual obligations to irrigators and attempt to achieve flows to maintain fisheries. Consensus was not reached on all items. The group then discussed and proposed minimum streamflow study for several tributaries to the main stem.

Meeting #9 - Monday, June 3, 1996; 7:00 - 10:00 p.m.; Ririe Senior Citizens Center, Ririe, Idaho

The final meeting's objective was to conclude discussions about the remaining strategy topics. The meeting devoted 20 minutes of discussion time to each of the following topics: water allocation, flood management, water development, operation of Palisades, riparian management, and water quality. Eight additional topics that did not deal with water management, but were indirectly related, remained. Individuals at the meeting were asked to rank the top two topics they would like to discuss. At the end of the meeting, the top ranked categories would be discussed using the time remaining. Recreation issues were ranked the highest by the group and were discussed in the time remaining.

The process involved discussion of the strategies, suggestions for wording changes, or suggestions for new strategies. When the group felt comfortable with the strategies, discussion moved to the next category. A final list of draft strategies/recommendations developed during advisory group meeting discussions was submitted to the SFSAG within the next two weeks, allowing one final opportunity to review them before they were submitted to the Board.

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APPENDIX B: ISSUE SUMMARY

The following list was derived from comments provided by individuals attending public meetings held by the Idaho Water Resource Board from February 27 through March 2, 1995; a South Fork Snake Advisory Group meeting on June 19, 1995; and written comments. Eleven broad categories were identified. Individual comments were arranged under the appropriate category heading. Repetitious comments were grouped together and condensed to a single statement. The order of presentation does not indicate significance or importance of the issue.

Water Quality

- protect water quality of all tributaries
- accumulate data to allow monitoring and verification of water quality impacts
- minimize erosion through protection of natural vegetation and encouraging use of BMPs for all land uses
- establish cooperative agreements with landowners along the river to help protect water quality
- establish policy applicable statewide regarding flows outside the state and into the Lower Columbia (water quality and quantity)
- monitor and manage activities (float trip sanitation, development in corridor, livestock) potentially impacting water quality in basin to minimize water pollution
- water quality concerns from releases at Palisades Dam
- maintain water quality in a biologically beneficial condition when it leaves basin

Fisheries

- maintain a quality fishing experience
- minimum stream flows to maintain fishery year round
- protect areas where streams merge for fisheries
- protect fishery on South Fork from overuse

Riparian Management

- tax incentives for riparian improvements
- control noxious weeds along river using method safe for the water
- preservation of riparian vegetation in developed areas
- funds to help fence along the river
- maintain and enhance riparian visual corridor
- preserve and maintain cottonwoods -- flooding required for regeneration, use bank storage for cottonwood regeneration in years of excess water
- control bank erosion to protect natural vegetation

Wildlife

- protect wildlife habitat -- instream flows, cottonwood restoration/protection, eagle and geese nesting, canyon which is important to eagle
- concerns about beaver in some sections of the river and recommendations to transplant to others

- recognize the value of waterfowl, wildlife habitat and birds of prey

- maintain basin ecological integrity

- concerns about BPA wildlife mitigation plan

Recreation

- conflicts between motorized and non-motorized uses

- appropriate types and amount of recreation use on the South Fork Snake River

- maintain or improve access to river for recreation

- concerns about commercial outfitters

- safety concerns at the Big Feeder Diversion

- improved enforcement of violations

- long range recreation use management plan to address safety, sanitation, carrying capacity, and interpretive signs

- maintain quality outdoor recreation experience -- fishing, hunting, camping, hiking, rafting, and aesthetic values

- adjust releases from Palisades Dam to be in line with other uses (fish, wildlife and recreation)

- means to obtain current information on flows and predicted flows

- concerns about out-of-state demands for recreation resources

- need daily fees assessed to users or registration system

- determine impacts to recreation if Lynn Crandall storage reservoir were built

- manage for all recreation uses

- recreation users need to be courteous to each other

- policies pertaining to recreation uses should be general in nature

Development and Growth

- protect rural lifestyle and economy

- control subdivisions

- concerns about land uses and development along the river, particularly in the canyon, and associated impacts

- cooperative agreements with landowners along the river to help protect resource values

- establish setbacks for riparian corridor protection

- concerns about dams in canyon or on other reaches of the Snake

- concerns about impacts to private property rights

- existing mineral rights

- no additional boat ramps

- concerns about hydropower development

- concerns about timber sales

- need additional storage in the basin to store in high water years

Agency Involvement and Management Direction

- effects to private land ownership rights

- regulations with flexibility to apply to individual conditions at specific streams, not blanket regulations -- allow local input

- improved coordination between all agencies with responsibilities in the South Fork Snake River basin

- recommend formation of a group to coordinate with landowners regarding easements, etc.

- federal versus local control of resources

- concerns about BPA wildlife mitigation plan

- communication with all stakeholders facilitated and improved

- management decisions using the best available science

- form watershed council

- concerns about omitted lands and the outcome

- public education literature dealing with water and land use issues

- support and opposition to federal and state designations of rivers and streams

Water Quantity and Allocation

- maintain existing water rights, including instream livestock watering

- make water available for instream flows by changing water law to encourage water conservation or allowing changes from consumptive uses (irrigation) to non-consumptive instream uses

- investigate transfer of storage rights from Palisades Reservoir to ground water rights

- concerns about salmon flow augmentation

- federal versus local control of water

- prevent purchase of water rights where change in use may interfere with current practices

- develop policy applicable statewide regarding flows outside the state and into the Lower Columbia

- maintain a balance between all uses

- protect downstream users of water

- minimum stream flows suggested to benefit or maintain irrigation, fisheries, recreation, and wildlife

- develop policy on water spreading

- concerns about zero river flow

Operation of Palisades Project

- adjustment to flows and timing to meet the needs of irrigators, private property owners, fisheries, wildlife, cottonwood regeneration, and recreation

- improve communication of current and planned water releases out of Palisades Reservoir to all groups

- concerns about use of Palisades Reservoir water for salmon flush

- transfer surface water rights / storage at Palisades Reservoir for ground water rights

- use water bank storage for cottonwood regeneration in years of excess water

- increase volume and velocity of water between Palisades Dam to American Falls to prevent eutrophication in stagnant bays and coves

- recognize releases from Palisades Dam are determined by irrigation and flood management needs

Irrigation

- improve efficiency of irrigation to make water available for instream flows

- examine pressurized gravity irrigation system study conducted by SCS at Rainey and Palisades creeks

- irrigators need to communicate better with a better delineation of district boundaries

- allow continued access to the river for water rights diversions, maintenance and construction (point of diversion transfers)

- minimum stream flows or other recommended actions should not interfere with irrigation water rights

- improve water accounting responsiveness (weekend too long)

Flood Management

- concerns about future expansion of levees below Heise

- high water table causing flooding concerns in the Ririe and surrounding area

- survey from Palisades Dam to Heise to delineate highwater mark and existing floodplain

- flooding requirements for cottonwood regeneration

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APPENDIX C: STRATEGIES CONSIDERED

BACKGROUND INFORMATION

The Idaho Water Resource Board (Board) identified eleven categories of issues through public meetings, written comment and discussion with the South Fork Snake Advisory Group (SFSAG). The SFSAG then ranked specific items under each issue category for importance and effort the group would like to expend in addressing these issues. The issues receiving a score of 30 or higher for effort were restated as a want or need. The SFSAG and public provided strategies or solutions to address wants and needs. A "strategy" is an action, policy or recommendation that would accomplish or implement the want or need. Attached is a list of all strategies received by the Board, and reviewed by the SFSAG. These represent alternatives considered for the South Fork Snake Plan. Not all strategies were forwarded to the Board as recommendations.

WATER QUALITY

WQ - WANT OR NEEDS:

Protect water quality of all tributaries.

Accumulate data to allow monitoring and verification of water quality impacts.

Monitor and manage activities in the river corridor potentially impacting water quality to minimize pollution.

Minimize erosion.

Maintain water in a biologically beneficial condition when it leaves the planning basin (confluence with the Henrys Fork).

SUGGESTED STRATEGIES:

1. Establish appropriate buffer zones along streams (to be established by qualified biologist) where logging will not occur.

2. Construct fences to keep livestock out of riparian areas in grazing allotments.

3. Establish zoning requirements to prohibit building in riparian areas.

4. Establish cooperative agreements with land owners along the river to protect water quality.

5. Accumulate data to allow monitoring and verification of water quality impacts. Measure water temperature, turbidity, oxygen, and presence of E. coli.

6. Encourage best management practices (BMPs) for all land uses.

7. Extensive studies need to be conducted now to determine the maximum concentration of dwellings that the land can support (by drainage). Link density of dwellings in a development to a level adequate to protect water quality. This information should be provided to the local planning authorities so development can be planned so as not to impact water quality.

8. Maintain minimum flows in streams (Streams should not be dewatered).

9. Recommend enabling legislation to allow communities to extract fees from new land sales to be used for future sewage systems.

10. Seek funding and identify additional drainages that could benefit from State Agricultural Water Quality Programs similar to those being implemented by the East Side Soil & Water Conservation District on agricultural land

in the Antelope and Granite creek watersheds. The programs are applying BMPs to reduce soil erosion. Goals of the projects are to treat 75 percent of the critical areas. Critical areas are non-irrigated cropland, all irrigated cropland with slopes exceeding 4 percent, and any concentrated feeding operations. These projects promote voluntary participation and local decision making.

11. Encourage all land owners to leave undisturbed strips along streams (both the main stem and tributaries). This will benefit landowners as well as the public, by preventing loss of acreage to erosion.

12. Encourage establishment of conservation easements for agricultural lands to prevent future development for other uses.

13. Educate homeowners about the sources of pollution harmful to aquatic life, i.e. lawn chemicals, septic tank discharge, automotive and household fluids, and siltation.

14. Investigate Conservation Reserve Program (CRP) and identify the incentives for farmers to reduce erosion. Incorporate these incentives into overall state water plan.

15. Keep homes 600' minimum distance from river and stream banks.

16. The Legislature should provide adequate funding to ensure that the Division of Environmental Quality can conduct an adequate program to monitor water quality in all streams where human activity has the potential to degrade water quality. Accumulate data to determine the source and sources of water contamination of rivers; and the amount and nature of contamination by sewage and animal waste.

17. All industrial and farming uses, and city and rural sewage systems should be monitored to ensure surface and drinking water is not contaminated by these uses.

18. Monitor canal water which may be contaminating well water.

19. Use funds collected through daily use permit system to allow a selected state agency, or to hire a private firm or contractor with a university or private foundation, to develop a monitoring program. This monitoring program could be developed by a graduate student as part of a Masters degree program. Eventually, other MS candidates could monitor the water quality and model the river ecosystem.

20. Water quality monitoring plan could include such actions as water sampling, BMP effectiveness evaluations, beneficial use assessments, and photo point sampling.

21. Impose requirements to pack out human waste anywhere on the South Fork Snake River.

22. Require frequent rotation of livestock in grazed areas along the main stem so that no part of the riparian area is overgrazed.

23. The following criteria should be considered in a holistic water quality program:

- water quality (flow rate, temperature, biological oxygen demand, chemical oxygen demand, oxygen content, organic content, pathogens)
- number of river users
- monitor irrigation withdrawals rates
- monitor low flow augmentation
- monitor activities that impact water quality (grazing, development along the river, etc.)
- monitor water fowl populations
- monitor eagle populations along the river
- monitor wildlife populations
- monitor fish (type, size, quantity)
- monitor water quality downstream, if any residential or grazing uses, to verify water quality

24. Development should have a minimum setback so that it is visually out-of-sight from the river channel.

25. Buffer zones should be established along the river and around the reservoirs to control erosion and minimize human impacts.

26. Run off from livestock pastures should be treated to some minimal standard before entering river.

27. In the canyon section of the South Fork Snake River (Conant - Black Canyon), provide public overnight toilets or designated toilet areas to minimize impacts of human waste.

28. Riparian vegetation should be protected and clear cutting should cease to be used as a forestry technique.

29. Increase education and enforcement to reduce erosion from off-road vehicle use.

30. Build sediment ponds in eroding tributaries.

31. Give tax incentives, grants or loans to landowners to repair badly eroded areas.

32. The Conservation Reserve Program (CRP) should be continued by the federal government.

33. Plant willows.

34. *Establish riparian zone of at least 150 feet* along the South Fork Snake River to help preserve aesthetics, wildlife and riparian values.

35. Encourage landowners to retain Conservation Reserve Program (CRP) lands in grass cover after contracts expire to reduce soil erosion.

36. State authorities should work with all entities to provide sufficient water to maintain water quality (flow rates, temperature and chemical standards) as it leaves the state sufficient to meet the needs of salmon/steelhead and other fisheries in the state.

37. Biologically beneficial condition should be defined as a condition suitable for the preservation of healthy populations of the native cutthroat trout.

38. DEQ should monitor the water quality for sediment, coliform bacteria, oxygen content, and identifiable agricultural chemicals.

39. Baseline and historic water quality data should be examined to determine if degradation has occurred. State authority should identify polluters and implement appropriate fines on responsible parties.

40. Establish monitoring site at the confluence to measure temperature, turbidity, oxygen content at each fork.

41. Encourage implementation of BMPs appropriate to the farming operation and needs to minimize soil erosion. BMPs may include:

conservation tillage
crop residue use/no till
chiseling/subsoiling
cross slope farming
conservation cropping sequence
pasture and hayland planting
integrated pest management
nutrient management
planned grazing system
fencing
brush control
spring developments
pasture and hayland management
strip cropping
terrace and sediment basins
grassed waterways
windbreaks
conservation cover (CRP)
vegetative filter strips

42. *Divide reservoir and river system into* segments where different biological conditions can be maintained. The river system should not be managed as a single biological environment. (The reservoir should be allowed to maintain a different quality than the free-flowing river.) The river will be a cold water fishery and able to support cold water fish (trout). This will require a high dissolved oxygen level, low BOD/COD, low temperatures, and high flow rates. The reservoir on the other hand could be managed as a cool water fishery and allow fishing in shallow warm water for blue gill and bass and deep cold water fishing. Once the segments of the river system are defined, the basin will need to be monitored to ensure these segments are

maintained to beneficial use. The monitoring and enforcement will be funded through river use permit fees.

43. To maintain the beneficial conditions of the reservoir, the turbines of the Palisades Powerhouse need to be modified as will the irrigation intake structures to protect wildlife, fish and humans, etc.

FISHERIES

F - WANTS OR NEEDS:

Maintain a healthy cutthroat fishery.

Prevent over harvest of the fishery.

Maintain quality fishing experience.

SUGGESTED STRATEGIES:

1. The Water Plan should recommend as a goal that every stream in the basin be allocated a minimum streamflow adequate for the survival of its fisheries; the allocation should be approached through the voluntary transfer of water rights to instream use as, for example, increased efficiency allows irrigators to cultivate the same amount of land with less water.

2. A minimum flow should be maintained in all streams (Do not allow streams to be dewatered).

3. Minimum stream flows are needed on all trout spawning tributaries.

4. Establish a minimum streamflow of 1500 cfs at Lorenzo Bridge.

5. Strengthen the informal minimum flow agreement between U. S. Bureau of Reclamation and Idaho Department of Fish and Game.

6. A minimum flow of 2200 cfs is the lowest acceptable flow on the South Fork Snake River.

7. The Idaho Water Resource Board should pursue a minimum streamflow of 1500 cfs during the winter for the main stem South Fork Snake River from Palisades Dam to the confluence with the Henrys Fork to maintain a healthy fishery, and for the benefit of wintering and nesting bald eagles.

8. The Idaho Water Resource Board should pursue a minimum instream flow study on Pritchard Creek, and in five years recommend a minimum streamflow to protect fisheries and riparian habitat values.

9. The Idaho Water Resource Board should pursue a minimum instream flow study on Pine Creek, and in five years recommend a minimum streamflow to protect fisheries and riparian habitat values.

10. The Idaho Water Resource Board should pursue minimum streamflow studies for the most important tributaries, and in five years recommend a minimum streamflow to protect fisheries and riparian habitat on those tributaries. Accomplishing this action may be limited by funding over the next 5 years, and minimum streamflow studies may have to be prioritized. The highest priority tributaries needing flow protection include Pine Creek, Burns Creek, Warm Springs, Palisades Creek, Rainey Creek (headwaters to lower Targhee NF boundary), Pritchard Creek, Big Elk Creek, Fall Creek, McCoy Creek, Bear Creek, and Indian Creek (tributary to Palisades Reservoir).

11. For the main stem South Fork from Palisades Dam to the confluence with the Henrys Fork, flows should be maintained above 1,500 cfs during the fall and winter period (October 1 - March 30). The most important habitat for over-wintering juvenile trout is in side-channels, which are most affected by flow reductions and fluctuations. The flow versus habitat relationship for fish (Schrader and Griswold 1994) indicates the greatest rate of loss of habitat occurs between 1,540 and 1,240 cfs. Of the weighted habitat available to subyearling cutthroat trout at 3,370 cfs, approximately one-third is lost as flows are reduced to 1,540 cfs, and over half is lost at 1,240 cfs. For brown trout, about half is lost at 1,540 and two-thirds at 1,240 cfs. Survival of

overwintering juvenile trout is critical to maintain the South Fork and tributary fisheries.

12. Acknowledge the importance of the South Fork Snake River as a nationally significant fishery.

13. Agencies with jurisdiction over the river perform their management duties with fisheries values in mind.

14. The Board should not micro-manage the IDFG role.

15. Maintain current catch rates and fishing regulations. (The quality of the fishing experience is a personal matter and should not be regulated. People will seek their own places and times according to their personal wants and needs. Overregulation impacts quality of the experience.)

16. Change fishing regulations to catch and release, no bait, and artificial lures only.

17. Water levels in the South Fork Snake River must be maintained between 2200 and 16,000 cfs.

18. Allow fishing all year round on the South Fork Snake River to avoid opening day crowds.

19. Two types of fishing activity in the South Fork basin -- reservoir and river. The entire watershed should be evaluated to determine the heaviest concentration of users and to limit users to a level to maintain a quality experience.

20. Catch and release only to increase number and size of fish.

21. Establish permit fees to maintain the fishing experience.

22. Change regulations to enhance size of fish below Swan Valley Bridge.

23. Manage the section below Poplar as a trophy fishing area. Require release of fish under 20 inches.

24. Improve catch rates by requiring release of everything between 12 and 20 inches.

25. Manage fishery as a wild cutthroat fishery.

26. Remove obstructions to free passage of fish where spawning tributaries enter the main stream.

27. IDFG should regulate fishing in areas where streams merge to protect spawners entering tributaries. Habitat should be protected and enhanced by local authority, BLM, Forest Service and counties.

28. IDFG should be encouraged to seek measures to prevent the imminent takeover of the cutthroats by rainbows. Genetic integrity of cutthroats is very important, discourage hybrids.

29. The river should be managed to emphasize production of cutthroat; other species are secondary. Minimize efforts to maintain brown trout since it is a non-native fish.

30. Remove slot limit on rainbow trout and hybrids, but maintain slot limit for brown trout.

31. Eliminate year round fishing below Heise.

32. Increase length limit to 17" or 18" minimum.

33. Reduce take home limit to one fish.

34. Eliminate bait fishing.

35. Have Id. Dept. Of Fish and Game determine the fish carrying capacity of the South Fork Snake River to determine the biological limit of people on the river. Study should answer the following questions: When are wildlife adversely impacted by the numbers of people? When is the fishery adversely impacted?

36. In times of drought with low flows that will harm fish, increase allowable harvest of fish.

37. Reduce fishing access on the river.

38. With existing regulations, over harvest does not appear to be a problem. As needed, IDFG can develop more-restrictive regulations. However, to safeguard against over harvest in the future, while providing for an increasing recreational demand, current trout habitat needs to be maintained, and overall habitat quality and quantity needs to be increased.

39. Catch and release all cutthroat trout.

40. Increase spawning habitat by protecting spawning tributaries and require fish screens in tributaries.

41. Stop the stocking of any ponds or streams in Idaho to stop the spread of whirling disease.

42. Conduct studies to determine how to prevent hybridization of the cutthroat and rainbows.

43. Fishery management should focus on protection of rainbow and brown trout, not just the cutthroats.

44. Reduce sedimentation into stream with improved farming practices to minimize harmful effects to salmonid eggs and fry.

45. Increase upper limit of the slot to 18".

46. Pritchard Creek provides potential spawning habitat for cutthroat trout from the South Fork Snake River. Designate Pritchard Creek as a state natural river from its source to the lower Targhee National Forest boundary. The following activities should be prohibited in the natural reach:

1) Construction or expansion of dams or impoundments;
2) Construction of hydro projects;
3) Construction of water diversion works;
4) Dredge or placer mining;
5) Mineral or sand and gravel extraction within the stream bed; and
6) Alterations of the stream bed.

47. Designate Pritchard Creek a state protected recreational river from the lower Targhee National Forest boundary to the confluence with the South Fork Snake. The following activities should be prohibited in the recreational reach:

1) Construction or expansion of dams or impoundments;
2) Construction of hydro projects;
3) Construction of water diversion works;
4) Dredge or placer mining; and
5) Mineral or sand and gravel extraction within the stream bed.

Stream channel alterations shall be prohibited except those necessary to maintain and improve existing utilities, roadways, diversion works, fishery enhancement facilities and managed stream access facilities; for the maintenance of private property; and for public agencies to construct public access facilities and fishery enhancement facilities. In addition, new private stream access facilities may be allowed with Idaho Water Resource Board approval.

48. The Idaho Water Resource Board should pursue a minimum instream flow study on Pritchard Creek, and in five years recommend a minimum streamflow to protect fisheries and riparian habitat values.

49. Rainey Creek is an extremely important spawning tributary of the South Fork Snake River supporting cutthroat trout. Designate Rainey Creek as a state protected recreational river from its source to the confluence with South Fork Snake. The following activities should be prohibited:

1) Construction or expansion of dams or impoundments;
2) Construction of hydro projects;
3) Construction of water diversion works;
4) Dredge or placer mining; and
5) Mineral or sand and gravel extraction within the stream bed.

Stream channel alterations shall be prohibited except those necessary to maintain and improve existing utilities, roadways, diversion works, fishery enhancement facilities and managed stream access

facilities; for the maintenance of private property; and for public agencies to construct public access facilities and fishery enhancement facilities. In addition, new private stream access facilities may be allowed with Idaho Water Resource Board approval.

50. Designate Pine Creek as a state protected natural river from the Targhee National Forest boundary to its mouth at the South Fork Snake. The following activities should be prohibited in the natural reach:

1) Construction or expansion of dams or impoundments;
2) Construction of hydro projects;
3) Construction of water diversion works;
4) Dredge or placer mining;
5) Mineral or sand and gravel extraction within the stream bed; and
6) Alterations of the stream bed.

51. Designate Burns Creek as a state protected recreational river to protect important cutthroat trout spawning habitat.

52. The Idaho Water Resource Board should pursue a minimum instream flow study on Pine Creek, and in five years recommend a minimum streamflow to protect fisheries and riparian habitat values.

53. Pine Creek is an extremely important cutthroat trout spawning tributary for the South Fork Snake River. Designate Pine Creek a state protected recreational river from its source to the county road just below Highway 31 bridge as the lower Targhee National Forest boundary. The following activities should be prohibited in the recreational reach:

1) Construction or expansion of dams or impoundments;
2) Construction of hydro projects;
3) Construction of water diversion works;
4) Dredge or placer mining; and
5) Mineral or sand and gravel extraction within the stream bed.

Stream channel alterations shall be prohibited except those necessary to maintain and improve existing utilities, roadways, diversion works, fishery enhancement facilities and managed stream access facilities; for the maintenance of private property; and for public agencies to construct public access facilities and fishery enhancement facilities. In addition, new private stream access facilities may be allowed with Idaho Water Resource Board approval.

54. The South Fork Snake River possesses outstanding fish and wildlife values including unique, diverse cottonwood gallery forest, blue ribbon native trout fishery, and nesting and wintering bald eagles. Designate the South Fork Snake River from Palisades Dam to the Conant Valley power line as a state protected recreational river. The following activities should be prohibited on the recreational reach:

1) Construction or expansion of dams or impoundments;
2) Construction of hydro projects;
3) Construction of water diversion works;
4) Dredge or placer mining; and
5) Mineral or sand and gravel extraction within the stream bed.

Stream channel alterations shall be prohibited except those necessary to maintain and improve existing utilities, roadways, diversion works, fishery enhancement facilities and managed stream access facilities; for the maintenance of private property; and for public agencies to construct public access facilities and fishery enhancement facilities. In addition, new private stream access facilities may be allowed with Idaho Water Resource Board approval.

55. Designate the South Fork Snake River from Conant Valley power line to the Riley Diversion as a state protected natural river. The following activities should be prohibited on the natural reach:

1) Construction or expansion of dams or impoundments;
2) Construction of hydro projects;
3) Construction of water diversion works;
4) Dredge or placer mining;

5) Mineral or sand and gravel extraction within the stream bed; and
6) Alterations of stream bed.

56. Designate the South Fork Snake River from the Riley Diversion to the confluence with Henrys Fork as a state protected recreational river. The following activities should be prohibited on the recreational reach:

1) Construction or expansion of dams or impoundments;
2) Construction of hydro projects;
3) Construction of water diversion works;
4) Dredge or placer mining; and
5) Mineral or sand and gravel extraction within the stream bed.

Stream channel alterations shall be prohibited except those necessary to maintain and improve existing utilities, roadways, diversion works, fishery enhancement facilities and managed stream access facilities; for the maintenance of private property; and for public agencies to construct public access facilities and fishery enhancement facilities. In addition, new private stream access facilities may be allowed with Idaho Water Resource Board approval.

57. The principal threat to the future of the South Fork Snake River fishery is habitat quantity and quality. IDFG manages the entire South Fork Snake River as a wild trout fishery. Therefore, the river fishery depends on spawning access to tributaries, recruitment of juveniles back to the river, and survival of juveniles through the fall and winter period. If the river and tributary fisheries are to be maintained or improved to accommodate an increasing recreational demand, the following habitat-related objectives are needed :

- Ensure fish passage between the tributaries and main stem;
- Maintain or improve water quality;
- Provide adequate flows in the main stem and tributaries to support a healthy fish community;
- Protect and enhance riparian vegetation conditions;
- Install screens at diversions, where feasible;
- Install fish passage facilities at man-made barriers, where feasible;
- Protect riparian and riverine habitats from the following: construction or expansion of dams or impoundments; construction of hydropower projects; construction of water diversion works; dredge or placer mining; alterations of the stream bed; and mineral or sand and gravel extraction within the stream bed.

RIPARIAN MANAGEMENT

RM - WANT OR NEED:

Preserve riparian vegetation in developed areas.

SUGGESTED STRATEGIES:

1. Encourage homeowners to leave willows, cottonwoods and other native vegetation in place along the stream banks as opposed to manicured lawns, etc.

2. Zoning requirements should be imposed to prohibit removal of vegetation within a buffer zone along the river/streams, and prohibit construction in riparian areas.

3. Investigate the feasibility of floods for cottonwood regeneration of 30,000-40,000 cfs every 20 years. If impractical, promote planting of cottonwoods.

4. Give preservation of cottonwood forest an extremely high priority, because of its significance as an ecosystem.

5. Minimize construction of new roads in riparian corridor.

6. Discourage development on the floodplain.

7. Promote education of the importance of cottonwood regeneration.

8. Local authorities need to develop regulations to maintain native vegetation in riparian corridor (cottonwood areas), and streams and sloughs in their natural state. This may be accomplished by

limiting development and requiring developers or residences to be setback from the river so that they are not visible from the river.

9. Flood flows are not feasible for cottonwood regeneration. Protection of cottonwood vegetation should be achieved by regulation from local authorities and re-planting.

10. Plant cottonwoods in and around mature stands.

11. Fence all livestock from cottonwood forests and riverbanks.

12. Utilize a "flood stage" flow level of 35,000 + cfs every 10 years to flush the system and to encourage cottonwood regeneration.

13. Require flood insurance for new houses built in the 100-year floodplain to discourage construction in the riparian zone and to prevent damage to property during floods. It would also reduce the need for state-federal matching funds to save people who build in the floodplain.

14. Educate landowners about the opportunity to obtain loans and grants from the SWCDs (through the Idaho Soil Commission) for range and riparian improvements.

15. Delineate the zone of land affected by flows of 30,000 to 35,000 cfs needed to regenerate cottonwood. Prohibit development impacted by flooding in these zones.

16. Recommend to County Planning and Zoning Commissions that future development should only be permitted when located outside of sensitive areas, including river shorelines.

17. Provide tax incentives for leaving riparian areas undeveloped or improving riparian habitat.

18. The South Fork Snake River should be designated as a National Wild and Scenic River from Conant Valley to Black Canyon to preserve the cottonwood forest, considered one of the most ecologically important riparian area in Idaho.

19. All private property from Conant Valley to Black Canyon should be purchased to protect cottonwood forest.

20. Hire the services of experts in planting cottonwood to determine the feasibility and expense of planting.

21. Discourage construction in riparian zones to protect riparian habitat. Promote setbacks, conservation easements, and other appropriate legal techniques.

WILDLIFE

W - WANTS OR NEEDS:

Maintain wildlife habitat.

Recognize the value of waterfowl, wildlife habitat and birds of prey

Maintain basin ecological integrity.

SUGGESTED STRATEGIES:

1. River use should be limited or excluded in critical goose nesting areas during critical times (March through May) to prevent disturbance. The primary nesting areas would be Rainey Creek to Conant Valley and Heise Bridge to the Henrys Fork confluence.

2. Maintain river flows above 1500 cfs to benefit eagles by preventing ice buildup and enhancing food supply.

3. Control noxious weeds which displace native vegetation and reduce the productivity of the habitat. Promote biological control, as opposed to chemical control, to achieve these objectives and protect water quality. Educate landowners about this opportunity to control noxious weeds through the South Fork Biological Weed Control Committee.

4. Address grazing pressures from the elk herds.

5. Manage predators such as cougar, coyote, foxes, etc. to improve pheasant and quail populations.

6. For the main stem South Fork from Palisades Dam to the confluence with the Henrys Fork, maintain flows above 1,500 cfs during the fall and winter period (October 1 - March). Bald eagle productivity depends on the condition of birds following winter, as well as the foraging conditions during the nesting period, which begins on approximately February 1. The bald eagles that nest in the basin tend to winter on the South Fork. Winter low flows that lead to extensive ice-over for extensive periods of time reduce the productivity of nesting bald eagles during the summer following the low flows and extensive icing conditions.

7. Pritchard Creek and its supporting riparian habitat provides habitat for large numbers of big game. Designate Pritchard Creek as a state natural river from its source to the lower Targhee National Forest boundary. The following activities should be prohibited in the natural reach:

1) Construction or expansion of dams or impoundments;
2) Construction of hydro projects;
3) Construction of water diversion works;
4) Dredge or placer mining;
5) Mineral or sand and gravel extraction within the stream bed; and
6) Alterations of the stream bed.

8. Designate Pritchard Creek a state protected recreational river from the lower Targhee National Forest boundary to the confluence with the South Fork Snake. The following activities should be prohibited in the recreational reach:

1) Construction or expansion of dams or impoundments;
2) Construction of hydro projects;
3) Construction of water diversion works;
4) Dredge or placer mining; and
5) Mineral or sand and gravel extraction within the stream bed.

Stream channel alterations shall be prohibited except those necessary to maintain and improve existing utilities, roadways, diversion works, fishery enhancement facilities and managed stream access facilities; for the maintenance of private property; and for public agencies to construct public access facilities and fishery enhancement facilities. In addition, new private stream access facilities may be allowed with Idaho Water Resource Board approval.

9. Protect and enhance wildlife habitats, especially wetlands and big game winter ranges by minimizing development in these habitat areas. The main stem river corridor and adjacent lands are crucial winter habitat for many wildlife species. New developments in big game winter range would reduce the size of big game populations and the associated recreational hunting and observing opportunities.

10. Minimize impacts of livestock grazing, logging, road construction, and farming through implementation of best management practices.

11. The more rare species, or those of significance to users of the river corridor, should be given specific recognition, including the bald eagle, peregrine falcon, geese, moose, bears, elk, and cutthroat and brown trout.

12. Install information posters at the put-in to warn people about harassing or disturbing birds (especially bald eagles) and other wildlife.

13. Maintain a buffer zone of several hundred feet above highwater to maintain wildlife and waterfowl habitat.

14. Maintain CRP lands in grass cover to maintain important wildlife habitat.

15. The Idaho Water Resource Board should pursue a minimum streamflow of 1500 cfs during the winter for the main stem South Fork Snake River from Palisades Dam to the confluence with the Henrys Fork to maintain a healthy fishery, and for the benefit of wintering and nesting bald eagles.

16. Ecological integrity will be achieved by implementing actions to maintain water quality and limit development.

17. No development should be allowed in the canyon.

18. Designate canyon as Wild and Scenic River with all land being managed by the Forest Service and BLM.

RECREATION

R - WANTS OR NEEDS:

Maintain quality of the outdoor recreation experience.

Maintain quality of the fishing experience.

Adjust flows from Palisades Dam to be more favorable to the needs of the fishery, wildlife and recreation while accomplishing irrigation, flood control and power generation objectives.

Improve safety at the Big Feeder for boaters.

SUGGESTED STRATEGIES:

1. Maintain the current number of outfitters and legally outfitted trips on the South Fork Snake.

2. Establish zoning to address conflicts between motorized and non-motorized users.

3. Establish horsepower limits for motorized use.

4. Encourage proper boating etiquette.

5. Address law enforcement concerns in the Swan Valley and Irwin areas from increased recreation use.

6. Log dead and downed timber to prevent catastrophic fires in the future, and improve the recreation experience.

7. Prohibit jet skies on the South Fork Snake.

8. Allow outboard motors less than 100 HP

9. Recommend a no wake law for motors. Speed limited to 5 mph.

10. No private homes in the canyon section. The Federal government should make land exchanges for all private land in the canyon.

11. Do not improve the Snake River Road.

12. Restrict certain types of motorized crafts to designated segments of the river and/or to specified days of the week.

13. Legislation needs to be passed allowing heavier fines and strict enforcement of outfitter and guide regulations to prevent illegal outfitting. For example, allow confiscation of property in addition to monetary fines.

14. Restrict access to levees by recreationists. Maintain limited access between Heise and the Henrys Fork confluence at Twin Bridges, Labelle area, and Annis area.

15. Reconstruct bridges located on Rainey Creek washed out in the spring of 1984.

16. Provide additional parking and camping at Palisades Creek Campground.

17. Cress Creek offers one of the most impressive environmental education opportunities for the South Fork Snake River corridor, being a short driving distance from Idaho Falls. Designate Cress Creek as a state protected natural river along its entire reach. The following activities should be prohibited:

1) Construction or expansion of dams or impoundments;
2) Construction of hydro projects;
3) Construction of water diversion works;
4) Dredge or placer mining;
5) Mineral or sand and gravel extraction within the stream bed; and
6) Alterations of the stream bed.

18. The Idaho Water Resource Board should obtain a minimum streamflow for Cress Creek.

19. More enforcement people at the access points on the river.

20. Regulate general public on the river.

21. Limit motorized use to the reservoir. Only non-motorized use below Palisades Dam.

22. State of Idaho to administer a permit system that would give outfitters and guides no more than 50 percent of permits, and requiring limited number of permits for day use floaters.

23. Do not implement a permit system.

24. Limit number of boat launchings each hour during heavy use months (July).

25. Change the Outfitter and Guides Licensing Board rules to limit the use of out-of-state guides by outfitters to minimize illegal guiding.

26. Restrict development to 500 feet from the river bank.

27. Prohibit development in the canyon section (Conant to Black Canyon).

28. Agencies managing recreation should conduct a study to determine the physical and social recreation carrying capacity of the South Fork Snake River corridor.

29. Implement a program to help various recreation users resolve conflicts and learn to respect each other.

30. Determine how Lynn Crandall would impact the cutthroat fishery.

31. Determine if there is enough unappropriated water to justify Lynn Crandall.

32. Determine the demand for reservoir versus free-flowing river recreational experiences.

33. Determine the impacts to summer and wintering habitat for wildlife species if Lynn Crandall were proposed.

34. The entity undertaking measures to improve safety at the Big Feeder needs to consider minimum safety standards, and may assume responsibility for future liability and maintenance or upgrade.

35. Maintain the current number of developed river access points.

36. Maintain the Snake River Road at its current level of development. Allow only minor improvements for safety and maintenance.

DEVELOPMENT & GROWTH

D - WANTS OR NEEDS:

Minimize or prevent adverse effects from development along the river corridor, particularly the canyon.

Protect private property rights.

SUGGESTED STRATEGIES:

1. Limit development in the canyon to maintain wilderness qualities.

2. Do not allow visible development on canyon rim.

3. Place a moratorium on development along the river.

4. Establish a buffer zone several hundred feet from the highwater level.

5. Development should use best available management of its wastes. Eliminate septic/drain fields. All waste water should be transported out of the river valley for treatment. Or new secondary treatment should be required for all new development.

6. Encourage the practice of "conservation development" along the river corridor. Build as far from the river as possible, in the least sensitive areas, and do not remove vegetation along the river.

7. Development should be set back a minimum of 75 to 150 feet to protect aesthetic values. This buffer should include leaving the natural vegetation in place, unaltered.

8. Require subdivision/development applicants to provide a site-specific habitat conservation plan, including a plan to protect nesting and foraging bald eagles.

9. Permit development only if they are at least > ½ mile from bald eagle nests and not in identified principal management parcels.

10. Require developments to retain all trees along shorelines for fish and wildlife, including bald eagle perch and nesting trees.

11. Require sufficient construction setbacks from shorelines to protect visual values.

12. Require developments to retain sufficient native vegetation on shorelines (no mowing, burning, spraying, cutting, etc.) to protect shoreline stability, water quality, fish and wildlife habitat, and visual values.

13. Approve preliminary plats only after approved wetland mapping is complete.

14. Grant building permits only in uplands existing at the time of preliminary plat approval.

15. Permit clustering outside wetland and shoreline areas only.

16. Permit no further subdivision of platted lots.

17. Require developments to retain streams and streambeds (bridges only; no culverts or filling).

18. Permit future development when they are outside of sensitive areas, including river shorelines.

19. The option to build future water development projects should be preserved (for example Lynn Crandall/Burns Creek storage reservoir) .

20. The Palisade and Rainey Creek project placing irrigation water in a pipe, should only be considered if both creeks are developed jointly. There is normally not enough water in Rainey Creek during normal irrigation season to take care of the farmers, even with the reduced requirement, and still leave enough water to keep from drying up the creek. If the systems from both Rainey and Palisade creeks were tied together that would not be a problem.

21. The main stem and important tributaries should be protected from water storage projects and hydropower generation projects.

22. Provide additional storage in the Upper Snake to store water in high water years.

23. Establish cooperative agreements with landowners along the river to help protect resource values.

24. Require public comment for all proposed changes in land and water use associated with the South Fork Snake River corridor.

AGENCY INVOLVEMENT & MANAGEMENT DIRECTION

AM - WANTS OR NEEDS:

Management decisions should use the best available science.

Improve agency coordination in managing the resources in the South Fork Snake River basin.

SUGGESTED STRATEGIES:

1. Manage the river according to the direction established in the *Snake River Activity and Operations Plan.*

2. State agencies should coordinate with the U.S. Bureau of Reclamation, debating state rights versus federal rights will not resolve issues.

3. Support implementation of the Bonneville Power Administration's wildlife mitigation plan.

4. Establish a group to coordinate with landowners and agencies, and to resolve conflicts.

5. Form a watershed council for the South Fork Snake River basin.

6. Based on the evaluation of outstanding resource values identified in the South Fork Snake basin. Designate the following reaches as state protected rivers:

- Bear Creek, headwaters to Palisades Reservoir;
- Big Elk Creek and headwaters, state line to Palisades Reservoir;
- Burns Creek, headwaters to South Fork Snake River;
- Cress Creek, headwaters to its sinks;
- Dry Canyon, mouth of Waterfall Canyon to Palisades Creek (includes Upper Palisades Lake);
- Fall Creek, headwaters to South Fork Snake River;
- Indian Creek (reservoir trib) and headwaters, state line to South Fork Snake River;
- Indian Creek (main stem trib), headwaters to South Fork Snake River;
- McCoy Creek, headwaters to Palisades Reservoir;
- Palisades Creek, headwaters to South Fork Snake River;
- Pine Creek, headwaters to South Fork Snake River;
- Pritchard Creek, headwaters to South Fork Snake River;
- Rainey Creek, headwaters to South Fork Snake River;
- South Fork Snake River, state line to Henrys Fork confluence; and
- Waterfall Canyon, headwaters to Dry Canyon Creek confluence.

7. Evaluate and protect as state protected rivers the following stream reaches:

- Warm Springs (tributary near Burns Creek), headwaters to South Fork Snake River;
- Little Elk Creek, headwaters to Palisades Reservoir;
- Wolverine Creek, headwaters to South Fork Snake River;
- Black Canyon Creek, headwaters to South Fork Snake River
- Trout Creek, headwaters to Palisades Reservoir.

WATER QUANTITY AND ALLOCATION

WA - WANTS OR NEEDS:

Maintain a balance between all water users.

Change water law to allow greater flexibility in allocating water to different uses and address the changing demands for water in the basin and state.

SUGGESTED STRATEGIES:

1. Buy existing water rights from canal companies that have lost farms due to development.

2. Establish policy for water spreading. (Additional water is being supplied to previously irrigated acres because conversion of flood to sprinkler irrigation has made additional water available.)

3. Water from Idaho should not be used for "flow augmentation" to flush salmon smolts. Successful outmigration of salmon smolts requires that conditions in the lower Snake and Columbia Reservoir system be essentially river-like and not lake-like. These conditions cannot be achieved without substantial drawdowns of these reservoirs in the lower Snake and Columbia rivers.

4. Restrict pumping from the aquifer to compensate for reduced irrigation water from the Snake River.

5. Make water available for instream flows by changing water law to encourage water conservation, or allowing changes from consumptive uses (irrigation) to non-consumptive instream uses.

6. Establish priorities for the use of water during low water years between the different uses -- irrigation is first (by law) down to a minimum streamflow; then fisheries and water quality take priority; fisheries have priority over recreation.

7. Investigate current aquifer recharge policy and establish clear objectives for the recharge program. Determine appropriate areas in the Snake River Plan aquifer to apply recharge water to accomplish these objectives.

8. Prevent purchase of water rights where change in use may interfere with current uses.

9. Transfer storage rights from Palisades Reservoir to ground water rights.

10. Water management policy should consider the effects of these policies and protect downstream users of water, including users outside the basin.

11. Increase instream flows by giving incentives to water rights holders to be more efficient, i.e., allow water right holder to keep 50 percent of the water that he saves by using more efficiently his water. The other 50 percent would be required to go to instream use.

12. Recommend that the law be changed to allow transfers on a voluntary basis.

OPERATION OF PALISADES RESERVOIR

PR - WANT OR NEED:

Adjust flows and timing from Palisades Reservoir to meet the needs of irrigators, flood management, private property owners, fisheries, wildlife, cottonwood regeneration, and recreation.

SUGGESTED STRATEGIES:

1. Release water early enough from Palisades and Jackson to keep the flow less than 18,000 cfs during July.

2. Provide high enough flows to regenerate cottonwood in April and May during years when high runoff is expected. The flows could be short in duration and at a safe controlled level -- less than one week at 30,000.

3. Reexamine the flood control curves used to determine releases in the Upper Snake projects. Calculate new flood control curves integrating flows needed for fisheries, recreation, and wildlife and riparian habitat, in addition to irrigation and flood control.

4. Improve communication of current and planned water releases from the Upper Snake to all water users by establishing a prerecorded message accessible to the public.

5. Water accounting response needs to be improved to allow communication and action on weekends.

6. Develop a predictive model that regulates changes in river flows based on precipitation records for the year and biological needs of fish (spawning and winter minimum flows). Regulate the changes to minimize impacts on life cycles of the resident fish population.

7. Adjust flows from the Dam to meet the needs of the fish. Maintain a minimum flow from the Dam established by comparing 10-15 percent of the mean annual flow with minimum streamflow studies conducted by IDFG. Support irrigation needs as long as minimum flow is maintained.

8. Work on any and all compromises to achieve flow rates to better balance wildlife needs.

9. Provide flow releases from Palisades Dam of at least 1,500 cfs during fall and winter for fishery.

10. Establish ramping rate protocols for normal Palisades Dam operation.

11. When sufficient water is available, provide periodic releases from Palisades Dam of sufficient amount and duration to facilitate cottonwood seedling establishment to perpetuate the stands.

12. Manage reservoir levels to avoid large flow increases immediately before, or during, the fishing opener and 4th of July weekends.

13. Manage Palisades flows and Big Feeder diversions to maintain adequate flows in the South Fork below the Big Feeder.

14. Maintain Palisades Reservoir at a level adequate to absorb the 50-100 year flood without increasing the river flow rates above 100-150 percent of the annual mean average flow.

15. Many consider it feasible to develop 75-90 percent of the mean annual flow of a river (Clark, Viessman, and Hammer). The minimum streamflow should be defined as 10-25 percent of the mean annual flow; however, this value needs to be confirmed by actual basin data. The minimum flow should be maintained and not decreased unless severe drought conditions exist for extended periods. The volume of flow may be increased under flood conditions.

16. When sufficient water is available, manage Palisades releases to improve Canada goose nesting success: 8,000 to 16,000 cfs releases during the nesting season (March-May). The recommended flow reduces predator access to nesting islands, while preventing inundation of the important islands. Parker (1973) and DeShon (1976, 1977, 1978) found a significant reduction in nest attempts and success at flows $<5,000$ cfs; and they found significant nesting island inundation at flows $>18,000$ cfs. The recommended consistent high flows cause Canada geese to initiate nesting far enough uphill to reduce their vulnerability to nest flooding later during their nesting attempt.

IRRIGATION

I - WANT OR NEED:

Improve irrigation efficiency to make water available for instream flows.

SUGGESTED STRATEGIES:

1. Determine the availability of water from transfer of irrigated land to other uses.

2. Pursue and establish a policy about water spreading.

3. Provide incentives to convert from flood irrigation to sprinkler and/or lining of ditches and canals.

4. Quantify how improved efficiency effects aquifer recharge, and flows at wells and springs.

FLOOD MANAGEMENT

FM - WANT OR NEED:

Address future flood management in the South Fork Snake River basin, including the future of levees below Heise.

SUGGESTED STRATEGIES:

1. Raise levees to accommodate recommended flows for cottonwood regeneration.

2. Areas currently protected by levees should remain free of residential development or significant structures.

3. Reassess the 100-year floodplain and delineate it based on current operation of the Upper Snake projects.

4. Prohibit construction of new or expansion of existing levees and dikes along South Fork Snake River which will constrict the river, reduce the floodplain, lead to more severe flooding downstream, further encroachment on the floodplain by development, and impact wildlife and aesthetic values.

5. Increased flood control will also accelerate the rate of loss of the cottonwood community.

6. Prior to permitting additional dikes, levees, and riprap projects, the situation on the South Fork Snake River in Wyoming should be understood, and it should be avoided on the South Fork in Idaho. (Fish and wildlife habitat, and associated recreational opportunities, may be permanently degraded as a result of dikes, levees, and riprap projects.)

7. Release flood flows from Palisades Dam as necessary to re-establish wetlands in areas that

have been converted to uplands as a result of flood control.

8. Study options to address the high water table and flooding concerns in Ririe and surrounding areas.

9. Survey from the dam to confluence with Henrys Fork to delineate the highwater mark and floodplain.

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